

**University of Southampton**

**Business and Law School**

**Exploratory Study of Strategic Visionary Management of  
Innovation, Research and Technology Parks Affiliated with  
Universities**

**By**

**Reem Helmi Turkey**

**Thesis for the Degree of Doctorate in Business Administration**

**October 2019**

**University of Southampton**

**Abstract**

**Business and Law School**

**Thesis for the Degree of Doctorate in Business Administration**

**Explanatory study of Strategic Visionary Management of Innovation, Research  
and Technology Parks Affiliated with Universities**

**Reem Helmi Turkey**

There are substantial literature reviews on Research and Technology Parks' (RTPs) governance model and the measurement of its performance and growth rate. However, only limited studies have been conducted on RTPs in Middle Eastern Countries, and there is a paucity of literature on the case of RTPs in the Kingdom of Saudi Arabia (KSA). Nevertheless, no research has investigated the relationship between the RTP's governance model and its performance and growth. Therefore, this thesis aims to empirically test the relationship between RTPs' governance and strategic model and RTPs' growth performances by examining the performance improvement of RTPs affiliated with universities. The thesis investigates key questions regarding the RTP's strategic visionary management model in the context of KSA by adopting Cabral-Dahab science parks management paradigm, Triple-helix theory, and the literature review on the measurement of RTPs' performance and evaluation of growth rate:

- 1) Is there a correlation between RTPs' governance and the growth rate and performance of the park?
- 2) What are the different strategies and business management models adopted by successful RTPs?

By utilising a pragmatic research philosophy using the mixed-methods approach to test the relationship between the governance model and its performance and growth rate using questionnaires. In addition to multiple cases studies strategy from three RTPs in the KSA and adopting semi-structured interviews with main stakeholders of the RTPs such as 1) RTPs' CEOs, 2) RTP's tenants' firms, 3) entrepreneurs and 4)

Policymakers, the thesis explores how the RTPs' governance models satisfy the strategic visionary management of the parks and increased the performance growth rate of the parks by benchmarking the case studies with international RTPs to identify the combination of the different successful business and strategic models. It then proposed a new customised strategic management model for the primary case study RTPKEID and listed the expected benefits for RTPKEID of adopting the new model.

The thesis presents seven main findings: First, it presents how the governance of quality of services provided to tenants' firms in RTPs vary based on RTP's governance model, showing that the Triple-helix and non-profit governance models are the top in providing the tenants' firms located on-park with high-quality services due to the flexible governance and autonomy of these two models.

Second, it benchmarks international RTPs in the aspects of a) Governance model, b) Commercialisation, c) Performance measurement, and d) Entrepreneurship. The findings of each aspect vary based on the RTP's governance model; for example, the governance model of the company with the 'Triple-helix' RTP is the most flexible and adaptable to change due to the variety of stakeholders with shared goals. On the other hand, the performance measurement in 'company with capital share' and 'non-profit' RTPs are significantly stronger than the other RTPs since 'company with capital share' RTP concentrates on the financial impact, while 'non-profit' concentrates on providing an impact on the local/regional economy. Third, it analyses the relationship between the RTPs' governance models and performance and growth rate of the RTPs among the six identified governance models and shows that the RTP with highest performance and growth rate goes to RTPs with flexible management and governance policies, such as 'Triple-helix' and 'non-profit'.

Fourth, it develops a strategic visionary management model of RTPKIED innovation and economic development department.

Fifth, it proven that the closer the linkage between the universities with RTPs, the highly impacted RTP's strategy with the associated university's strategy, such as: quality of tenants' firms' services, value proposition /attraction to tenants' firms, commercialisation, funding sources, globalisation, stakeholders, financial performance, complexity of changes in governance /management models, complexity of research confidentiality, entrepreneurship.

Sixth, it set the basis for the National-level of RTPs' governance model and RTPs' performance measurement in the KSA and proposed national the funding model for the KSA will boost the Saudi economy.

Finally, the findings show that despite the general agreement on the consortium governance model, it is difficult to change the governance model to a legal format.



# TABLE OF CONTENTS

<b>LIST OF TABLES</b> .....	<b>x</b>
<b>LIST OF FIGURES</b> .....	<b>xii</b>
<b>GLOSSARY</b> .....	<b>xv</b>
<b>DECLARATION OF AUTHORSHIP</b> .....	<b>xvi</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>xvii</b>
<b>CHAPTER 1: INTRODUCTION</b> .....	<b>1</b>
1.1. Research Aim .....	1
1.2. Research Objectives .....	2
1.3. Significance of the Research Topic .....	4
1.4. Structure of the Thesis .....	6
<b>CHAPTER 2: LITERATURE REVIEWS</b> .....	<b>9</b>
2.1. Introduction .....	9
2.1.1. Background on Research and Technology Parks .....	9
2.1.2. Emergence of Research Parks.....	11
2.1.3. Employing the Knowledge-based Economy, and Research Parks to Foster the Economic Development in the KSA.....	14
2.2. The Literature on the Knowledge-based Economy .....	16
2.3. The Literature on Different Management Models and Performance Growth Rate of Research Parks.....	18
2.3.1 Governance Models of Research Park and its Relationship to Growth Rate.....	19
2.3.2 Research Park Performance Evaluation.....	22
2.3.3 Factors that Impact Research Parks' Growth Rates .....	24
2.4. Strategic Management Models of Different Research Parks.....	29
2.5. Conclusion and Literature Gaps .....	31
2.5.1. Theoretical Base of the Research Study .....	31
2.5.2. Literature Gaps.....	35
2.5.3. Research Questions.....	38
2.5.4. The most Common Elements within RTPs' Successful Strategic and Business Models .....	38
2.5.5. Conclusion .....	39

<b>CHAPTER 3: RESEARCH PHILOSOPHY .....</b>	<b>42</b>
3.1 Introduction .....	42
3.2 Philosophical Approach .....	43
3.3 Research Philosophy.....	45
3.3.1 Pragmatism Approach .....	46
3.3.2 Ontological Approach.....	47
3.3.3 Epistemological Approach .....	47
<b>CHAPTER 4: RESEARCH METHODOLOGY.....</b>	<b>50</b>
4.1 Introduction .....	50
4.2 Methodological Approach (Mixed Methods) .....	52
4.2.1. Quantitative Research .....	54
4.2.2. Qualitative Research.....	55
4.3. Case Study Research Design.....	55
4.4. Influences on the Research Design Method and Theoretical Assumptions .....	56
4.4.1 Rationale for Case Study .....	57
4.4.2. Cases Selection.....	59
4.4.3. Unit of Analysis .....	60
4.5. The Research Strategies .....	60
4.5.1. Multiple-case studies .....	60
4.6. The Methods of Data Collection .....	63
4.6.1 Documentary Analysis.....	71
4.6.2. Direct Observations .....	72
4.6.3. Survey Research Questionnaire and Variables' Analysis .....	72
4.6.5. Semi-structured Interviews .....	72
4.6.5. Sampling Strategy and Participants .....	73
4.6.5.1. Survey Participants.....	74
4.6.5.2. Interview Participants .....	74
4.6.5.3. Critical Case Sampling.....	75
4.6.6. Pilot Interviews.....	75
4.7. Ethical Considerations .....	76
4.8. Conclusion .....	77
<b>CHAPTER 5: DATA ANALYSIS, DATA COLLECTION, AND CASE STUDIES'</b>	
<b>OVERVIEWS .....</b>	<b>79</b>
5.1. Introduction .....	79

<b>5.2. Data Analysis .....</b>	<b>79</b>
<b>5.3. Interviews and Data Collection Summary .....</b>	<b>82</b>
<b>5.3.1. Data Collections Timeline.....</b>	<b>82</b>
<b>5.3.2. Sample Size and Response Rate .....</b>	<b>83</b>
<b>5.3.3. Coding Technique.....</b>	<b>84</b>
<b>5.4. Case-studies' Overviews .....</b>	<b>84</b>
<b>5.4.1. Background about the Kingdom of Saudi Arabia, Western and Eastern Regions, and Jeddah Province.....</b>	<b>85</b>
<b>5.4.2. RTPMWC Case Study.....</b>	<b>85</b>
<b>5.4.2.1. Introduction to the Associated University.....</b>	<b>85</b>
<b>5.4.2.2. Introduction to the RTPMWC.....</b>	<b>86</b>
<b>5.4.2.3. RTPMWC Research Areas .....</b>	<b>86</b>
<b>5.4.2.4. RTPMWC's Innovation Value Chain, Stakeholders, and Services .....</b>	<b>87</b>
<b>5.4.2.5. RTPMWC's Governance Structure and Model .....</b>	<b>92</b>
<b>5.4.2.6. RTPMWC's Start-ups' Model and Best Practices.....</b>	<b>94</b>
<b>5.4.2.7. RTPMWC's Performance Measurements.....</b>	<b>97</b>
<b>5.4.2.8. Conclusion on RTPMWC's Case Study .....</b>	<b>98</b>
<b>5.4.3. RTPDVC Case Study.....</b>	<b>99</b>
<b>5.4.3.1. Introduction about the Associated University .....</b>	<b>99</b>
<b>5.4.3.2. Introduction about the RTPDVC.....</b>	<b>99</b>
<b>5.4.3.3. RTPDVC Research Areas .....</b>	<b>100</b>
<b>5.4.3.4. RTPDVC's Innovation Ecosystem.....</b>	<b>103</b>
<b>5.4.3.5. RTPDVC's Governance Structure and Strategic Model.....</b>	<b>104</b>
<b>5.4.3.6. RTPDVC's Large-corporate Model.....</b>	<b>106</b>
<b>5.4.2.7. RTPDVC's Performance Measurements .....</b>	<b>107</b>
<b>5.4.3.9. Conclusion on RTPDVC's Case Study .....</b>	<b>108</b>
<b>5.4.4. KRIED Case Study .....</b>	<b>109</b>
<b>5.4.4.1. Introduction to the Associated University.....</b>	<b>109</b>
<b>5.4.4.2. Introduction about KRIED and its Collaboration Model .....</b>	<b>110</b>
<b>5.4.4.1. KRIED Research Areas .....</b>	<b>112</b>
<b>5.4.4.1.1 Biological and Environmental Science and Engineering, Bioscience.....</b>	<b>113</b>
<b>5.4.4.1.2. Computer, Electrical and Mathematical Science and Engineering.....</b>	<b>113</b>
<b>5.4.4.1.3. Physical Science and Engineering, Chemical and Biological Engineering</b>	<b>113</b>
<b>5.4.4.2. KRIED Objectives .....</b>	<b>113</b>
<b>5.4.4.3. The Current Problems facing KRIED from the Perspectives of KRIED's Different Departments .....</b>	<b>114</b>

5.4.4.3.1. Entrepreneurship Centre .....	114
5.4.4.3.2. Investment Funds.....	117
5.4.4.3.3. Technology Transfer Office .....	120
5.4.4.3.4. Industry Liaison and Engagement Office .....	121
5.4.4.3.5. Tenants' Firms' Affairs.....	123
5.5. Conclusion .....	123
<b>CHAPTER 6: ANALYTIC STRATEGY AND DATA ANALYSIS .....</b>	<b>126</b>
6.1. Introduction .....	126
6.2. Analytic strategy .....	126
6.3. Qualitative Data Analysis Structure.....	127
6.4. Use of NVivo software for Qualitative Data Analysis.....	131
6.5. Qualitative Data Analysis Coding .....	131
6.5.1. Data Summarisation and Reduction .....	133
6.5.2. Data Categorisation .....	134
6.5.3. First-level Coding.....	134
6.5.4. Second-level Coding (Patterns Coding) .....	136
6.5.5. Third-level Coding.....	137
6.6. Conclusion .....	138
<b>CHAPTER 7: BENCHMARKING STRATEGIC MANAGEMENT MODELS OF SUCCESSFUL RESEARCH AND TECHNOLOGY PARKS TO CREATE A FRAMEWORK FOR A STRATEGY MODEL FOR KRIED .....</b>	<b>140</b>
7.1. Introduction .....	140
7.2. The Analysis of the Benchmarking Results .....	141
7.2.1. The Advantages and Disadvantages of Different RTPs' Governance Models ..	141
7.2.1.1. The Perspectives of RTPs' CEOs Regarding 'Triple-helix' RTP's Governance Model...141	
7.2.1.2. The Perspectives of RTPs' CEOs Regarding 'Under University Structure' RTP's Governance Model.....	148
7.2.1.3. The Perspectives of RTPs' CEOs Regarding 'Non-Profit' RTP's GovernanceModel .....	154
7.2.1.4. The Perspectives of RTPs' CEOs Regarding 'Company with Capital Share' RTP's Governance Model.....	155

7.2.1.5. The Perspectives of RTPs' CEOs Regarding 'Company Owned by the University' RTP's Governance Model .....	156
7.2.1.6. The Perspectives of RTPs' CEOs Regarding 'Government/Free Zone' RTP's Governance Model .....	157
7.2.1.7. The Commercialisation Policies and Processes of Different RTPs' Governance Models .....	159
7.4. Conclusion .....	163
<b>CHAPTER 8: QUANTITATIVE DATA ANALYSIS.....</b>	<b>163</b>
8.1. Introduction .....	163
8.2. Quantitative Research Methodology.....	164
8.3. Quantitative Sample Design .....	164
8.4. Survey Design .....	165
8.5. Correlation Analysis Using SPSS .....	167
8.5.1. Correlation between RTP Governance Model and number of Operational Tenants on-park.....	168
8.5.2. Correlation between RTP Governance Model and number of Start-ups on-park	171
8.5.3. Correlation between RTP Governance Model and RTP's Average Growth Rate per RTP's Governance Model .....	175
8.5.4. Correlation between RTP Governance Model and Average Growth Rate of RTP's Tenants' Firms .....	180
8.5.5. Correlation between RTP Governance Model and Average Growth Rate of Start-Ups	184
8.5.6. Correlation between RTP Governance Model and Number of IPs Licensed.....	187
Figure 8.5.7-1: Correlation between RTP Governance Model and RTP's Collaborations on Strategic or Operational Levels .....	191
8.6. Descriptive Statistics Generated from the Questionnaire.....	195
8.7. Correlation Analysis Using NVivo.....	201
8.8. Conclusion .....	208
<b>CHAPTER 9: QUALITATIVE DATA ANALYSIS DISPLAY .....</b>	<b>211</b>
9.1. Introduction .....	211
9.2. Analysis of RTPs' Directors' Data.....	211
9.2.1. The Goal of the RTP .....	213
9.2.2. The Background of the RTPs .....	215

9.2.3. The Technology Fields of the RTPs .....	218
9.2.4. The Governance Models of the RTPs .....	222
9.2.5. The Funding Sources of the RTPs .....	227
9.2.6. The Services Provided by the RTPs .....	230
9.2.7. The Performance Measurements and Growth Rate of the RTPs .....	233
9.2.8. The Relationship between the Park’s Governance Model and the Park’s Growth Rate from Qualitative Perspective .....	240
9.2.8.1. Summary of RTPs’ CEOs’ Perspectives regarding the Relationship between the Park’s Governance Model and the Park’s Growth Rate According to the RTP’s Governance Model .....	245
9.2.9. The Benefits that can be gained from changing the RTP’s Governance Model in case of “Part of the university’s structure” .....	264
9.2.10. The Problems of the Solo-governance Model of RTP .....	265
9.2.11. The Various Strategic and Management Model of RTPs .....	267
9.3. Qualitative Data Analysis of RTPs’ Tenants’ Firms’ Directors.....	272
9.3.1. The Attractions to locate on-Park .....	274
9.3.1.1. The Attractions for Large-scale Tenants’ Firms .....	274
9.3.1.2. The Attractions to Academic Spin-off and Entrepreneurs’ Tenants.....	275
9.3.2. The Collaboration with RTPs.....	275
9.3.2.1. The Collaboration between the RTPs and the Large-Scale Tenants’ Firms... ..	275
9.3.2.2. The Collaboration between the RTPs and Academic Spin-off and Entrepreneurs’ Tenants .....	277
9.3.3. The Access to the RTPs’ and Associated University’s Services .....	277
9.3.3.1. The Access to the RTPs’ and Associated University’s Services from the Perspectives of the Large-Scale Tenants’ Firms .....	277
9.3.3.2. The Access to the RTPs and Associated University’s Services from the Perspectives of Academic Spin-off and Entrepreneurs’ Tenants.....	278
9.3.4. The Impact of the RTPs’ Strategic Model on the Performance of the Tenants’ Firms	279
9.3.4.1. The Impact of the RTPs’ Strategic Model on the Performance of the Large-Scale Tenants’ Firms .....	279
9.3.5. The Collaboration between the RTPs’ Associated University, Other Tenants’ Firms located on-Park, and Entrepreneurs .....	280
9.3.6. The Shortcoming of the RTPs .....	281
9.4. Qualitative Data Analysis of Saudi’s Policymakers .....	285

9.4.1. The Challenges of RTPs' Governance in Saudi Arabia from the Perspectives of Policymakers.....	285
9.4.2. Policymakers' Perspectives and Recommendations towards RTPs' Governance as part of Saudi Vision 2030.....	287
9.5. Data Analysis of RTPs' Associations .....	290
9.6. Conclusion .....	293
CHAPTER 10: DATA FINDINGS AND CONCLUSIONS .....	296
10.1. Introduction .....	296
10.2. RTP Services Categories.....	296
10.2.1 Governance of Quality of Services Provided to Tenants' Firms in RTPs based on RTP's Governance Model.....	297
10.3. RTP Proposed Funding Model for RTPs in the KSA.....	299
10.4. The Impact of University's Strategy on the RTP's Strategy and Performance	302
10.4.1. Financial Performance.....	305
10.4.2. Collaboration, Partnerships, and Funding Sources .....	305
10.4.3. Quality of Tenants' Firms' Services .....	306
10.4.4. Value Proposition and Attraction to Tenants' Firms.....	306
10.4.5. Stakeholders.....	307
10.4.6. Commercialisation .....	308
10.4.7. Entrepreneurship .....	309
10.4.8. Complexity of Research Confidentiality .....	309
10.4.9. Complexity of Changes in Governance and Management Models .....	310
10.4.10. Globalisation .....	311
10.5. Factors influencing RTPs' Governance Change.....	311
CHAPTER 11: DISCUSSION .....	313
11.1. Introduction .....	313
11.2. The Proposed Strategic Visionary Governance and Management Model for KRTPIED .....	313
11.2.1. Development of Specific Skills in Young Generation.....	316
11.2.2. Develop RTPKIED's Strategic and Business Model .....	316
11.2.3. Cooperation with the City Authorities to Enhance Infrastructure and Transportation to the Park .....	318
11.2.4. Partnership with External Incubators and Co-Working Spaces.....	318
11.2.5. Enhance Spaces and Services for Off-Park Entrepreneurs .....	319

11.2.6. Bridging the gap between Entrepreneurs, Government, and Scientific Communities .....	319
11.2.7. Introduce more Flexibility to RTPKIED Governance Policies .....	320
11.2.8. Establish a Solid Framework on Management of Performance Measurement for RTPKIED and the Tenants' Firms .....	320
11.2.9. Improve the Services and Attraction to Tenants' Firms .....	321
11.2.10. Improvement of the National Policies and Governance of RTPs .....	321
11.2.11. Introduce Revenue Generation Channels in RTPKIED Business Model .....	322
CHAPTER 12: CONCLUSION.....	323
1.1 Introduction .....	323
12.2. Research Aim .....	323
12.3. Contribution to Theory and Practice .....	324
12.3.1 Contribution to Cabral-Dahab Science Park Management Paradigm.....	324
12.3.2 Contribution to the Triple-helix Model Theory .....	328
12.4. Limitations and Risks .....	328
12.5. Further Research .....	330
APPENDIX A: RTPS' DIRECTORS QUESTIONNAIRE .....	334
APPENDIX B: RTPS' TENANTS' FIRMS QUESTIONNAIRE .....	343
APPENDIX C: INTERVIEW WITH RTPS' DIRECTORS .....	347
APPENDIX D: INTERVIEW WITH RTPS' TENANTS' FIRMS .....	348
APPENDIX E: INTERVIEW WITH RTPS' ASSOCIATIONS .....	349
APPENDIX F: INTERVIEW WITH POLICYMAKER.....	351
APPENDIX G: LIST OF RTPS' SERVICES.....	353
APPENDIX H: LIST OF RTPS' KEY PERFORMANCE INDICATORS .....	356
APPENDIX I: LIST OF COUNTRIES PARTICIPATED IN THE RESEARCH STUDY .....	374
APPENDIX J: RTP VISION REALISATION COMPONENTS AND SUB COMPONENTS	375
APPENDIX K: ERGO FORMS: UNIVERSITY OF SOUTHAMPTON.....	379
(RISK ASSESSMENT FORM).....	379
APPENDIX L: ERGO FORMS: RESEARCH PROJECT CONSENT .....	385
APPENDIX M: ERGO FORMS: DEBRIEFING FOR RTPS DIRECTORS.....	386
APPENDIX N: ERGO FORMS: PARTICIPANT INFORMATION SHEET .....	389
APPENDIX P: APPROVAL OF QUESTIONNAIRE DISTRIBUTION .....	392
APPENDIX Q: POSTING THE RESEARCH QUESTIONAINNE AT AURP .....	393
APPENDIX R: TABLE 27 .....	394



<b>APPENDIX S: TABLE 28 .....</b>	<b>421</b>
<b>APPENDIX T: CODED IN NVIVO .....</b>	<b>439</b>
<b>LIST OF REFERENCES.....</b>	<b>452</b>

## LIST OF TABLES

TABLE 1: CATEGORISATION OF NUMBER OF RTPS INTERVIEWED -----	82
TABLE 2: TIMELINE OF RESEARCH PROJECT -----	83
TABLE 3: THE FIGURES OF RTPMWC'S PERFORMANCE MEASUREMENTS -----	97
TABLE 4: THE ENTREPRENEURIAL PROGRAMME OF DIFFERENT RTPS' GOVERNANCE MODELS -----	157
TABLE 6: BIVARIATE CORRELATION BETWEEN RTP'S GOVERNANCE MODEL AND THE NUMBER OF OPERATIONAL TENANTS ON-PARK -----	168
TABLE 7: PERCENTAGE AND NUMBER OF OPERATIONAL ON-PARK TENANTS ACCORDING TO RTP'S GOVERNANCE MODEL -----	169
TABLE 8: BIVARIATE CORRELATION BETWEEN THE GOVERNANCE MODEL AND THE NUMBER OF START-UPS ON-PARK USING CHI-SQUARE TESTS -----	172
TABLE 9: PERCENTAGE OF START-UPS ON-PARK ACCORDING TO RTP'S GOVERNANCE MODEL CROSS TABULATION -----	173
TABLE 10: PERCENTAGE OF START-UPS ON-PARK ACCORDING TO RTP'S GOVERNANCE MODEL USING CHI-SQUARE TESTS -----	176
TABLE 11: PERCENTAGE OF RTP'S GROWTH RATE ACCORDING TO RTP'S GOVERNANCE MODEL CROSS TABULATION -----	177
TABLE 12: AVERAGE GROWTH RATE OF RTP'S TENANTS' FIRMS ACCORDING TO RTP'S GOVERNANCE MODEL USING CHI-SQUARE TESTS -----	180
TABLE 13: CORRELATION BETWEEN AVERAGE GROWTH RATE OF RTP'S TENANTS' FIRMS AND RTP FUNDED BY THE PRIVATE SECTOR -----	181
TABLE 14: CORRELATION BETWEEN RTP'S GOVERNANCE MODEL AND AVERAGE GROWTH RATE OF TENANTS' FIRMS CROSS TABULATION -----	182
TABLE 15: BIVARIATE CORRELATION BETWEEN RTP'S GOVERNANCE MODEL AND AVERAGE GROWTH RATE OF START-UPS USING CHI-SQUARE TESTS -----	184
TABLE 16: PERCENTAGE AND COUNTS OF AVERAGE GROWTH RATE OF START-UPS ON- PARK CROSS TABULATION -----	185
TABLE 17: SPEARMAN CORRELATION BETWEEN THE GOVERNANCE MODEL AND THE NUMBER OF IP LICENSES -----	187
TABLE 18: PERCENTAGE AND COUNT OF AVERAGE GROWTH RATE OF IPS LICENCES ACCORDING TO RTP'S GOVERNANCE MODEL CROSS TABULATION -----	189
TABLE 19: SPEARMAN CORRELATION BETWEEN RTP'S GOVERNANCE MODEL AND THE NUMBER OF IP LICENSES -----	191
TABLE 20: GOVERNANCE MODEL OF RTP AGAINST RTP'S COLLABORATIONS ON STRATEGIC OR OPERATIONAL LEVELS CROSS TABULATION -----	193
TABLE 22: GOVERNANCE DEFINITIONS AS INTERPRETED FROM THE INTERVIEW TRANSCRIPTS -----	225

TABLE 23: THE DIFFERENT FUNDS SOURCES PROVIDED TO RTPS IN DIFFERENT STAGES OF THEIR LIFE CYCLE -----	228
TABLE 24: CLASSIFICATIONS OF RTPS' SERVICES AS INTERPRETED FROM THE INTERVIEW TRANSCRIPTS-----	231
TABLE 26: NUMBER OF RTPS' CEOS' OPINIONS IN THE RELATIONSHIP BETWEEN THE RTP' GOVERNANCE AND RTP'S GROWTH CATEGORISED BY RTP GOVERNANCE MODEL --	242
TABLE 29: THE IMPACT OF UNIVERSITY'S STRATEGY ON THE RTP'S STRATEGY AND PERFORMANCE -----	304
TABLE 30: RTP'S STAKEHOLDERS AND THEIR INTERESTS-----	307
TABLE 31: THE COMPARATIVE ANALYSIS FOR THE DEGREE OF RELEVANCE TO THE THREE CASE STUDIES-----	326
TABLE 25: THE IMPORTANCE OF EACH PERFORMANCE MEASURES FOR THE VARIOUS RTP'S GOVERNANCE MODEL-----	356
TABLE 27: RTPS' CEOS' OPINIONS IN THE RELATIONSHIP BETWEEN THE RTP'S GOVERNANCE AND RTP'S GROWTH AND THEIR PERSPECTIVE ON GOVERNANCE DEFINITION-----	394
TABLE 28: SUMMARY OF RTPS' STRATEGIC MODELS INTERPRETED FROM INTERVIEWS TRANSCRIPT-----	421

## LIST OF FIGURES

FIGURE 1. 1: CONCEPTUAL COMPONENT OF THE STRATEGIC MODEL FOR RTPKEID	3
FIGURE 2. 1: THE RELATIONSHIP BETWEEN THE BETWEEN CABRAL-DAHAB, RTPS' GOVERNANCE MODELS AND THE RTPS' PERFORMANCE MEASUREMENT	21
FIGURE 2. 2: COMBINING TWO THEORIES AND LITERATURE REVIEW LEADING TO FINAL OUTPUT OF THE RESEARCH STUDY	32
FIGURE 2. 3: HOW THE RESEARCHER CONCEPTUALISED THE RESEARCH QUESTIONS DERIVED FROM THE LITERATURE GAPS "QUALITATIVE METHODS"	37
FIGURE 2. 4: HOW THE RESEARCHER CONCEPTUALISED THE RESEARCH QUESTIONS DERIVED FROM THE LITERATURE GAPS "QUANTITATIVE METHODS"	37
FIGURE 3. 1: RESEARCH UNION	42
FIGURE 4. 1: PRIMARY DATA COLLECTIONS IMPLEMENTED IN THE RESEARCH PROJECT	65
FIGURE 4. 2: SECONDARY DATA COLLECTIONS IMPLEMENTED IN THE RESEARCH PROJECT	67
FIGURE 4. 3: ASSOCIATED VARIABLES AND DATA COLLECTION METHODS TO ANSWER RQ1	68
FIGURE 4. 4: ASSOCIATED VARIABLES AND DATA COLLECTION METHODS TO ANSWER RQ2	69
FIGURE 4. 5: ASSOCIATED VARIABLES AND DATA COLLECTION METHODS TO ANSWER RQ3	70
FIGURE 4. 6: ASSOCIATED VARIABLES AND DATA COLLECTION METHODS TO ANSWER RQ4	71
FIGURE 5. 1: LAYERS OF CASE STUDY RTPS WITHIN SAUDI ARABIA	81
FIGURE 5. 2: TECHNOLOGIES' FIELDS EMBEDDED WITHIN THE INNOVATION AND TECHNOLOGY ECOSYSTEM OF RTPMWC	87
FIGURE 5. 3: RTPMWC'S STAKEHOLDER CATEGORIES AND INTERACTIONS	88
FIGURE 5. 4: MAPPING THE ACTIVITIES OF THE ASSOCIATED UNIVERSITY TO THE INNOVATION VALUE CHAIN	89
FIGURE 5. 5: MAPPING THE ACTIVITIES OF THE ASSOCIATED UNIVERSITY TO THE INNOVATION VALUE CHAIN	91
FIGURE 5. 6: MAPPING THE ACTIVITIES OF THE ASSOCIATED UNIVERSITY TO THE INNOVATION VALUE CHAIN	92
FIGURE 5. 7: MAPPING THE ACTIVITIES OF THE ASSOCIATED UNIVERSITY TO THE INNOVATION VALUE CHAIN	93
FIGURE 5. 8: MAPPING THE ACTIVITIES OF THE ASSOCIATED UNIVERSITY TO THE INNOVATION VALUE CHAIN	96
FIGURE 5. 9: COMPONENTS OF RTPDVC INNOVATION ECOSYSTEM	104
FIGURE 5. 10: COMPONENTS OF RTPDVC INNOVATION ECOSYSTEM	112
FIGURE 6. 1: STRATEGIC VISIONARY MANAGEMENT ROADMAP FOR RTPKIED	128

FIGURE 6. 2: COMPONENTS OF ANALYSIS BEHIND THE STRATEGIC GOVERNANCE AND BUSINESS MODEL FOR RTPKEI	129
FIGURE 6. 3: DEVELOPMENT OF QUALITATIVE METHODS AND DATA FINDINGS	132
FIGURE 8. 1: OPERATIONAL ON-PARK TENANTS ACCORDING TO RTP'S GOVERNANCE MODEL	171
FIGURE 8. 2: START-UPS ON-PARK ACCORDING TO RTP'S GOVERNANCE MODEL	175
FIGURE 8. 3: RTP'S AVERAGE GROWTH RATE PER RTP'S GOVERNANCE MODEL	179
FIGURE 8. 4: AVERAGE GROWTH RATE OF ON-PARK'S TENANTS' FIRMS	187
FIGURE 8. 5: RTP COLLABORATION WITH OTHER ENTITIES ON STRATEGIC/OPERATIONAL LEVEL ACCORDING TO RTP'S GOVERNANCE MODEL	195
FIGURE 8. 6: RTP'S IDENTITY OWNERSHIP	195
FIGURE 8. 7: NO. OF START-UPS ON-PARK	196
FIGURE 8. 8: NO. OF TENANTS' FIRMS ON-PARK UNDER CONSTRUCTION VS. NO OF TENANTS' FIRMS ALREADY OPERATIONAL	196
FIGURE 8. 9: GOVERNMENTAL ORGANISATIONS LOCATED ON-PARK	196
FIGURE 8. 10: GOVERNANCE OF SELECTION CRITERIA FOR RTPS' LOCATINGTENANATS' FIRMS ON-PARK	197
FIGURE 8. 11: RTPS' PERFORMANCE MEASUREMENT	197
FIGURE 8. 12: RTPS' OUTCOMES	197
FIGURE 8. 13: RESEARCH SERVICES PROVIDED ON-PARK	198
FIGURE 8. 14: DEVELOPMENT SERVICES PROVIDED ON-PARK	198
FIGURE 8. 15: GOVERNANCE OF RTPS' SERVICES	198
FIGURE 8. 16: RTPS' FUNCTIONS AND ACTIVITIES	199
FIGURE 8. 17: NUMBER OF RTPS' COLLABORATIONS	199
FIGURE 8. 18: NUMBER OF RTPS' COLLABORATIONS	199
FIGURE 8. 19: RTPS' COLLABORATIONS WITH EXTENRAL AND INTERNAL ORGANISATIONS	200
FIGURE 8. 20: FREQUENCY OF RTPS' COLLABORATIONS	200
FIGURE 8. 21: FREQUENCY OF RTPS' COLLABORATIONS	200
FIGURE 8. 22: RELATIONSHIP BETWEEN THE GOVERNANCE MODEL AND "TRIPLE-HELIX" TYPE AFTER FIRST CODING CYCLE	202
FIGURE 8. 23: RELATIONSHIP BETWEEN THE GOVERNANCE MODEL AND "TRIPLE-HELIX" TYPE AFTER SECOND CODING CYCLE	204
FIGURE 8. 24: RELATIONSHIP BETWEEN THE GOVERNANCE MODEL AND "TRIPLE-HELIX" TYPE AFTER THIRD CODING CYCLE	206
FIGURE 8. 25: RELATIONSHIP BETWEEN THE GOVERNANCE MODEL AND "TRIPLE-HELIX" TYPE AFTER FOURTH CODING CYCLE	207
FIGURE 8. 26: USING CODES TO DRAW CONCLUSIONS FROM THE DATA OF RTP INTERVIEWS ABOUT THE GOVERNANCE: "WHAT ARE PEOPLE SAYING?"	208
FIGURE 9. 1: THE WORD COUNT OF THE RTPS' GOALS	215
FIGURE 9. 2: RTPS' FIELDS OF TECHNOLOGY	221

FIGURE 9. 3: RTPS' FIELDS OF TECHNOLOGY WORD COUNTS	221
FIGURE 9. 4: GOVERNANCE MODEL OF RTPS' PERCENTAGE	222
FIGURE 9. 5: THE FREQUENCY OF WORDS CLOUD FOR THE RTP SERVICES	233
FIGURE 9. 6: OPINION OF RTPS' CEOS CATEGORISED BY RTP GOVERNANCE MODEL	241
FIGURE 9. 7: PERCENTAGE OF THE GOVERNANCE AND OWNERSHIP OF RTPS ACCORDING TO THE IASP 2015 GENERAL SURVEY	244
FIGURE 9. 8: THE VARIOUS PERSPECTIVES OF RTPS' CEOS REGARDING THE MEANING OF 'GOVERNANCE'	261
FIGURE 9. 9: REASONS FOR THE CORRELATION BETWEEN THE PARK'S GOVERNANCE MODEL AND ITS GROWTH RATE	262
FIGURE 9. 10: REASON FOR THE CORRELATION BETWEEN THE PARK'S GOVERNANCE MODEL AND ITS GROWTH RATE CLUSTERED BY WORD SIMILARITY	263
FIGURE 9. 11: OPINIONS OF RTPS' CEOS ON THE RELATIONSHIP BETWEEN RTP GOVERNANCE MODEL AND ITS GROWTH RATE	264
FIGURE 9. 12: TENANTS' FIRMS' NEEDS FROM RTPS IN THE KSA	272
FIGURE 9. 14: CHALLENGES OF RTPMVC FROM TENANTS' FIRMS' VIEWPOINTS	283
FIGURE 9. 15: CHALLENGES OF RTPDVTC FROM TENANTS' FIRMS' VIEWPOINTS	284
FIGURE 9. 16: CHALLENGES OF RTPKIED FROM TENANTS' FIRMS' VIEWPOINTS	285
FIGURE 9. 17: THE POLICYMAKERS' PERSPECTIVES AND RECOMMENDATIONS TOWARDS RTPS' GOVERNANCE AS PART OF SAUDI VISION 2030	289
FIGURE 10. 1: RTP SERVICES CATEGORIES	297
FIGURE 10. 2: GOVERNANCE OF QUALITY OF SERVICES PROVIDED TO TENANTS' FIRMS IN RTPS BASED ON RTP'S GOVERNANCE MODEL	298
FIGURE 10. 3: FUNDING SOURCES OF RTPS IN SAUDI ARABIA	300
FIGURE 10. 4: RTP VISION REALISATION	302
FIGURE 10. 5: FREQUENCY OF USING THE PENN STATE SPONSORED RESEARCH AGREEMENT	310
FIGURE 11. 2: ADVANTAGES OF ADOPTING THE TRIPLE-HELIX GOVERNANCE MODEL	317
FIGURE 11. 3: MEASURING THE PERFORMANCE INDICATORS FOR RTPS' STRATEGIES AND INITIATIVES PROVIDED TO TENANTS' FIRMS	321
FIGURE 12. 1: BOTTLENECK QUESTIONS OF THE SURVEY	330
FIGURE 12. 2: RTPS' NATIONAL LEVEL BENCHMARKING 'KSA VS. THE GLOBAL RTPS'	331

## GLOSSARY

Abbreviation	Description
<b>ADAA</b>	National Centre of Performance Measurement for Public Authorities
<b>ARAMCO</b>	Arabian American Oil Company
<b>ASO</b>	Academic Spin-Off
<b>AURP</b>	Association of Universities Research Parks
<b>CSR</b>	Corporate Social Responsibilities
<b>IASP</b>	International Association of Science Parks and Areas of Innovation
<b>KACST</b>	King Abdulaziz City Science Technology
<b>KEI</b>	Knowledge Economy Index
<b>KPIs</b>	Key Performance Indicators
<b>KSA</b>	Kingdom of Saudi Arabia
<b>MODON</b>	Saudi Industrial Property Authority
<b>NTBFs</b>	New-Technology-Based-Firms
<b>R&amp;D</b>	Research and Development
<b>ROI</b>	Return on Investment
<b>RTPs</b>	Research and Technology Parks
<b>SABIC</b>	Saudi Arabian Basic Industries Corporation
<b>SMEA</b>	Small and Medium Enterprises General Authority
<b>STC</b>	Saudi Telecom Company
<b>STP</b>	Science and Technology Parks
<b>TTOs</b>	Technology Transfer Offices

## **DECLARATION OF AUTHORSHIP**

I, **Reem Helmi Turkey**,

Declare that this thesis and the work presented in it is my own and has been generated by me as the result of my own original research.

**Implementation of Strategic Visionary Management of Research and Technology Parks Affiliated with Universities. Case Study: Benchmarking Strategic Management Models of Research and Technology Parks to Create a New Framework for the Strategy Model of RTPKEID**

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;  
I have acknowledged all main sources of help;
5. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
6. None of this work has been published before submission.

**Date: 1 October 2019**



## **ACKNOWLEDGEMENTS**

Firstly, I would like to express my sincere gratefulness to my first and second supervisors Dr. Jonathan Klein and Professor Malcolm Higgs for their continuous support of my Doctorate study, their patience, motivation, and knowledge sharing. Their guidance helped me throughout the research and writing of this thesis.

Besides my supervisors, I would like to thank the Doctoral Program Directors: Dr. M. J. Ashleigh and Dr. John Marti their insightful comments and encouragement throughout the programme.

Very special gratitude goes out to my father who helped me in finding the best research topic and his will and words were the greatest motivation for my determination to overcome all obstacles I faced throughout my doctoral journey.

Last but not least, I would like to thank my family: my mother, my siblings Sarah and Lina, and my children Rayan, Mohammed, and Sereen for spiritually supporting me throughout my study.

I cannot forget to gratefully thank my manager Mohammed Halawani for his continuous support and encouraging me during the hardest moments in my study.

## CHAPTER 1: INTRODUCTION

There are substantial literature reviews on Research and Technology Parks (RTPs) relating to their governance and the measurement of their performance and growth rate particularly in developing countries. However, only limited studies have been conducted on RTPs in Middle Eastern Countries, and there is a paucity of literature on the case of RTPs in the Kingdom of Saudi Arabia (KSA). Most literature on the knowledge-based economy in the context of RTPs falls under the following areas:

- 1) 'Governance' by introducing an effective policy for innovation governance.
- 2) 'Infrastructure' by building new research-driven universities, and governmental research centres.
- 3) 'Community and Culture' by spreading awareness within the community to change the culture to globalisation, sustainability and development of talented and creative human resources.

This research is based on three insights of the RTPs' governance model and performance management: 1) *Cabral-Dahab Science Park Management Paradigm*, 2) *Triple-helix Theory* and 3) *Literature Review on Measurement of Research Parks' Performance and Evaluation of Growth Rate*.

Methodologically, the research adopts a pragmatic critical realism perspective, employing a qualitative approach using semi-structured interviews and a quantitative approach using questionnaires distributed to RTPs' CEOs and tenants' firms.

Conversely, the quantitative approach is investigated to test the statistical hypothesis assuming there is a relationship between the two variables - 1) RTPs' governance model and 2) RTPs' performance. The use of case studies will allow a longitudinal perspective to the research with future follow up and replication. This research aims to add significant insight and build upon the current research to date in the fields of RTPs' governance models and performance measurement.

### 1.1. Research Aim

The interest of this research is to empirically test the relationship between RTPs' governance and strategic model and RTPs' growth performances by examining the

performance improvement of RTPs affiliated with universities. The research case studies are RTPKIED, RTPMWC, and RTPDTCV. The research investigates the different strategic models of RTPs affiliated with universities and takes into consideration the cultural differences and economic context of the KSA, to develop research aims and objectives for this thesis.

## **1.2. Research Objectives**

The research objectives are to statistically test the relationship between the RTPs' governance model and the RTPs' performance growth through the positivism approach by distributing questionnaires to RTPs' directors via the Association of Universities Research Parks (AURP) and International Association of Science Parks and Areas of Innovation (IASP). The aim is to find the successful strategic models applied through semi-structured interviews with RTPs' CEOs, on-Park's tenants' firms, entrepreneurs and the policymakers by:

1. Identifying a primary case study research strategy to draft the best strategic visionary management model on RTPKIED captured through semi-structured interviews.
2. Aligning the application of the strategic visionary management model at RTPKEID as an action conceptualisation to the context of the KSA and the unique RTPKIED's environment.

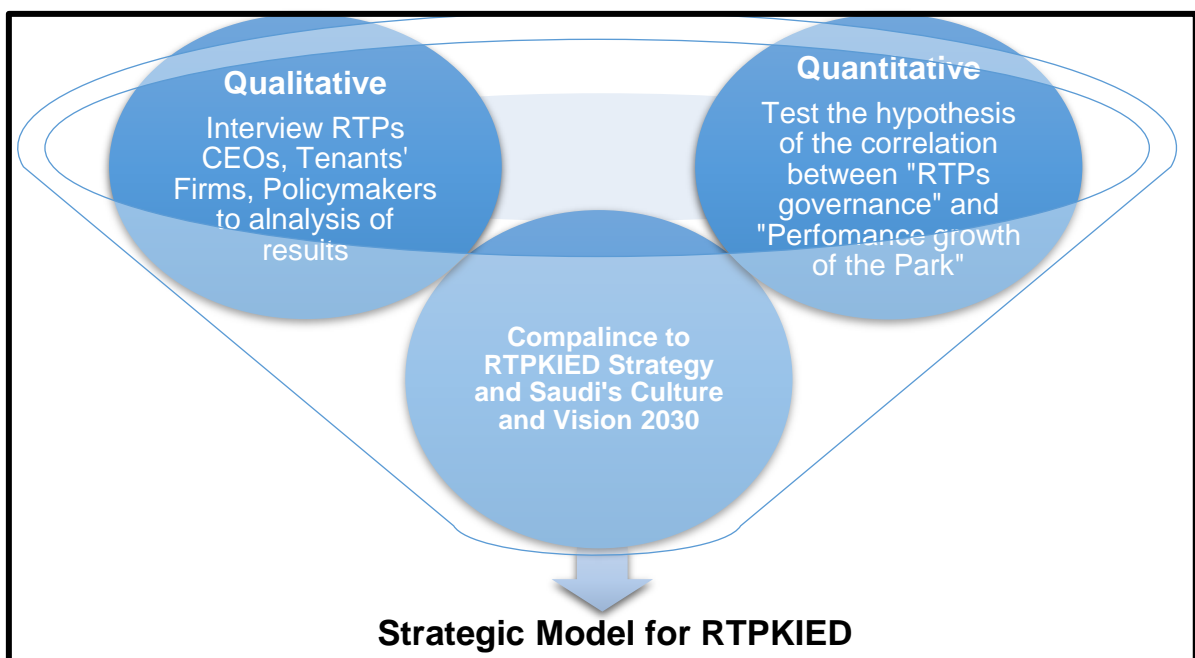
The research takes the following steps to accomplish its objectives:

- Get official approval and support for the research study from RTPKIED leadership.
- Review the literature on different strategic management models of RTPs around the world.
- Conduct interviews with RTPs' CEOs, RTPs' tenants' firms, and policymakers to determine the types of visionary management among the different strategic management models.
- Identify the pros and cons of each strategic management model and compare them with the RTPKIED visionary management towards RTP's operational model. This can be investigated by reviewing the secondary data by using

literature reviews and research parks' reports, and analysing the primary data using results of surveys and interviews.

- Determine the criteria to select the appropriate strategic management model for RTP's operational model and construct the most appropriate background for the best strategic management model that fits the RTPKIED's strategy including the communication and involvement between the university and the new RTP entity.
- Create a comprehensive strategic visionary realisation framework and roadmap for the RTPKIED Initiative.

To organise the empirical part of the research, the researcher must categorise the list of RTPs that will be used in the benchmarking, according to their governance models. Figure 1.3 below illustrates the high level of the research lifecycle that is proposed to find the solution to the RTPKIED's strategic visionary management framework implementation.



**Figure 1. 1: Conceptual Component of the Strategic Model for RTPKIED**

### **1.3. Significance of the Research Topic**

The significance of the topic arose from the interest of the Saudi Government to establish a base of RTPs and Techno-valleys in the KSA to adhere to the efforts of the Saudi National Transformation Program 2020 to achieve the Saudi Vision 2030. The Government of KSA launched the Saudi National Transformation Program 2020 to achieve its vision in transforming the country to a knowledge-based economy. Regarding the research, technology, innovation and entrepreneurship, the Program assigned four governmental bodies 1) King Abdulaziz City for Science and Technology, 2) King Abdullah City for Renewable Energy; 3) Ministry of Planning and Economy; and 4) the Ministry of Energy and Industry to achieve the following strategic objectives assigned to King Abdulaziz City Science Technology (KACST):

1. Strategic Objective #2: Establish emerging technology companies with added value to contribute to the increase of local content which relates to the below objectives of Vision 2030:
  - a. Create an attractive environment for both local and international investors and enhance their confidence in our economy
  - b. Boost entrepreneurship
  - c. Develop the IT sector
2. Strategic Objective #3: Strengthen the capability of small- and medium- sized companies to contribute to the increase of local content which relates to the following objective of Vision 2030:
  - a. Create an attractive environment for both local and international investors and enhance their confidence in our economy
3. Strategic Objective #4: Provide technical consulting services to government sectors which relates to the following objective of Vision 2030:
  - a. Improve performance, productivity and flexibility of public authorities
4. Strategic Objective #6: Support research and development to ensure the sustainability of the local content development system which relates to the following objective of Vision 2030:
  - a. Provide citizens with knowledge and skills to meet the future needs of the labour market in order to boost entrepreneurship

5. Strategic Objective #7: Support local content through development of nationally-qualified professionals which relates to the following objective of Vision 2030:

- a. Provide citizens with knowledge and skills to meet the future needs of the labour market. Develop youth skills and leverage them effectively

KACST translated these strategic objectives to reality by launching four new tech start-ups in the Saudi market. According to Saudi Gazzat Magazine: “The list of companies launched at a special ceremony held recently at Badir headquarters includes "Elag", which specializes in online medical technology and aims to facilitate booking of appointments in health facilities and access to medical services the soonest and at the lowest cost; "Ineed", specialized in car rentals and connecting customers to service providers in a technical way; "Ajeer", which seeks innovative solutions in the field of home maintenance by connecting customers to the best maintenance service providers; as well as "Tamweel", specialized in designing and developing an electronic platform combining financing and instalments applicants in the fields of cars, personal finance or mortgage finance.” <http://saudigazette.com.sa/article/518842>

The related Knowledge-based Economy Strategic Objectives Assigned to the Ministry of Energy, Industry, and Mineral Resources:

- Strategic Objective #1: Increase non-oil commodities exports which relates to the following objectives of Vision 2030:
  - a. Create an attractive environment for both local and international investors and enhance their confidence in our economy
  - b. Establish specific zones with competitive advantages to enhance investments
- Strategic Objective #3: Enhance market accessibility and promote in strategic markets which relates to the following objectives of Vision 2030:
  - a. Create an attractive environment for both local and international investors and enhance their confidence in our economy
  - b. Support national companies
  - c. Achieve actual local and international connections

- Strategic Objective#6: Incentivise the private sector to manufacture goods and provide services locally and encourage both public and private sectors to rely on local products and services which relates to the following objectives of Vision 2030:
  - a. Localise renewable energy sectors
  - b. Enhance competitiveness of energy sector
  - c. Create an attractive environment for both local and international investors and enhance their confidence in our economy
  - d. Support national companies
  - e. Boost small and medium enterprises

Conversely, to translate those strategic objectives to reality, the Ministry established a strategic collaboration with Japan. According to the press release from the partnership, “The cooperation themes will be further supported by enablers to create a more conducive environment, along four main dimensions (regulations, incentives, organizational support and human capital). Both countries will jointly identify the challenges and areas of improvement to facilitate the execution of cooperation projects.” (Japan Imperial Household Agency and Japan, 2017; Melorose et al., 2015a).

It is expected that most governmental bodies must take part in the Implementation of Vision 2030, such as the Small and Medium Enterprises General Authority (SMEA), Jobs Generating Authority, Ministry of Economic and Planning, and the National Centre of Performance Measurement for Public Authorities (ADAA). Alternatively, due to the scarcity of literature to test the relationship between the RTP's governance model and its performance growth is seen as an emerging research topic.

#### **1.4. Structure of the Thesis**

The thesis comprises 12 chapters. Following this introductory Chapter 1, Chapter 2 analyses relevant literature to construct the research's theoretical foundation. The philosophical perspective that the research adopted is described in Chapter 3, followed by a detailed discussion of the methodology and explanation of the research design in Chapter 4. Chapter 5 details the data collection methods along with the three case-study RTPs where the implementation of the research fieldwork took place,

including a summary of the interviews held and the data collection timescale. Chapter 6 defines how the analytical strategy was carried out in practice and introduces the Component of Analysis behind the Strategic Governance and Business Model for the primary case study, the *RTPKEID*. Additionally, it benchmarks the different components of RTPs such as governance model, commercialisation, and entrepreneurial activities. Then it presents and defines the inputs and outputs of the Strategic Visionary Management Roadmap and Realisation Framework for the case study, *RTPKIED*, and plans the methods required to deliver the qualitative data analysis.

Chapter 7 presents the key identified findings from interviews and observations in all three case RTPs, in addition to the interviews' findings with RTPs' directors from other countries, and observations of different RTPs. This was achieved by benchmarking the findings of 61 RTP organisations in the Middle East, Turkey, North and South America, the USA and Europe and mapping them on to the six RTPs' governance models.

Chapter 8 presents the quantitative data findings and empirically demonstrates the correlation between the RTPs' governance model and RTPs' growth and performance rates. In addition, it displays the descriptive statistics gathered from the questionnaires. Subsequently, Chapter 9 demonstrates the qualitative data findings by detailing the findings collected during the interviews with RTPs' CEOs and on-park Tenants' firms including the entrepreneurs, and the policymakers. Next, Chapter 10 presents the research findings and draws conclusions from the data findings. Then, Chapter 11 presents the Strategic Visionary Management Roadmap and Realisation Framework for the case study, *RTPKIED*, and details the recommendations on how to achieve it. Finally, Chapter 12 concludes the thesis by summarising the research aim and the contribution to the employed theories. It recommends future research directions, and presents the limitations and risks associated with the research.





## **CHAPTER 2: LITERATURE REVIEWS**

### **2.1. Introduction**

The literature reviewed in this chapter is organised into nine sections, which together provide conceptual and theoretical grounding for the research: 1) Background on RTPs, 2) Emerging of RTPs, 3) Employing the knowledge-based economy, and RTPs to foster the economic development in the KSA, 4) The literature on the knowledge-based economy, 5) The literature on different Management Models and Performance Growth Rate of RTPs, 6) legal / governance frameworks of RTPs and their relationship to growth rate, 7) RTPs performance evaluation, 8) Factors that Impact RTPs' growth rates, and 9) Strategic management models of different RTPs.

A concluding section provides an integrative summary of the literature review and pinpoints the gaps in existing research, which this thesis aims to address.

#### **2.1.1. Background on Research and Technology Parks**

The role of RTPs has significantly boosted national economic development worldwide. The roles of RTPs are not only limited to researchers' validations of the output of universities; they are energising and motivating the relationships between the three major actors: Universities, Government, and the Industry. Over the last decades, RTPs have advanced the economic and social growth of developing countries (Cabral and Dahab, 1998) Phan et al. (2005, p. 166) defined Science and Technology Parks (STP) as "property-based organizations with identifiable administrative centres focused on the mission of business acceleration through knowledge agglomeration and resource sharing". In addition, STP was defined as "special places especially conceived to host academics, research centres, entrepreneurs, businessmen, business support services, incubators, or accelerators under the same roof" (EIB/ CMI - ISESCO 2013).

AURP and IASP, the number of RTPs is increasing rapidly. In 2014, there were more than 400 memberships of RTPs from all around the world (Aulicino and Pfeiffenberger, 2014). Conversely, Haxton and Meade (2008) and Yuehua (2002) stated that in 2000, there was an increase of 900 operational RTPs. However, Kang (2004) predicted that

this number will increase by 1300 if those under establishment and those yet not registered are taken into consideration.

As mentioned by Phan et al. (2005) the idea of a RTP includes an organisation, managed by professionals whose main target is to increase the resources of the community by upholding the culture of research and competitiveness among the related businesses and knowledge-based organisations. With the aim of meeting these goals, the RTP manages the channel of knowledge and technology within the universities, research and development (R&D) organisations and companies to support the growth of innovation-based organisations via incubation and spin-off processes. It supplies various value-added services coupled with high-quality facilities. Aulicino and Pfeiffenberger (2014) stated that the technological parks can be considered as one of the major prerequisites in the modern-day science education based on the institutional pattern.

RTPs are not only supporting the researchers in gathering applied knowledge on the scientific theories, but also promoting the efforts of increasing awareness regarding science within the communities and the commercial organisations. Chan (2010) demonstrated that RTPs are government initiatives to promote the establishment of knowledge-based and New Technology-based Firms (NTBFs) by adopting commercially driven technological development. Instead, the knowledge-based economy relies on interdependent processes to enhance the local knowledge base, facilitate transfer of knowledge from external to local resources, and drive the transition of knowledge into commercial and profitable outcomes (Chen and Choi, 2004).

RTP literature has been reviewed from different angles and in different countries. Following this critical review of the literature, it is obvious that there are gaps in several aspects, such as the RTP-university legal connections, the correlation between RTPs' governance and strategic model, and the performance growth of the park. Moreover, gaps in the literature were identified in the studies on the performance measurement and governance of RTPs in the KSA, studies on the strategic visionary management of RTPs, and the impact of the culture of the RTPs in the park's development.

The literature review also exposed a gap in the existing knowledge of assessment and improvement of the RTP performance in the Saudi culture and context. Moreover, no investigation to date has tested the relation between RTP-university legal connections and the parks' performance and growth rates. Bigliardi et al. (2006) stated that, due to the significant growth of RTPs in developing countries, there is a significant need to assess the performance of those parks regarding their supporting strategies of innovation from the perspectives of industry and academia. Furthermore, Zhang (2013) identified the need for further research on the measurement of the RTPs' performance particularly around internal factors affecting the RTPs such as park's governance, and management structure.

Kang (2014) for instance found a lack of research governance studies conducted in Korea; also RTP governance has not been deeply investigated. He also emphasised the infeasibility of creating the ideal governance model for RTPs that can be standardised globally as there are various factors affecting the governance of RTPs from one park to another such as organisational culture. Therefore, this reveals a gap in the literature where further study on using the governance model to advance the development of RTPs is needed, taking into consideration RTPs' geographic, cultural and social contexts (Kang, 2014).

To investigate the gaps in RTPs' literature, this research explores the relationship between RTPs' governance and RTPs' performance growth rates. It is essential to be aware of the different models of RTP governance and how, and to what extent these affect RTPs' performance growth rates. Furthermore, Phan et al. (2005) recommended that further research should be conducted on RTPs and business incubators that have diverse cultures and different structures.

### **2.1.2. Emergence of Research Parks**

Literature has focused on the measurement of growth rate and strategic management of parks. *Cabral-Dahab Science Park Management Paradigm* is one of the most widely used models in RTP governance (Cabral and Dahab, 1998; Echols and Meredith,

1998; Cabral, 1998a; 1998b; 1998c; Sanni et al., 2010). The Cabral-Dahab paradigm consists of 10 elements (as listed below) should exist in any RTP before the Cabral-Dahab paradigm can be adopted.

1. *“Have access to qualified research and development personnel in the areas of knowledge in which the park has its identity.*
2. *Be able to a market its high valued products and services.*
3. *Have the capability to provide marketing expertise and managerial skills to firms, particularly SMEs, lacking such a resource (Incubators, Accelerators, entrepreneurship centre)*
4. *Be inserted in a society that allows for the protection of product or process secrets, via patents, security or any other means. (TTO)*
5. *Be able to select or reject which firms enter the park. The firm's business plan is expected to be coherent with the science park identity.*
6. *Have a clear identity, quite often expressed symbolically, as the park's name choice, its logo or the management discourse.*
7. *Have a management with established or recognized expertise in financial matters, and which has presented long term economic development plans.*
8. *Have the backing of powerful, dynamic and stable economic actors, such as a funding agency, political institution or local university.*
9. *Include in its management an active person of vision, with power of decision and with high and visible profile, who is perceived by relevant actors in society as embodying the interface between academia and industry, long-term plans and good management - Mr. /Ms. Science Park.*
10. *Include a prominent percentage of consultancy firms, as well as technical service firms, including laboratories and quality control firms.”*

It defines RTPs as representing a cost reduction between research centres and the market by creating networks of firms which will have social and industrial networks. Moreover, risk operations related to entrepreneurship innovation might be reduced in the RTP context, such as piloting and customer engagement before launching the products or services. That is why firms are willing to locate within the RTPs as tenants ( Al-Sultan, 1998; Echols & Meredith, 1998; Cabral, 1998a; 1998b; 1998c; Cabral & Dahab, 1998; Dahab, 1998).

Conversely, the *Triple-helix*, theorised by Etzkowitz and Leydesdorff (2000), states that the process of new research innovations emerging from universities should be linked with the government-funded banks and agencies, and industry, to stimulate the innovation process. However, the relationship and interaction between university-industry-government will generate more ways to improve economic development and take the national economy to the level of a knowledge-based economy (Leydesdorff & Fritsch, 2006; Eileen, 2007; Feldman, 2007; Jousma et al., 2009; Leydesdorff & Zawdie, 2010; Albahari et al., 2011; Al-Sultan & Alzaharnah, 2012; Leydesdorff, 2012; Shin et al., 2012; Zhou, 2014; Amaral, 2015; Zouain & Plonski, 2015). Moreover, Leydesdorff (2012a) demonstrated that one of the advantages to implementing the Triple-helix model in qualitative research is to disseminate the knowledge of the minimum requirements of the knowledge-based economy using at least three dimensions – ‘University- Government- Industry’. Some countries, like Japan, have added an additional dimension for the Triple-helix, which is ‘internationalisation’ since the higher educational institutions are heavily co-authoring with national parties.

Nevertheless, literature on the area of *Measurement of Research Parks’ Performance and Evaluation of Growth Rate* sheds light on the major factors impacting the evaluation of performance and growth rate of RTPs which are discussed in depth in Sections 2.2 and 2.3 of this thesis (Guy, 1996; Guy et al., 1996; Vedovello, 1997; Vedovello, 1997; Phillimore, 1999; Ndonzuau et al., 2002; Ndonzuau et al., 2002; Chan & Lau, 2005; Squicciarini, 2007; Jimenez-Zarco et. al., 2013; Ruiz-palomino, 2013).

Conversely, some literature has investigated the research parks-university legal framework connections but only with limited scope, such as *Technology in the Garden* (Luger and Goldstein, 1991), the *European Commission Report on Setting up, Management and Evaluating EU Science and Technology Parks* (European Commission, 2013), and *Governance and Business Models at the HTCE: Disrupting Science Parks* (Borgh, 2007). However, to the best of the researcher’s knowledge, no literature has investigated the correlation between RTPs’ governance and RTPs’ performance growth rates.

### **2.1.3. Employing the Knowledge-based Economy, and Research Parks to Foster the Economic Development in the KSA**

The KSA has made significant efforts in transitioning to a knowledge-based economy. According to the World Bank, in 2012, KSA ranked at 50<sup>th</sup> in the Global Knowledge Economy Index (KEI) (Al-Filali & Gallarotti, 2012; Bashir, 2013).

Moreover, since 2000, the KSA has demonstrated the best practical achievement out of 146 Islamic countries in progressing towards achieving a knowledge-based economy, ranking 26<sup>th</sup> on the KEI (Bashir, 2013). Moreover, KSA ranking as the 50<sup>th</sup> was comparing to global ranking. On the other hand, KSA was ranked as the 26<sup>th</sup> compared to the Islamic countries only. This resulted from the strategy planning which the KSA implemented in the form of several initiatives to achieve the dream by investing US \$240 million in supporting the research projects and developing 10 research centres and 15 technological innovation centres at different universities in collaboration with KACST, universities, and governmental agencies. The KACST is the main scientific government authority in the KSA responsible for coordination among the activities of government institutions and scientific research centres in accordance with the requirements of the development of the Kingdom. Moreover, the KSA has also invested in clean energy by establishing the King Abdullah Atomic & Renewable Energy City in April 2010 (Al-Filali & Gallarotti, 2012).

With the huge numbers of graduate students sent abroad for research scholarships as part of the King Abdullah Program for Higher Education Scholarships and the aim of the Saudi Government to diversify the country's economy, the KSA is aiming to effectively implement its national development strategy and its "10x10" programme to raise the country's position among the 10 best locations for international economic investment (Benner, 2012). Moreover, the KSA realised the need to invest in entrepreneurship, and to improve the quality of living in all the different regions. Therefore, the country invested in six economic cities around the country (Sagia, 2012); it set up SMEA in 2015 and established seven research, science and technology parks to promote R&D and technology transfer from research institutions

to industry and therefore create additional sources to eliminate unemployment (Ministry of Economy and Planning, 2014).

Conversely, as an outcome of the National Development Plan and Strategy, the KSA established the Industrial Clusters Programme which is overseen by the Ministry of Commerce and Investment and the Ministry of Petroleum and Mineral Resources. Furthermore, it partnered with different governmental agencies and large-scale private sectors (SABIC, ARAMCO, STC, etc.). The aim of this programme is to achieve the 2020 vision of the Kingdom, to “double the proportion of technology-based manufactured products from 30% to 45% of total industrial production by the end of the plan” (Ministry of Economy and Planning, 2010, p. 105).

Al-Sultan and Alzaharnah (2012, p. 89) on the other hand stated that, “In 2012, KSA was one of three new emerging economies to appear on the world R&D map for the first time”. Nevertheless, the 2030 vision brought a significant focus on entrepreneurs as it aims to increase SME contributions to GDP from 20% to 35% (Melorose et al., 2015b). The Ninth Economic Development Plan of the KSA has concentrated on the elements leading to improvements in the areas of R&D, science, technology and innovation, information and communications technology. It has focused significant attention on improving the technology systems and promoting the collaboration between the industry, research institutions, and universities (Ministry of Economy and Planning, 2014). Furthermore, the National Commission for Assessment and Academic Accreditation is overseeing several initiatives for quality improvement at the universities such as establishing university research excellence centres and supporting scientific research centres, science parks, and technology incubators at various universities (Onsman, 2011). Moreover, Khorsheed (2015) stated that the KSA allocated 25% of its budget to develop local human resources in the science and technology fields. On the other hand, Othman et al. (2014) stated that the KSA should take into consideration the successful experience and lessons learnt from different countries in regard to knowledge-based economy transformation. However, the KSA should focus its efforts on R&D to increase its chances to become internationally competitive in the global knowledge-based economy.



Based on what literature has highlighted, reviews on the KSA regarding RTPs and more specifically the performance measurement and governance of RTPs is lacking. Therefore, this research aims to shed light on the significant shift of the KSA to its current focus on knowledge-based and entrepreneurship economies. The researcher intends to achieve this through focusing attention on the science and technology innovation, and RTPs as an instrument to advance in the knowledge-based economy transition.

## **2.2. The Literature on the Knowledge-based Economy**

Much literature has addressed the issue of the knowledge-based economy. For example, Cooke and Leydesdorff (cited Nelson, 1982, 2006) demonstrated that there is a significant need to put in place innovations, technology, and science advancement policies for the local governments. Powell et al. (2004, p. 201) defined the knowledge-based economy thus: "Production and services based on knowledge-intensive activities that contribute to an accelerated pace of technological and scientific advance as well as equally rapid obsolescence". Borgh et al. (2012) emphasised that the knowledge-based economy has specific characteristics; for instance, it is limited to small communities, mostly focusing on high-technology, and is associated with R&D activities. Moreover, the knowledge-based firms should be located in RTPs for the sake of conducting knowledge-based R&D activities in collaboration with universities and the assistance of technology transfer offices (Yuehua, 2002).

The World Bank Institute, (p.23, 24, 2007) published a report detailing the pillars of the knowledge-based economy:

- 1) *Education*: An educated workforce who are equipped with the required skills to adopt their capabilities and continuously advance their skills to create, use, and transfer knowledge effectively to benefit the local economy.
- 2) *ICT Infrastructure*: that will enable the modern technological communications system, facilitate the effective communication, collaboration, and knowledge dissemination. Additionally, the development and implementation of electronic services such as "e-applications, e-government, e-business, e-learning, and e-

*services” should be the main priority of developing countries to accelerate the knowledge-based economy.*

- 3) *A Dynamic Innovation System: diverse research centres, educational institutions, consultancy offices, and innovative entrepreneurs that resolve the real needs and problems of the local community by adopting knowledge and technology. The main booster of the innovation system is the establishment of RTPs, increasing the R&D activities, and enabling the collaboration among the NTBFs, RTPs, and universities. Again, the developing countries should concentrate on the technological advancements.*
- 4) *Government Policies: The country’s governmental policies should focus on the effective use of resource allocation, develop economic incentives to encourage the establishment of entrepreneurial firms, and promote the dissemination and adoption of knowledge.*

Historically, Nelson and Winter (1982) shed light on the knowledge-economy, resulting in innovation systems and R&D activities delivered through RTPs which produce “Technical Change” regarded as a “shift in production function” (Flatau, 2002). Conversely, constructed advantage as stated by Cooke and Leydesdorff (2006) has established improvement linkages among different aspects: 1) Knowledge-based economy by supporting regional economic development through facilitating the integration of knowledge flow among firms, commercialisation, and building robust business networks regionally and globally; 2) Knowledge-based governance by introducing an effective policy for innovation governance, investment in R&D, flexible governance according to stakeholder’s expectations, and evaluation of local assets; 3) Knowledge-based Infrastructure by building new research-driven universities, governmental research centres, and business and professional consultancy offices; and 4) Community and culture by spreading awareness within the community to change the culture to globalisation, sustainability, and development of talented and creative human resources. In contrast, Cooke and Leydesdorff (2006) debated that the knowledge-based economy has a secondary impact within Triple-helix links between institutions and the various stakeholders. Therefore, the proximity to

institutions increased the possibilities of networking and, thus, the formation of new technological channels.

### **2.3. The Literature on Different Management Models and Performance Growth Rate of Research Parks**

Most literature reviews have focused on comprehensive studies on several aspects of RTPs, sciences and technology parks, and techno-policies such as:

- The impact of firms' proximity to RTPs
- The impact of NTBFs' performance on RTPs
- The role of RTPs in advancement of Local Innovation Systems, Regional Innovation System, and National Innovation system of the Economic Development, Sustainable Development and ecological footprints of RTPs
- The impact of on-park firms on the park's growth
- The impact of the park's networking and development of the park.

Numerous studies have been conducted in many countries with diverse cultures and political settings such as the *USA, Canada, and Southern America* (Anselin et al., 1997; Cabral, 1998c; Echols and Meredith, 1998; Link and Link, 2003; Adams, 2005; Link and Scott, 2006; Bement, 2011), *Europe and Turkey* (Quintas et al., 1992; Westhead and Storey, 1995; Guy, 1996; Guy et al., 1996; Thierstein and Wilhelm, 2001; Lindelöf & Löfsten, 2002; Ndonzuau et al., 2002; Siegel et al., 2003; Tamásy, 2007; Alvandi, 2010; Cetindamar, 2010; Basile, 2011; Omolo, 2011; Borgh et al., 2012; Wilson, 2012; Fikirkoca and Saritas, 2012; Ruiz-palomino et al., 2013) *Australia* (Phillimore, 1999), *South Asia* (Ma, 1998; Yuehua, 2002; Phillips and Wai-chung Yeung, 2003; Eto, 2005; Koh et al., 2005; Wong and Bunnell, 2006; Hu, 2007; Tsai et al., 2007; Vaidyanathan, 2008; Motohashi, 2013; Evgeny Klochikhin, 2013; Tian, 2013; Kang, 2014; Kim et al., 2014), and *Africa* (Sanni et al., 2010; Owolabi et al., 2012).

However only a few papers have considered the *Middle East* (Al-Sultan, 1998; Kharabsheh, 2011; Al-Filali and Gallarotti, 2012; Hanafi, 2013; Khorsheed, 2015). It has been noticed from the literature review that most RTP papers started with an introduction to RTP, the governance and legal framework of the park, the size of the

park's land, science and technology specialisms that the park is focusing on, and the affiliated universities. Additionally, RTP studies mentioned the numbers of companies, government agencies, and research centres located within the park, and the numbers or percentage of companies' specialisms along with the total number of employees. Conversely, only a few studies concentrated on the structural management of the RTPs; for instance Gkypali et al. (2016) reported that the RTPs which are being managed as public enterprises and not operating as private enterprises experience lower growth rates in regards to financial performance and financial sustainability. Nevertheless, Borgh et al. (2012) concluded that knowledge-based communities such as RTPs should regularly assist the NTBFs in re-evaluating their business models in order to fit with the park's overall strategic visionary management and increase the performance of both the park and the NTBFs.

### **2.3.1 Governance Models of Research Park and its Relationship to Growth Rate**

Based on the review of the literature, RTPs can have different governance models which significantly impact the growth rate of the park. For example, Chan (2010) demonstrated that, primarily, the RTPs are founded as a consortium to accelerate the high-technology start-ups, although to date no empirical study has investigated the correlation among the governance model and the growth rate of the RTPs.

According to (EIB/ CMI - ISESCO 2013) the RTP's governance model should consist of the right mix of people and organisations to determine the decision-making capacity in the park that will determine the RTP's success. The RTP's board members' competencies are considered as a critical factor in determining the RTP's success.

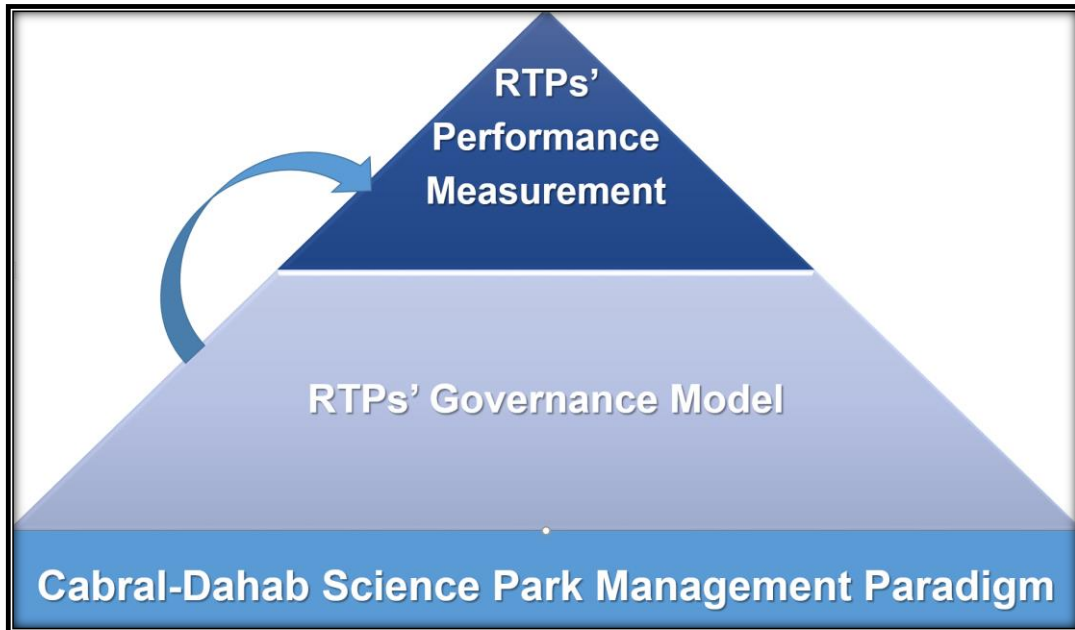
Examining a sample of 76 technological RTPs located within the boundaries of universities and operated by commercial companies with a technological focus particularly in Information Technology, Link and Scott (2006) reported that these RTPs have shown a faster absolute growth rate by 8.4% per year. Moreover, Centre and Kings (2015) reported that consortium management of Cambridge Research Park's so-called 'London Stansted Cambridge Consortium (LSCC)' has an average growth rate of 9% in the Bio sector. Moreover, Nauwelaers and Kleibrink (2014) argued that

involvement of diverse stakeholders in the RTPs' governance is a significant success factor for the 'Smart Specialisation Strategy' of the park.

These are the different types of RTPs' governance models. They do not relate to Cabral-Dahab as Cabral-Dahab focuses on the management elements that should be available in the park in order to achieve good management. However I am trying to investigate the impact of the RTP governance model on the performance. So the 10 elements of Cabral-Dahab management paradigm are the general theme that should be available for RTP good practices and RTP governance model is the focus of the research that I have proved that the RTP governance model influences the performance of the RTP. The researcher categorised the RTP governance models as below:

- 1) Triple-helix, Consortium of different governmental, local, and regional bodies, in addition to public and private organisations, universities and research centres. Yigitcanlar and Fachinelli (2011, p.91) defined the consortium as “an organization whose members work together to achieve common goals normally beyond the resources of a single member. The consortium can play the role of knowledge market maker to enable the exchange of knowledge between the various partner organizations.”
- 2) Non-profit RTP
- 3) Part of university organisation structure
- 4) Company with share capital
- 5) Company owned by a university
- 6) Governmental RTP/ Free Zones

Figure 2.1 below illustrates the relations between Cabral-Dahab, RTPs' governance models and the RTPs' performance measurement.



**Figure 2. 1: The relationship between the between Cabral-Dahab, RTPs' Governance Models and the RTPs' Performance Measurement**

In contrast, Kang (2014) categorised the strategic management models of RTPs into three categories: static model, liberalism model, and typical Triple-Helix model. The *static* model is where the government has sole control of the RTP and the tenant, whereas in the *liberalism* model the government, industry, and the RTP operate autonomously with agreed guidelines among them, and the typical *Triple-helix* model is based on a consortium of the three actors with decentralised governance (Villani and Antonietti, 2013). Moreover, Link and Scott (2006) showed that 6% of US RTPs are formally affiliated with more than one university. They confirmed that when universities are formally affiliated with RTPs, this has a significant impact on the growth rate of the RTP, as the percentage of RTPs affiliated with one to two universities increases by 2% annually. Although the information provided by Link and Scott's (2006) survey was useful, there is no evidence about the sample size and the study location.

Luger and Goldstein (1991) reported that only 25% of US RTPs fall under the universities' organisational structure. They reported that some universities assisted in establishment of the RTP then transferred its management to another party.

The university and the RTPs can have the following forms of relationship:

- The university owns the landscape and buildings and leases spaces to tenants' firms;
- The RTP is managed by a private company and the university owns and operates buildings on its park lands; and
- The RTP is located near the university and managed by a private company; the university owns the landscape and has authority over the strategic direction of the RTP's growth.

### **2.3.2 Research Park Performance Evaluation**

A review of the literature highlighted the relationship among the main components of the knowledge-based economy such as knowledge-sharing, innovation system, and performance. Wang and Wang (2012) empirically studied this relationship model via data collected from 89 technology firms in China. The study revealed that there are two types of knowledge-sharing that enhance the innovation system and affect the performance: Explicit and Tacit. Each influences some aspect of the innovation system. For instance, *explicit* knowledge-sharing can advance the financial growth and accelerate the innovation process. Conversely, *tacit* knowledge-sharing can advance the quality of innovation and operational growth.

The literature review revealed that when a RTP's performance is evaluated, consideration should be taken of how the park has developed over the years, such as the increase of companies and employees within the park, how the area of specialisms has expanded, and how the services are developed and enhanced within the parks. Moreover, Leydesdorff and Fritsch (2006) advised taking into consideration the regional and local environmental and cultural settings when measuring the knowledge-based economy, thereby limiting the negative factors associated with such an environment.

Bigliardi et al. (2006) stated that there are several indicators to evaluate the performance of RTPs:

- 1) Financially measuring the RTP by measuring the investment types, the park's ROI, and financial development of start-ups produced by their services or products. The performance of the share capital RTPs can be measured by financial indicators (Net income) only, which limits the measurement of other performance indicators.
- 2) Measuring the innovation performance of the parks such as the number of start-ups and RTP tenants' firms located on-park, number of patents registered, and number of new technological and innovative products developed within the park.
- 3) Measuring the SA 800 Social Accountability Standards defined as "a set of international workplace and human rights standards developed by Social Accountability International with input from the United Nations and numerous NGOs" (Miles and Munilla, 2004, p.4; Bigliardi et al., 2006). It was found that there are not many references to the SA 800 in the literature.

Other measurement indicators for non-profit RTPs are the services, innovations, and technology transfer. However, the measurement of non-profit RTP lacks the financial figures that present the financial value of the park. Additionally, Jimenez-Zarco et al. (2013) stated that the ability of the entrepreneurs to effectively operate the performance growth start-ups is a considerable measurement factor when it comes to evaluation of the RTPs' performance.

On the other hand, the developing countries will encounter barriers to boosting their economic development due to unprepared infrastructure, lack of expertise, and cultural resistance (Cabral and Dahab, 1998; Yuehua, 2002; ; Rodríguez-pose and Hardy, 2014) . If these barriers are compared to those that occur in the context of the KSA, we will find that cultural resistance is the biggest challenge facing the economic development performance of KSA's RTPs. Incomplete infrastructure will not pose an obstacle since there are huge improvements in the infrastructure and availability of expertise in the science and technology fields, which significantly increased in the KSA in the last 10 years (Shin et al., 2012).



Bigliardi et al. (2006) stated that the RTP business model does not always match the mission of RTP, and the different actors of RTP expect different outcomes and benefits from the RTP and its performance growth. Therefore, RTP management should be aware of the different and competing priorities of the RTP and balance them. That is why the research has provided examples of the implementation of the solutions and analysed other references and literature reviews, resulting in identification of a set of criteria for evaluating the performance of RTPs in Europe. The researcher shed light on the importance of governmental bodies overseeing the different innovation programmes within RTPs in order to avoid overlap among them. This will be achieved by the collaboration between RTPs with regional economic development agencies to link the local RTPs, which is currently not the case in the KSA. Despite the role of KACST in funding the universities' RTPs, KACST does not govern the collaboration and streamline the activities and efforts among RTPs in the KSA (Melorose et al., 2015a).

### **2.3.3 Factors that Impact Research Parks' Growth Rates**

The evaluation of RTP performance is complex because of the unequal factors influencing the performance of the parks (Guy et al., 1996). In regards to the growth rate, Jimenez-Zarco et al. (2013) stated that the RTP's performance is affected by many factors such as the park size, maturity level, financial stability of the RTP's tenants' firms, and potential profitability of the entrepreneurs within the park incubator. Another study conducted by Lockett et al. (2005) stated that corporate strategy should focus on the knowledge-based view in order to create competitive advantage, and consider the various maturity stages of the firm and the knowledge gaps in each stage that might affect the effectiveness of spin-off. Also, Luger and Goldstein (1991) suggested that RTPs have to consider the contribution to the enhancement of territory economic development such as technological advancement.

The review of the literature showed that the maturity level of RTPs significantly impacts the mission, performance measurement, and growth of the park (Lockett et al., 2005; Bigliardi et al., 2006; Jimenez-Zarco et al., 2013). Nevertheless, Phillimore (1999) conducted a survey to show the impact of tenants' firms' links on the park's

performance by analysing the sample and the population, and specified the type of questions asked in the survey including the collaboration with the organisations within the park and with other research organisations. However, he failed to investigate the WATP RTP management and quality and level of support offered to the tenants' firms. The survey found that 63% of the park tenants that have a collaborative relationship with one or more companies located in the park were more effective and this was considered an important factor for success. Cooke and Leydesdorff (2006) claimed that the *constructive advantage model* which fosters the regional networks has become the pioneer model in the successful regional development economies. Moreover, the study of Surrey Research Park in the UK found that there are three types of collaboration between the park and the university: 1) Research collaboration; 2) Sponsoring the students and hiring them to work in the RTP tenants' firms, and 3) Attending seminars and conferences, or using the library.

Phillimore (1999) claimed that the proximity of the RTP to the university would be important in increasing the research collaboration in the case of WATP. Nevertheless, Vedovello's (1997) survey results showed that 95% of the Surrey Research Park tenants were collaborating with Surrey University. Conversely, Vedovello (1997) has not found any evidence that geographical proximity can generate any research collaboration between Surrey University and the tenants' firms in Surrey Research Park.

The most important aspect of studying the collaboration among the RTP and the university is to test the type and degree of the collaboration, such as networking, social impact and communications, research-based and facilities utilisation. By considering the physical proximity between the park and Surrey University, the study showed that physical proximity was one of the major contributors to enhancement of the interaction. Petraite (2010) argued that the impact of the networking and forming of collaboration is an essential success factor implicit to the strategic innovation management in Lithuanian RTPs, as networking is considered a crucial marketing tool for expediting the advancement of the RTPs' growth rate. Meanwhile, Haxton and Meade (2008)

emphasised that networking with IASPAl<sup>1</sup>, AURP<sup>2</sup>, CASTIP<sup>3</sup> and APEC<sup>4</sup> organisations can establish a medium for the creation of an efficacious platform for fostering the RTPs in developing and underdeveloped nations worldwide.

The growth rate of academic spin-off (ASO) companies is one of the significant factors impacting the increased growth rate of RTPs. Ndonzuau et al. (2002) showed that intellectual property of academic spin-offs is one of the main barriers to the academic members proceeding with ASO companies since debate continues who owns the research idea, and who will finance the company formation. The most important issue is to find the best method of protecting the idea by patents or copyrights. Jimenez-Zarco et al. (2013) argued that there is currently no consensus regarding the legislation of the intellectual property of ASOs; thus, the universities are using their own preferred methods in securing/protecting their intellectual property.

Another issue is the conflict of interest that occurs between the university and the ASOs. However, a more significant issue is when ASOs relocate in another country, which will negatively affect their home country's economic development. An example of this is when an ASO in Belgium transferred to the Netherlands, negatively impacting the economic development of Belgium (Ndonzuau et al., 2002). Therefore, the networks' parties should consist of research institutions such as universities, research centres and national laboratories, industry and private sectors, venture capital investors, professional consultancy agencies, technology transfer offices (TTOs), governmental agencies, and research and technology funding agencies (Cooke and Leydesdorff, 2006).

Another aspect of RTPs' success as stated by Gulati et al. (2000) is that networking represents a significant competitive advantage to the firms and will grant them access

---

<sup>1</sup> IASPAl is the abbreviation for International Association of Science Parks and Areas of Innovation

<sup>2</sup> AURP is the abbreviation for Association of University Research Parks

<sup>3</sup> CASTIP is the abbreviation for China Association of Science and Technology

<sup>4</sup> APEC is the abbreviation for Asia-Pacific Economic Cooperative

to more markets, talent and organisational knowledge, besides the significant impact on the firm's profitability. Feldman (2007) also stated that networking among incubators, RTPs, universities, and the government agencies are the main pillars of support for entrepreneurs to boost their small businesses. This is also the concept behind the Triple-helix theory. Guan and Ma (2007) further showed that the networking capabilities are significant in improving China's position globally. Cooke (2001) postulated that the most successful networking style among the institutions, government agencies and the industries is the regional interaction economy, such as Baden-Württemberg<sup>5</sup> in which the collaboration seems to follow a methodological approach. Meanwhile, Phillimore (1999) claimed that the main aim of creation of RTPs in Australia is to enable technology transfer between the RTP and tenants' firms, and the commercial sector in general. Phillimore also claimed that Massey et al. (1992) did not find a tangible technology transfer from RTPs to commercial sectors and that the value generated by parks' economic development is a phenomenon that has not yet been proven significant. Nevertheless, Massey et al. (1992) stated that RTPs are only focusing on real-estate development and that technology transfer among RTPs in the geographical proximity was not significant, as was expected. Castells and Hall (1994) meanwhile claimed that technology transfer was not happening within technical aspects among the tenants' firms of the park, and that the park is separated from the technical society and networking and was just focusing on the urban development of the park.

Nonetheless, Luger and Goldstein (1991) stated that the main reasons for RTP failures are: 1) paucity of stakeholders' engagement and lack of patience; 2) Distributive politics; 3) Unsuitable population size and development possibility in the region; 4) Paucity of research universities in the region, and 5) Constraints on accessing the intellectual properties.

---

<sup>5</sup> Baden-Württemberg was chosen instead of Wales to test the hypothesis: "Is there is a generalised model for Regional Economic Success?" Baden-Württemberg was chosen because it had a comparable, though larger-scale, industry structure to that of Wales, dominated by automotive and electronics engineering as well as a mix of large and smaller firms in supply chains. Yet there the resemblance ended since the German region remains the far more prosperous and innovative" (Oh, Phillips and Cities, 2014, p.52)

On the other hand, Joseph (1994, cited by Phillimore, 1999) critically evaluated the Australian RTPs on the *linear innovation model* which he evaluated as an inappropriate and old-fashioned management model which should not be used for evaluating and improving parks' performance. He stated that such a model does not have standard criteria to assess the RTP's performance, technology development and technology transfer. Moreover, Australian RTPs tend to show bias towards research activities over other activities. Joseph claimed that they need to implement the innovation management model that RTP managers are adopting to excel in managing the parks. He suggested that Australian RTPs should concentrate more on the networking opportunities with private companies within Australia to develop technology transfer, which is the most important aspect in a country with isolated boundaries like Australia. Consequently – and due to the lack of strategic management – Australian RTPs were focusing on university affiliation and not concentrating on the RTP collaboration with industry, which has proved to be a significant success factor for technology transfer (Phillimore, 1999).

Another factor that impacts RTPs' performance significantly as identified by Squicciarini (2007) is that locating NTBFs onsite within the parks increases the probability that NTBFs will file patents by up to 13.95%. Therefore, the RTP's performance and growth rate are increased. Nevertheless, Ruiz-palomino et al. (2013) claimed that social theory impacts the interaction and therefore impacts the performance of the RTPs. Their paper carefully showed the contribution of its research and linked it to previous research and literature reviews. Moreover, Cabral (1998c) claimed that the success of the RTP comes from the individual success of all firms located within it, and the informal links among them increases the success rate for the park. Cabral further stated that one of the most significant factors for a park's success is the selection method of the firms located within the park; this needs significant intuitive managerial skills regarding potential of the economic value that firms will add to the park.

#### 2.4. Strategic Management Models of Different Research Parks

This section reviews the different strategic management models of RTPs and the literature on the strengths and weaknesses of different models. Few studies shed light on the strategic vision of innovation: Petraite (2010) defined it as the invention of innovation strategies resulting in novel products, services, and business models that embed a considerable difference and value-added in the performance of consumers and organisations. A review of Bigliardi et al.'s (2006) article showed that Galileo Science Park's business model is *Consortium*, in that it is managed by several shareholders from the Padua Chamber of Commerce (with 41% share of the equity), the Municipality and Province of Padua (with 11% for each), and three other Chambers of Commerce in the Veneto Region (Belluno, Treviso, Vicenza). There are also other local industrial associations, the Agency for regional development *Veneto Innovazione*, and the University of Padua. The park's mission is to liaise between the innovation requirements of industry and different academic divisions of the University of Padua.

Koh et al. (2005) simulated the successful experience of RTPs to Singapore RTPs. This resulted in a framework that monitors the success factors and renovates the existing strategy implementation to expand its performance by studying the growth setup, technological competencies, and how Singapore RTPs fit within the global and national economic development. The results of the framework revealed that for Singapore Science Park to become the leading science park in the Far East going into the future, the park's management should engage in huge efforts to identify and enable the global and local linkages that accelerate the performance of parks. The main challenges of implementing the proposed framework were to enhance and encourage more collaboration with the local industry and establish connections with the renowned science parks internally and externally. The researcher admitted that the Singapore Science Park model is not the perfect model and that the North One Science Park has been established after learning the failure lessons from the Singapore Science Park. Thus, the North One Park built efficient infrastructure which facilitated continuous collaboration and networking opportunities that satisfied the business services and tenants' firms. It also works closely with tenants to facilitate research collaboration

among them, and between them and the research institutions. Moreover, it has modern infrastructure and facilities that appeal to global firms to relocate in One North Park (Wong and Bunnell, 2006). On the other hand, Yan and Chien (2013) reported that RTPs such as those in Zhongguancun in Beijing, Daedeok Innopolis in Korea, and Hsinchu in Taiwan can be benchmarked with China RTPs to reach global level. The world's most successful Science Parks (Silicon Valley, Cambridge Science Park, and Hsinchu Science-based Industrial Park) were established based on different strategic management models (Koh et al., 2005). The strategic management model for Silicon Valley is focused on the high-technology clusters for entrepreneurial culture embedded within an academic anchor (Adams, 2005; Fikirkoca and Saritas, 2012). Conversely, Cambridge Science Park's strategic management model is based on partnership, in which the land is owned by Trinity College and there is a robust partnership with Cambridge University. Moreover, real-estate developers have been authorised to develop the land's properties (European Commission, 2013). On the other hand, the strategic management model of China's Hsinchu Science-based Industrial Park (HSIP) is the total extreme as it is completely government-oriented. HSIP Development was fully funded by the government and is located on public land (Lai and Shyu, 2005). It is obvious that none of the famous RTPs worldwide governance models include the 'under University-structure RTP' governance model.

Furthermore, Bigliardi et al. (2006) claimed that the legal framework of the RTP influences its mission and restricts several management aspects of the park. Moreover, the tenants located on-park will benefit most from their locations as confirmed by the survey conducted by Lindelöf and Löfsten (2002), which showed that the NTBFs located on RTPs had significant opportunities and showed a more rapid growth rate than off-park NTBFs did.

Bigliardi and colleagues also stated that companies located on RTPs attached to the universities are exposed to a higher percentage of individuals with postgraduate qualifications than those in off-park firms. Furthermore, Link and Scott (2006) postulated that one of the reasons behind the slow growth of RTPs operated by the university is due to restricted policies and procedures that create obstacles in the park. Nevertheless, the university's management does not have sufficient level of expertise



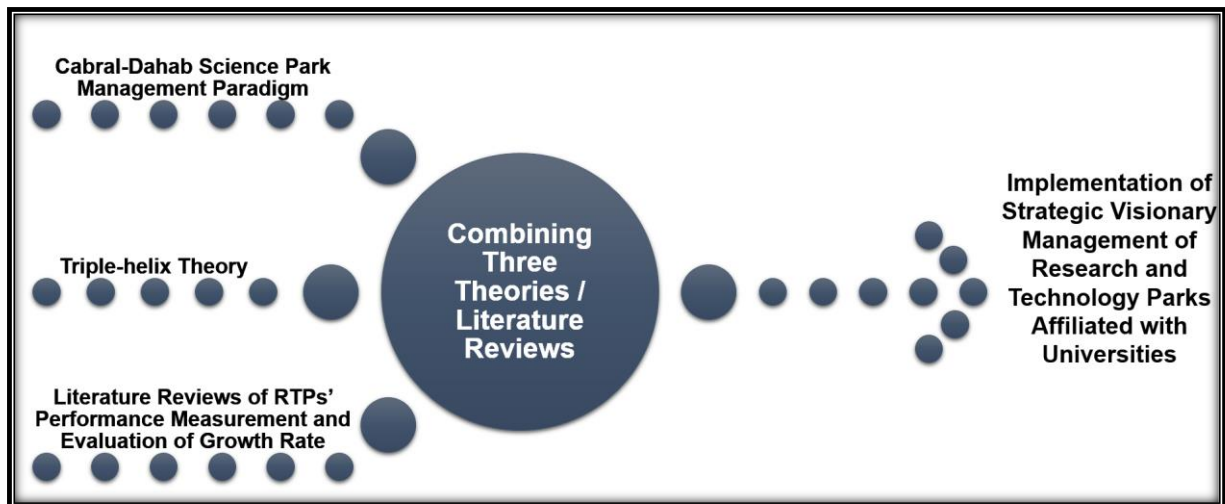
in economic development activities. Additionally, Ndonzuau et al. (2002) noted that one of the main problems in RTPs operated by universities as academic institutions is that they operate different management styles compared to those of technological parks. Therefore, we can conclude that the governance of RTPs as a consortium is the best strategic and business model as it combined the measurement factors for both financial and non-profit RTPs' measurement factors. Moreover, in a study conducted by Luger and Goldstein (1992), the interviews with the park's directors revealed that the university's management underestimated the cultural differences between the industries and universities and did not provide adequate remuneration for the faculty to collaborate with RTPs' tenants in the commercialisation of research.

## **2.5. Conclusion and Literature Gaps**

### **2.5.1. Theoretical Base of the Research Study**

This research intends to combine three theories; the first is the Cabral-Dahab Science Park Management Paradigm, which is one of the widely used models in science park governance (Sanni et al. 2010). The second theory is the Triple-helix, which was theorised by Leydesdorff and Etzkowitz (1996). The third theoretical basis of the research study is the literature reviews relating to the measurement of RTPs' performance and evaluation of growth rate, and the governance of the RTPs sheds light on the major factors influencing the evaluation of performance and growth rate of RTPs. The researcher combined the three theories as Cabral Dahab contains the main elements for any successful RTP. Triple-helix is the type of RTP governance model that enables the collaborations among the RTP stakeholders and partners, and the literature review of measurement of RTPs is needed to relate the growth of RTP to the RTP governance. Figure 2.2 below illustrates the relationship between the two employed theories and literature reviews in the research study.





**Figure 2. 2: Combining Two Theories and Literature Review Leading to Final Output of the Research Study**

To date, literature has focused on the measurement of growth rate and strategic management of parks. The Cabral-Dahab Science Park Management Paradigm is one of the most widely used models in RTP governance. Before adopting the Cabral-Dahab paradigm, RTP should verify that Cabral-Dahab's 10 elements exist in the park. As discussed by Cabral (1998c) the Cabral-Dahab management paradigm is one of the majorly popular models of park management. According to this park management model, a science and technology park needs to have access to qualified personnel related to the R&D area of the topic of knowledge, which is giving the park its typical identity. Moreover, according to Yuehua (2002) it is important for the park to be able to market its services and products. On the other hand, the park must also have the expertise of rendering marketing and managerial skills to the small- and medium-sized enterprises that lack such skills. As mentioned by Cabral (1998), premised on this park management model, the park needs to be able to select or reject the firms which are entering the park. Moreover, the firms' business plans need to align to the identity of the park. According to Tsamis (2009), this model has suggested that the parks needed to have the support of powerful, dynamic and stable economic actors like political institutions, funding agencies or the local universities. On the other hand, according to Squicciarini (2007) the technological firms should have clear identity, name and logo. In addition, for better management of the park, it should include a person with active vision, decisive power, visible profile and image of credible interface between

education and industry, long-term plans, and effective management. Finally, according to Tsamis (2009) the parks should consist of a significant percentage of consultancy firms, laboratories and technological and quality control firms. This park management model thus calls for 10 different prerequisites for successful management of the technological firms.

The model defines the RTP as a cost reduction between research centres and the market by creating networks of firms that will have social and industrial networks. Moreover, risk operations related to innovation might reduce in the RTP context, which is why firms are willing to locate within the RTPs as tenants (Al-Sultan, 1998; Echols and Meredith, 1998; Cabral, 1998a; 1998c; 1998b; Cabral and Dahab, 1998; Sanni et al., 2010). The advantage of the Cabral-Dahab paradigm is that it can be implemented in many countries including Arab countries. Conversely, it needs to be refined particularly as for the case of Kuwait because, in Arab countries, the economic impact of the paradigm differs from country to country. For example, we cannot compare Kuwait's economic growth to that of any other Arabic countries in the MENA region such as Egypt, although the latter has a huge volume of scientific work force compared to Kuwait. Thus, the implementation of Cabral-Dahab will have different outcomes depending on context. In addition, many challenges emerged when the Kuwait National Research Centre tried to implement it in practice, such as:

- 1) The lack of technology transfer between research institutions and Kuwait's market;
- 2) At the time of the study, Kuwait had no formal policy or strategy in place concerning the knowledge-based or scientific economies; and
- 3) There was a lack of competent scientific management.
- 4) One of the most significant factors for the success of the park is the selection criteria to the on-park firms requires significant managerial skills that are intuitive concerning the potential economic benefits that firms will add to the park. Moreover, the success of the RTPs comes from the individual success of all firms allocated in it, and the informal links among them increases the success rate for the park (Cabral, 1998c).

On the other hand, the Triple-helix, theorised by Etzkowitz and Leydesdorff, (2000), states that the process of new research innovations emerging from universities should be linked with the government-funded banks and agencies, and industry, to stimulate the innovation process. However, the interaction between university-industry-government will generate a new approach to improve economic development and take the national economy to the next level of a knowledge-based economy (Leydesdorff and Fritsch, 2006; Eileen, 2007; Feldman, 2007; Jousma et al., 2009; Leydesdorff and Zawdie, 2010; Albahari, Alberto et al., 2011; Al-Sultan and Alzaharnah, 2012; Leydesdorff, 2012; Shin et al., 2012; Zhou, 2014; Amaral, 2015; Zouain and Plonski, 2015). Moreover, Leydesdorff (2012a) demonstrated that one of the advantages to implementing the Triple-helix model in qualitative research is to disseminate the knowledge of the minimum requirements of the knowledge-based economy using at least three dimensions: 'University-Government-Industry'. Some countries, like Japan, have added an additional dimension for the Triple-helix, which is 'internationalisation', since the higher educational institutions are heavily co-authoring with national parties.

Nevertheless, literature on the area of measurement of RTPs' Performance and Evaluation of Growth Rate sheds light on the major factors influencing the evaluation of performance and growth rate of RTPs (Guy, 1996; Vedovello, 1997; Phillimore, 1999; Ndonzuau et al., 2002; Chan and Lau, 2005; Bigliardi et al., 2006; Link and Scott, 2006; Squicciarini, 2007; Jimenez-Zarco et al., 2013; Ruiz-palomino et al., 2013; Nauwelaers and Kleibrink, 2014).

Conversely, only limited literature has investigated the research parks-university legal framework connections with limited scope, such as Technology in the Garden (Luger and Goldstein, 1991), the European Commission Report on Setting up, Management and Evaluating EU Science and Technology Parks (European Commission, 2013; Tobergte and Curtis, 2013), and Governance and Business Models at the HTCE: Disrupting Science Parks (Borgh, 2007). However, to the best of the researcher's knowledge, no literature has investigated the correlation between the growth of Performance Parks and their governance.

### 2.5.2. Literature Gaps

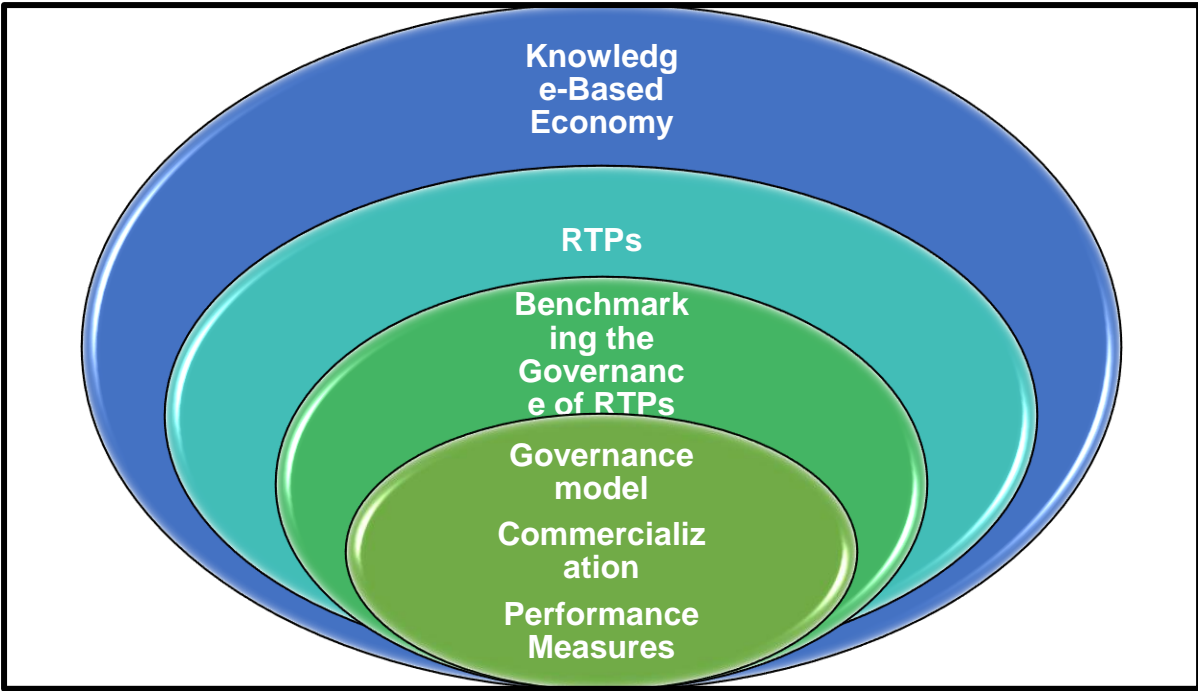
Phan et al. (2005) recommended that further research and improvement should be undertaken on RTPs and business incubators that have diverse cultures and different structures. Moreover, Bigliardi et al. (2006) stated that, due to the significant growth of RTPs in the developing countries, there is a significant need to assess the performance of those parks in regard to their supporting strategies of innovation from the perspectives of industry and academia. Nevertheless, Zhang (2013) identified the need for further research on the measurement of the RTPs' performance particularly in the area of internal factors affecting the RTPs such as a park's governance and management structure. Chan (2010) investigated the performance of the science park's firms but, to date, and to the best of the researcher's knowledge, no research has been undertaken to shed light on the performance of the science parks.

Kang (2014) highlighted a lack of research governance studies conducted in Korea, and RTP governance has not been investigated in depth. He also emphasised the infeasibility of creating the ideal governance model for RTPs that can be standardised globally as there are various factors affecting the governance of RTPs from one park to another such as organisational culture. Therefore, this reveals a gap in the literature where further study on using the governance model to advance the development of RTPs is needed, taking into consideration the RTPs' geographic, cultural and social contexts (Kang, 2014).

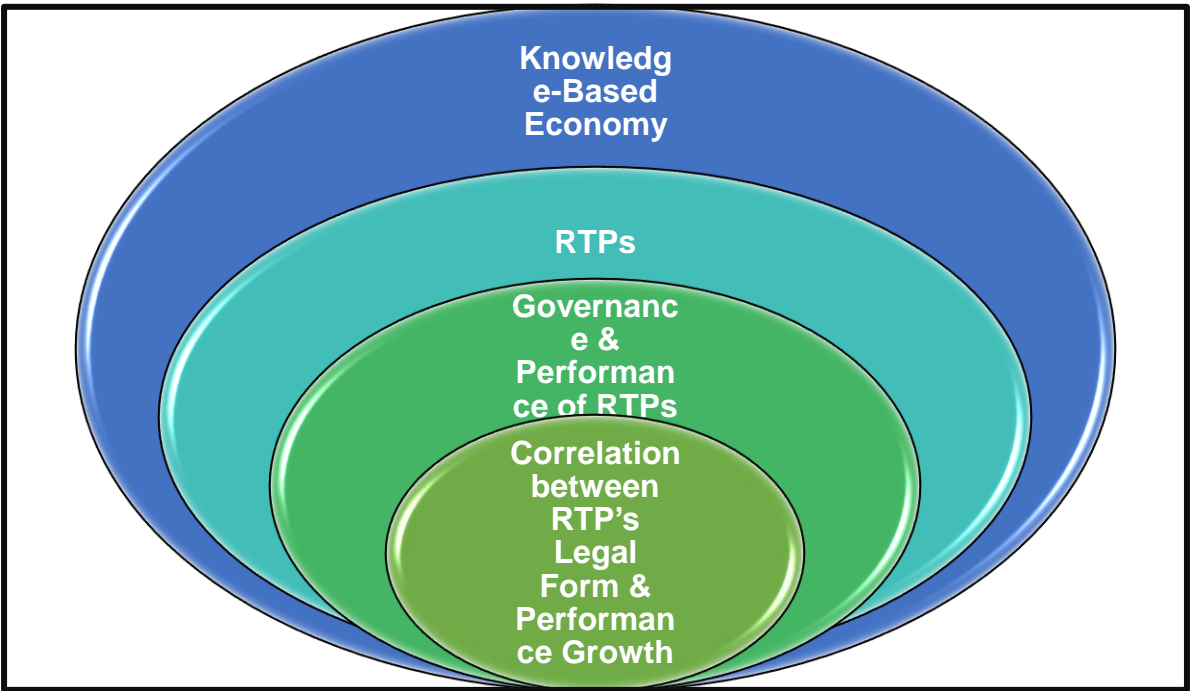
Al-Filali and Gallarotti (2012) postulated that policymakers should focus the strategy on developing the commercialisation of innovation and technological research and compete globally, but they lack investment from the private and public sectors in that aspect. This in turn created another major obstacle for knowledge-based advancement in the KSA, which is the lack of formal authority for controlling and governance of RTPs and coordinating among the existing RTPs instead of competing among each other. Conversely, Asheim and Coenen (2005) who studied the linkage between Regional Innovation System (RIS) and the RTPs cautioned against the use of the standardised business model of RTPs, and argued about the diversity of RTPs' collective knowledge base. Therefore, in a later chapter, this researcher employs the case study as a research strategy, since the RTP business model cannot be standardised.

Following this critical review of the literature, it is obvious that there are gaps in literature in a number of aspects such as the RTP-university legal connections; the correlation between performance park's growth and the park's governance and strategic model; studies on the performance measurement and governance of RTPs in the KSA; studies on the strategic visionary management of RTPs; and the impact of the culture of the RTPs in the park's development. The literature review also exposed a gap in the existing knowledge of assessment and improvement of the RTP performance in the Saudi culture and context. Moreover, no investigation to date has tested the correlation between the research parks-university legal connections (stakeholders determining the RTP policy and strategy) and the parks' growth rate. Thus, the intent of this research is to verify the improvement of performance of spin-off RTPs affiliated with universities in the KSA by considering RTPKEID as the case study. Moreover, it investigates the different strategic models of RTPs affiliated with universities. The research takes into consideration the cultural difference and economic context of the KSA.

The link between this study's research questions (listed below) and the research questions from the literature reviews is that they are all based on exploratory methodological approaches to evaluate performance of RTPs and investigate the networking activities among the parks' tenants' firms. Below, Figures 2.3 and 2.4 illustrate how the researcher conceptualised her research questions derived from the literature gaps.



**Figure 2. 3: How the Researcher Conceptualised the Research Questions Derived from the Literature Gaps “Qualitative Methods”**



**Figure 2. 4: How the Researcher Conceptualised the Research Questions Derived from the Literature Gaps “Quantitative Methods”**

### **2.5.3. Research Questions**

Derived from the literature reviews, the following research questions have been formulated:

1. Is there a correlation between RTPs' Governance and the growth rate and performance of the park?
2. What are the different strategic and business management models adopted by successful RTPs? How have these models satisfied the strategic visionary management of the parks and increased the performance growth rate of the parks? (Ndonzuau et al., 2002; Borgh, 2007)
3. What is the combination of the different successful business and strategic models that will best fit RTPKEID? (*Exploratory Research Methodology: Case study to implement the best model on RTPKEID*)
  - a. How will the research collaboration and data transfer between RTPs' tenants, research, and academic be conducted?
  - b. What services will be provided to RTP firms' tenants?
4. What are the expected benefits for RTPKEID if it adopts the new customised strategic management model?

### **2.5.4. The most Common Elements within RTPs' Successful Strategic and Business Models**

This section reviews the different strategic management models for research parks, and the literature on the pros and cons of different models.

Although it is hard to measure the performance of RTPs due to the difference among RTPs' strategic management models and the diverse criteria from one RTP to another, many factors influence the RTP's performance. These factors include: Number of patents registered, KPIs for financial revenue and profitability, number of on-park tenants' firms, growth of sales, increase in self-employment, outputs of R&D activities, and capacity for establishing formal and informal links with Higher Education Institutions (Bigliardi et al., 2006; Albahari, Klofsten, and Perez, 2011; Liang, 2013). Koh et al. (2005) simulated the successful experience of Research Parks to Singapore research parks. This resulted in a framework that monitored the success factors and renovated the existing strategy implementation to expand its performance by studying



the growth setup, technological competencies, and how it fits within the global and national economic development. The results of the framework implementation showed that Singapore Science park has made huge efforts to identify and enable the global and local linkages that definitely accelerate the performance of the park to become the leading science park in the Far East for the upcoming years.

The challenges of implementing the proposed framework were to enhance and encourage more collaborations with the local industry and establish connections with the renowned science parks internally and externally. Koh et al. (2005) admitted that the Singapore Science Park model is not the perfect model and the North One Science Park has been established after learning the failure lessons from Singapore Science Park. Thus, it built efficient infrastructure resulting in continuous collaboration and networking opportunities that satisfied the business services and tenants' firms. It works closely with tenants to facilitate research collaboration among them with the research institutions. Moreover, it has modern infrastructure and facilities that appeal to global firms to relocate in One North Park (Wong and Bunnell, 2006).

Conversely, the support of the government and Linköping University (LiU) to MSP and NOSP boost the successful performance of the parks. They collaborated to establish an effective Triple-helix model to facilitate the essential circumstances to develop the Sciences and Technologies objectives (Albahari, Klofsten and Canto, 2011). A review of Bigliardi et al.'s (2006) article showed that Galileo Science Park's mission is very similar to RTPKEID's mission, in which they both are performing as liaison agent between the innovation requirement of industry and different academic divisions of both RTPPU and RTPKEID.

### **2.5.5. Conclusion**

This thesis addresses research questions derived from the literature review, to explore performance of Science and Technology Parks and investigate the networking among the parks' tenants' firms. On the other hand, this thesis' research questions empirically test the relationship between the governance of RTP and the performance growth rate of the park. In addition, this research explores a method of increasing the performance



growth rate by creating a strategic management conceptualisation model generated from benchmarking different successful management models of science parks from all over the world. This research project expands the existing knowledge of assessment and improvement of the research park performance with a key focus on the KSA culture and context. Following this critical review of the literature, it is obvious that there are five gaps in literature in several aspects related to RTPs.

According to Quintas et al. (1992), the concept of linking is the foundation of science parks. The absence of linkages though might be meaningful for the tenants but there is no value or minimal value added in comparison to other corporate and technology businesses or to the economic development of the places where the parks are set up. Thus, linkages are necessary for the evaluation of the technology park set up and its feasibility for the same. However, it is acknowledged by Quintas that a tension is always present between the outcome-oriented and process-oriented foci at the tactical level within the environment. To ease the relevant tension, Quintas has identified a compromise between the outcomes and the processes although this was only achieved with a fair share of obstructions.

The five gaps alluded to above are 1) the RTP-university legal connections; 2) the correlation between Performance Park's growth and the park's governance and strategic model; 3) studies on the performance measurement and governance of RTPs in the KSA; 4) studies on the strategic visionary management of RTPs; and 5) the impact of the culture of the RTPs in the park's development.

Al-Filali and Gallarotti (2012) postulated that policymakers should focus their strategy on developing the commercialisation of innovation and technological research and compete globally, but they lack investment from the private and public sectors in that aspect. This in turn created another major obstacle for knowledge-based advancement in the KSA, which is the lack of formal authority for controlling and governance of RTPs and coordination instead of competition among the existing RTPs. Conversely, Asheim and Coenen (2005) who studied the linkage between Regional Innovation System (RIS) and the RTPs cautioned against the use of the standardised business model of RTPs, and argued about the diversity of RTPs' collective knowledge base.



## CHAPTER 3: RESEARCH PHILOSOPHY

### 3.1 Introduction

This chapter introduces the research philosophical approach and research paradigm to demonstrate the methodologies adopted in this research study. Figure 3.1 below shows the research onion visually display the overall plan for a research study. The researcher's decision about tactics of research study requires a clear understanding of the different quantitative and qualitative data collection techniques (e.g., questionnaires, interviews, and secondary data) and the ensuing quantitative and qualitative data analysis approaches. In this chapter, the researcher presents the general philosophical perspectives and discusses in details the philosophical approach that fit the research question. According to Saunders et al. (2009), the research onion forms the building blocks of the research design, which is explained comprehensively in Chapter 4.

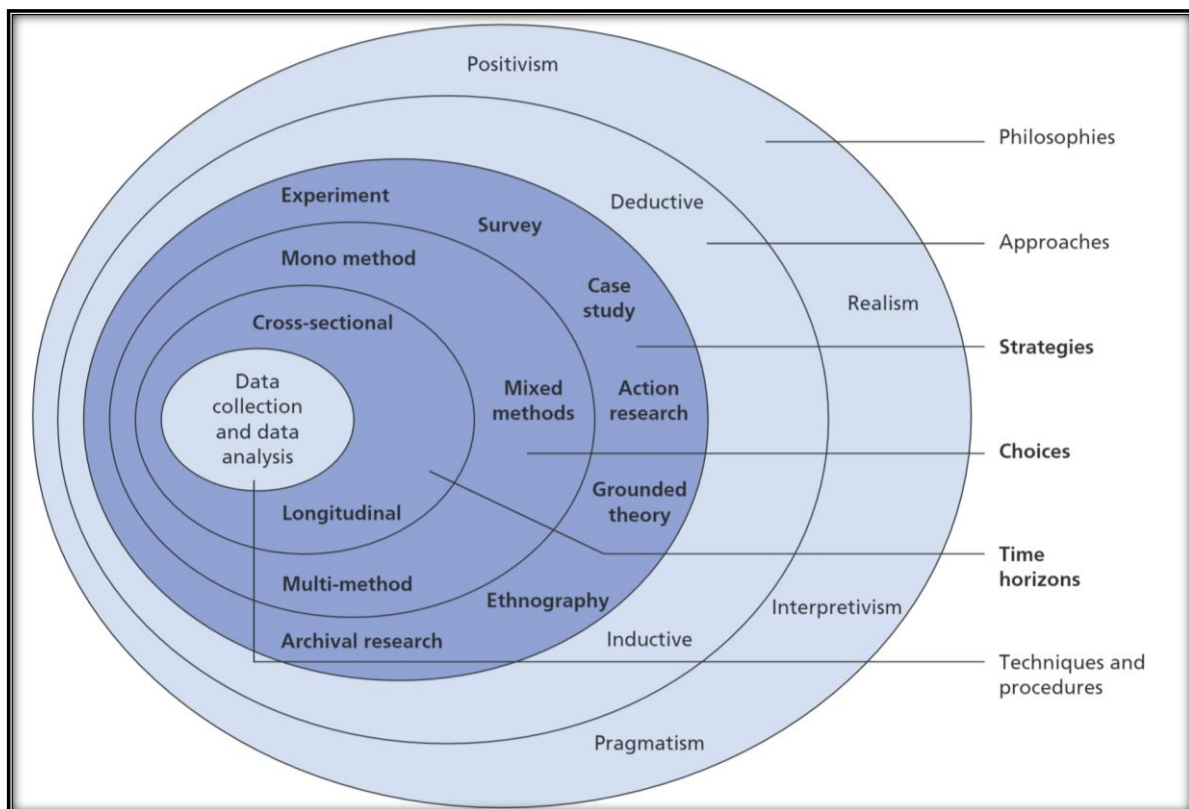


Figure 3. 1: Research Onion

### 3.2 Philosophical Approach

Creswell (2013, p. 31) identified the research approach as “plans and the procedures for research that includes the steps starting from broad assumptions to detailed methods of data collection, analysis, and interpretation.”

Despite the fact that the governance type and the RTP’s performance growth are already investigated in the literature, several researchers have attempted to explore the governance of RTPs (Soon et al., 2011, Borgh et al., 2012, Deakin, 2014, Kang, 2014). In particular, Soon et al. (2011) stated that many governments did not show achievements in the performance of RTPs due to improper governance structure of the park and lack of management capabilities. On the other hand, several researchers empirically studied RTPs and factors impacting them (Chan, 2010).

An empirical study was conducted among 21 European countries between 2000 and 2011 to study the relationships among the innovation performance of the research centres and financial governance of the knowledge of RTPs (Del Giudice, 2014). The (EIB/ CMI - ISESCO (2013) Report recommended that the governance model of a RTP plays a crucial role in the success of the park, particularly when the governance model has some diverse stakeholders with capabilities and skills who have a decision-making power over the park. Moreover, the report emphasised that RTP management teams should differentiate between the shareholders who are *investing* in the RTP and stakeholders who have an *interest* in the RTP. Nevertheless, the success of the RTP and potential development significantly depend on many factors related to the RTP’s governance as **consortium** model, such as the capabilities of the RTP’s management and the board of directors with their roles and voting power. Moreover, concerning the legal structure of the RTP, the local governmental sectors’ contribution to the RTP’s governance are crucial factors to the RTP’s success. The RTP’s management must create a clear governance mechanism for the consortium model particularly regarding the accountability and responsibility of shareholders and stakeholders’ parties.

The researcher chosen to employ pragmatism as this allows the researcher to maneuverer between the quantitative and qualitative data simultaneously to achieve a better understanding of the research problems. Therefore, during the quantitative

phase, the researcher will administer the survey and collect the data using the web-based standardised procedures, including reliability and validity checks of the questionnaires. Meanwhile, during the qualitative phase, the researcher will assume a more participatory role due to the “sustained and extensive experience with participants” (Creswell, 2013, p. 184) and personal involvement with the research topic. (Ivankova and Stick, 2007)

The justification for employing pragmatism as the philosophical research perspective is that “an ideology is true only if it works”, especially in supporting the fairness and it creates applicable significance for society. Thus, pragmatism concentrates on ontology if a case is significant enough to create an impact and opens the door for more fairness and freedom in the society (David 2004), which is the optimum goal of RTP.

The below mentioned points are considered in this research as these are dictated by pragmatism:

- Simplest strategy to be adopted first, i.e.
  - Documentation that is available should be read
  - The major stakeholders and the concerned commissioners should be identified
  - Thereafter the major stakeholders and the concerned commissioners should be interviewed
  - The drivers for the concerned should be noted down
  - These drivers should be shared with major stakeholders and commissioners and should be agreed with them
  - The process of review as well as amendment as per the requirement should be followed robustly throughout the period of the feasibility study.
- On unsatisfactory outcome of the process mentioned, additional formalised procedures should be adopted; e.g.:
  - The documentation base should be expanded
  - For uncovering of the drivers, the textual analysis technique should be used

- Formal methods of mapping techniques should be used for identification of all the relevant stakeholders
- Formal data elicitation technique to be applied for collection, analysis and mapping of the drivers
- Formal consensus to be used
- Techniques should be built for establishing the set of drivers that have been unconditionally agreed with.

### 3.3 Research Philosophy

According to Creswell (2013) the research philosophies are driven by the context of the research itself. Many factors can contribute to the selection of the philosophical view, such as the research problem, preferences of the researcher's supervisory team, and the previous research studies conducted on that subject. The most common research philosophies employed in research are post-positivism, constructivism, transformative, and pragmatism.

Guba and Lincoln (1994) and Saunders et al. (2009) claimed that the research philosophy, e.g., positivism, interpretivism, pragmatism, determines ontological and epistemological positions. On the other hand, Olsen (2004) classified realism to be the only plural among the different research philosophies, which makes it adaptable for research that employs the mixed-methods approach. Moreover, Sayer (1992) argued that using interpretivism /constructionism, 'as part of the ontological view' alone is too superficial as a methodology. (Easton, 2010)

Conversely, RITCHIE et al. (2003) stated that ontology has three perspectives: Realism, Materialism, and Idealism. *Realism* asserts that people's philosophical views of the world differ from how the world really exists. On the other hand, *materialism* states that the only reality in the world exists in the material characteristics of that world, such as economic associations, and the tangible features of that world. Finally, *idealism* holds that the individual's beliefs are the only way to discover the reality.

Due to the nature of the practical research study of RTPs, which integrate positivist and interpretivist research philosophies, the researcher figured out that choosing

between the ontological and epistemology perspectives will lead to quite impractical outcomes. Therefore, if the researcher's point of view is following the previously mentioned approach, then it would be possible to employ the position of the pragmatist. Moreover, the most important factor in choosing your research philosophy is determined by the research questions. In this thesis, the research questions vary between epistemology, ontology and axiology; therefore, the researcher chose to adopt the pragmatism perspective. Conversely, more than one of the research questions in this thesis do not suggest explicitly if the research should adopt positivist nor interpretivist philosophies, therefore, this justifies the pragmatist's perspective as the best fit to answer such variation among the different research philosophical views: epistemology, ontology and axiology. (Saunders et al., 2009)

On the other hand, Tashakkori and Teddlie (1998) recommended that it is more suitable for the researcher to consider the philosophy employed in a particular research field by employing consortium than single positions (Saunders et al., 2009)

### **3.3.1 Pragmatism Approach**

Morgan's (2007) research project was to study the different case studies in literature that used mixed-methods paradigm. He proved that the mixed-methods paradigm had gained significant attention in research by concluding valuable findings. Moreover, he claimed that the pragmatic approach should be viewed from a point of view of "Shared meanings" as two researchers are collaborating to achieve a shared goal to fulfil a collaborative project.

Meanwhile, Schuh and Barab (2008) demonstrated that *pragmatism* is neither an ontology nor an epistemology. The pragmatists' advocates John Dewey, C.S. Peirce and William James viewed this philosophical perspective as truth. Thus, they defined it as follows: "Knowledge is derived from interaction among groups of individuals and the artefacts in their environment, both of which create a reality" (Schuh and Barab, 2008, p.72). However, the traditional pragmatist differentiation is to demonstrate pragmatism by cohesive practice and theory (Hellmann, 2009).

The important feature is that pragmatism provides the researcher with the capabilities to manage and integrate mixed methodologies to develop an in-depth strategy to attain

the reliable integration between the ontology and epistemology philosophical perspectives. (Creswell, 2007, p. 107)

According to Kuhn (1962, p. 23) a paradigm could be regarded as an “accepted model or pattern” in the cases where a deeper philosophical position required for the nature of social phenomena, which make it easier for the researcher to combine the correlation between RTPs’ governance model and the performance and growth rate of the RTPs with the perspectives of RTPs’ stakeholder, and the lessons learnt from the local, regional, and international RTPs. The awareness of the unforeseeable human perspectives and factors drives the pragmatic researchers to be adjustable and open to the emergence of unpredictable findings out of the data (Feilzer, 2010).

### **3.3.2 Ontological Approach**

The ontological approach is focused on the “nature of reality”, which is investigated by many business and management researchers from the different perspectives of the mechanism of the world process and operations. Ontology has two stances: objectivism and subjectivism (Saunders et al., 2009).

Huizing (2007) defined *subjectivism* as the philosophical stance that concentrates on humanity in general and realisation of the human’s sense, personalities, experiences, and beliefs. On the other hand, *objectivism* is concerned about the exterior stances of the human being and senses. He demonstrated that the objectivist researchers segregate the human component from the surrounding objects in their search for the truth.

### **3.3.3 Epistemological Approach**

Schuh and Barab (2008) identified *epistemology* as a philosophy that declaims the originality, inwardness, and boundaries of human knowledge. Thus, researchers who focus on education and teaching have a significant epistemological goal regardless of the research approach they have chosen to adopt. Saunders et al. (2009) stated that epistemology focuses on the form of appropriate knowledge in the field of study. Epistemological researchers consider the actuality by only objects such as machines



or measurement tools. Their point of view is that these objects are isolated from the researcher's feelings and therefore are not influenced by researcher bias.



## CHAPTER 4: RESEARCH METHODOLOGY

### 4.1 Introduction

Methodology is one of the most important parts of the research because the success of a research study depends on the selection of a valid and relevant research method. There are three main parts involved in the methodology of a research; these are (i) selection of research philosophy, (ii) selection of research approach, and (iii) selection of research design. This section explores the methodological considerations that underpin the proposed research and the paradigm selected followed by a discussion on the methods to be employed. As explored in the literature review, researchers who studied the RTPs' governance mainly employed the mixed-methods research approach. For example, Borgh (2007) used mixed methods to investigate how the governance can enhance the value creation and appropriation on the High Tech Campus. Moreover, Tsamis (2009) used mixed methods to support the triangulation principle and to study multiple-case studies in his research. On the other hand, Chan (2010) employed a quantitative methodology in his study to investigate the relationship between the innovation of RTP and its performance by using questionnaires as research methodology. Meanwhile, Yuehua (2002) developed a model for RTPs in developing countries by investigating the appropriateness of management strategies for RTPs in developed countries for application in developing countries.

Bigliardi et al. (2006) empirically studied the factors that create an efficient evaluation system and qualitative method using an exploratory analysis in four science parks. However, Tobergte and Curtis (2013) employed mixed methods to evaluate the strategic capabilities of Technology Parks in Latin America, while Yuehua (2002) stated that exploratory study through interview is crucial for the research that needs to answer research questions for testing hypotheses that are scarce in the literature. He studied in depth the financial models used to establish the RTPs by using an exploratory research methodology. Moreover, Bigliardi et al. (2006) employed an exploratory research methodology to investigate the factors for establishing an effective evaluation system in four RTPs in north-eastern Italy.

The goal of this research falls under the pragmatism method since it focuses on examining the hypothesis regarding the impact of the RTP's governance on its performance and growth. According to Guy et al. (1996), the *pragmatic* approach is the most appropriate when assessing the RTPs, due to nature of RTPs' governance and management researchers. For example, measuring the growth rate of RTPs and the relationship to its governance model usually investigated by employing a quantitative approach. Conversely, investigating the best strategic visionary management model requires deeper analysis from the qualitative approach.

Furthermore, the argument regarding the two research methodologies - *deductive* and *inductive* - has emerged as a new method to research the so-called Pragmatic Paradigm, which enables the researcher to employ a positivist stance to explore the research study using quantitative method while at the same time allowing them to employ interpretivist stances which will facilitate adoption of the qualitative method. Therefore, the pragmatic method enables the researcher to concentrate on the research methods and pay attention to the differences among the philosophical foundations of each research method. However, this current research uses the quantitative method to test the hypothesis using the deductive approach as evidence to support the research conclusion. On the other hand, the research employs the inductive approach as the genesis of the conclusion (Ritchie et al., 2003).

Furthermore, this research employs the mixed methods approach. The reason behind this is that the data of the quantitative approach are gathered from an expected population of 400-600 members in RTP organisations in different countries and with different governance models, which need to be tested empirically to explore the correlations among each RTP's governance model and the performance growth rate. On the other hand, the qualitative approach is employed to collect data through structured and semi-structured interviews with 50- 60 RTPs' directors from different countries and within the KSA and Gulf countries. Initial approval was obtained from the RTPs' directors to conduct the interviews. The data from the interviews provided the research study with in-depth analysis of the role that RTPs' stakeholders play in the relationship between the RTP's governance model and the park's growth rate, the success factors for the RTPs, and the facts that lead to performance growth of the

park. Moreover, semi-structured interviews are undertaken with the RTPs' tenants to investigate the stakeholder's points of view in conceptualisation of the best strategic visionary model for RTPs in the KSA.

The inductive approach of the research involves benchmarking the strategic management models of existing research, science and technology parks around the world to come up with the best strategic management model that satisfies the RTPKIED visionary management and fits within the unique culture.

The research considers both successful research parks and lessons learnt from failed cases and the approaches they followed to overcome the failure and become successful. This research uses the research philosophical approaches as a "toolkit" to get the advantages of both quantitative and qualitative methods and support of one method to strengthen the evidence of the other method. According to Ritchie et al., (2003), the variance perspectives among the qualitative method itself indicated that the mixed methods should be a strength to the overall research studies and in fact some social researchers have started to realise the benefits of combining the research methods instead of arguing about which method is superior. The argument here is to concentrate on seeking the truth to answer the research questions rather than overwhelming the research with the diversity of the philosophical perspectives.

#### **4.2 Methodological Approach (Mixed Methods)**

The concept of the mixed-method approach emerged during the 1960s and was the most preferred approach in several areas of knowledge like management (Currall and Towler, 2003). There are some advantages that the researcher may benefit from by using the mixed-method research design. The most beneficial element of mixed methods is that the method provides the scope for exploration as well as analysis. Research that is based on the mixed methods of research design starts with the qualitative study which helps the researcher to explore detailed knowledge relating to the main problem area of the research. After gaining detailed knowledge on the main research problem, the method influences the researcher to conduct the analysis by employing a quantitative data-collection tool, like a *survey*. This means that the mixed-methods approach helps to explore the new sides of research problem in one hand

and on the other hand, it helps to analyse the research problem in detail. Apart from this, the mixed-methods approach helps the researcher to conduct the study from a broader perspective. In the case of a single approach, the research can concentrate on a particular issue and only tries to identify the cause-effect relationship between the research variables. However, in case of the mixed-methods or mixed research approach, the overall scope of the research is analysed from a broader perspective.

On the other hand, Teddlie and Tashakkori (2010) argued that there are several issues in adopting mixed methods as the research approach; the major challenge is identifying the proper research design. Therefore, Leech and Onwuegbuzie (2009) came up with a three-dimensional typology to resolve the issue of research design in the mixed-methods approach: “a) level of mixing (partially mixed versus fully mixed); (b) time orientation (concurrent versus sequential), and (c) emphasis of approaches (equal status versus dominant status)” (Teddlie and Tashakkori, 2010, p.268).

Another disadvantage in mixed methods is the level of complexity which is much higher. The mix of quantitative and qualitative methods increases the complexity level of this approach.

Hurmerinta-Peltomäki and Nummela (2006) conducted a thorough investigation of the most preferred research approach and the study revealed that the mixed-methods approach has the lead over the qualitative method. The significant argument in Olsen's (2004) research is that the data analysis in different data collection methods should be smooth and should not conflict with each other. Pragmatism is the main philosophical perspective for mixed-methods research, which consists of theory and practice. Therefore, the researcher elected to use mixed methods to achieve five outcomes.

1) **Triangulation:** to triangulate the data collection techniques by using two quantitative data collection approaches with the RTPs to corroborate the research findings from *one-to-one semi-structured interviews* and the *multiple-case studies*.

2) **Facilitation:** by using the quantitative research strategy of *survey* to help generate the main hypotheses and measurements for the qualitative method, the *case study*.

3) **Complementarity:** using the quantitative data collection method, *surveys*, to fill in the gaps and analyse the relationship between the RTP's governance model and the

park's performance and growth rate, and use the interviews and the multiple-case studies to provide the explanations for the hypotheses.

4) **Generality:** the quantitative data collection method – *Surveys* – was employed as an independent source of data collection to contextualise the qualitative method, *case study, and interviews* in order to set the broader context for generalisation of the research.

5) **Aid interpretation:** the use of qualitative data collection method aids in explanation of the relationship between the quantitative variables in the research study to answer the the main research question: *Is there a correlation between RTP's Governance and the growth rate and performance of the park?*

Ritchie et al. (2003) stated that mixed methods are crucial in examining both quantity and quality of a single phenomenon. In some cases, it is very complex to study one side of the phenomenon with a statistical measurement and there is a significant need to study the phenomenon in depth. Therefore, this research undertakes two exploratory studies using different types of information and measurements.

#### 4.2.1. Quantitative Research

As theorised by Saunders et al. (2009), explanatory research studies the phenomenon or the problem to demonstrate the relationships between two or more variables. As per the nature of this research, the research design should employ explanatory approach in the first step of the study. This research employs the quantitative methodology, which uses primary data. The primary data are gathered from an estimated population of 400-600. The survey is carried out with the members of AURP and IASP in the Research and Technology Parks (RTPs) in different countries and with different models of governance.

To test the hypothesis regression analysis is required to study the relationships between the governance (legal form) of the RTPs and the performance of the RTPs. The pilot study is planned to kick-off the research project with different RTPs inside and outside KSA and is tested before conducting the formal data collection.

To examine the validity of the questionnaire and its measurement items, a panel of subject matter experts consisting of one Assistant Professor in Applied Statistics, one RTP director, and two senior business managers reviewed the questionnaire and the interview's questions. The likelihood scales ranging from "Definitely", "Very Probably", "Probably", "Possibly", "Probably Not" and "Definitely Not" were used in the question related to the relationship between the RTP and the performance growth rate.

In addition, the dichotomous scales were used in some sections of the questionnaire. Two questionnaires were constructed, one for the RTP directors, which is the main questionnaire related to the research questions, and the second for the RTP tenants' firms (Start-ups and Large Corporate) mainly designed to test the validity of the answers of the RTP Directors. Both sets of questions are listed in Appendices A and B.

#### **4.2.2. Qualitative Research**

After the quantitative stage of the research, the qualitative research method follows as the exploratory aspect of this research. It is significant to explore the success factors for RTPs and seek new insights to create the framework for RTPKIED. There are many research strategies in conducting exploratory studies such as literature review and interviews with the subject matter experts (Saunders, Lewis and Thornhill, 2009).

#### **4.3. Case Study Research Design**

The case study research method was selected after the careful assessment of various research study strategies such as research in action and case study. The suitability is that studying RTPKEID as the key case study was justifiable as it is the only RTP in the KSA that has a different governance model. According to Yin (2004), the case study provides the researcher with the ability to deeply explore the hidden aspects of phenomena that will be fully investigated by other research methods and can be strengthened by another research method.

The researcher undertook the data collection stage in the following iterative process: identify the critical elements that will lead to answering to the research questions (as shown in Figures 4.6-3, 4.6-4, 4.6-5, and 4.6-6), observe and collect data via survey



questionnaire and interviews, and analyse the partially collected data to categorise the data and then draw the interconnected themes and patterns. The researcher kept the reporting of the findings to the later stage after the in-depth observations so that the reporting of data will be based on a solid understanding of the real-life problem for RTPKEID and of how the strategic visionary management roadmap will help to achieve the RTPKEID and Saudi vision 2030 at the end of the research.

Despite the opposite opinions of those who criticise the difficulty to generalise the results of the case study method, the case study can encourage the researcher to think 'out of the box' and provide innovative insights, develop new theory and to get connected with the practitioners, who are going to benefit more than the researcher after the delivery of the research findings. According to Voss et al. (2002) several innovative theories in operation management such as lean production resulted from case study research.

Yin (2004), however, presented critical conditions for employing the case study method: "construct validity, internal validity, external validity and reliability", claiming that if these found conditions were adopted, the use of case study in research will provide rigorous data for the research context. The condition on validity can be met via 'Triangulation' through implementing multiple methods of data collection. The case studies provided the researcher with the insights to explore the phenomena happening on-park starting from close connections with the tenants' firms such as large corporate's management team or staff, entrepreneurs, the management team and staff of the park, service providers, and other stakeholders. The observations give more realistic and pragmatic findings than online surveys alone (Yin, 2003, 2006; Voss et al., 2002).

#### **4.4. Influences on the Research Design Method and Theoretical Assumptions**

The major contribution was the strategies provided by the governmental bodies, which assisted the researcher in her findings and synthesis with the report findings that presented real and practical recommendations to RTPs in the KSA, and which

generalised the case study to other countries with similarities to Saudi's economic situation.

***The major influences on the research study can be categorised into two factors:***

**National Influence:** The dynamics in the Saudi economy and the National Transformation Plan 2020 which included the RTPs' governance, the establishment of the SMEA as the governance authority for entrepreneurs, and the establishment of a national centre for performance measurement of public sectors (ADAA). There is also included a high focus of the country on entrepreneurial activities, and the emergence to govern the techno valleys and measure the impact of the entrepreneurs on the country, and the openness to foreign investment.

**Researcher Influence:** Two additional case studies included in the research projects to 1) avoid the bias of researcher influences on the case study, and 2) several theoretical assumptions verified by the researcher during the field study, interviews, observations, and attending the conferences and networking sessions with the practitioners from RTPs, the government authorities engaged, and other stakeholders.

#### **4.4.1 Rationale for Case Study**

There are several justifications for selecting the case study as the research methodology, some of which are the strength that case studies afford to the research goals and relevance to the research questions and project limitations. The researcher selected three multiple-case studies from the KSA: two from the Western Region – one from Makkah City “RTPMWC”, another one from Jeddah City “RTPKEID”, and the last one from the Eastern Region, particularly from Dhahran City “RTPDTCV”. The selection of the case studies is also based on different geographic locations, sizes, and different cultural and strategic directions of the selected RTPs. The selected case studies are independent from each other: according to Yin, (2004, p. 8), “None of the cases should be considered “controls” for each other, in the same sense of the term “control group” because in case study research you do not manipulate “treatments” or control any real-life events”.

The main case study of the research project is the institution where the researcher is currently employed at RTPKEID, and the case study conducted on RTPKEID:

1. RTPKEID is an extreme case among the other RTPs in the KSA and the region. It is unique because of many factors, such as the high level of multicultural human resources, rare core labs and research centre facilities and equipment and the openness of the community as it is the **only research-based university in the KSA that has mixed genders** studying and working side-by-side in the labs, research centres, and different organisations.
2. RTPKEID is the only RTP in the KSA that falls under the structure of the university. All the other RTPs in the KSA have the governance and legal form of a 'Holding Company'.
3. The researcher has very good relationships within RTPKEID and the full study is sponsored by the employer.
4. RTPKEID has strong alliances and collaborations with diverse RTPs and STPs inside and outside KSA, in addition to the memberships with major RTP and innovations associations.
5. The risks of time management and financial resources allocated for travelling are all eliminated by selecting RTPKEID as a case study, since the researcher lives and works in the RTPKEID Community. Therefore, access to different organisations within RTPKEID is very easy for the researcher in order to conduct the research study. Saunders et al. (p. 118, 2009) stated that: "Single cases are appropriate when a particular case is a critical case and we want to use it to explain or question an established theory."

On the other hand, RTPDTCV and RTPMWC were selected due to the following justifications:

1. RTPDTCV has a similarity with RTPKEID in relation to the clean energy technologies.
2. RTPDTCV's strong collaboration with RTPKEID.

3. RTPDTV C's easy access since ARAMCO Company, which is the key board of director's member in RTPDTV C, was the sole responsible body in building RTPKEID.
4. RTPDTV C has the best success story among other RTPs in the KSA regarding the large-scale tenants' firms' located on-park.

Conversely, the RTPMWC was selected as it has the most successful story in fostering the entrepreneurs in the KSA, and the RTPKEID management team has a good relationship with the RTPMWC's CEO which allowed the researcher to conduct the case study on-park and get access easily to the required information, documentation, and tenants' firms as well.

#### **4.4.2. Cases Selection**

From another aspect, multiple-case studies were selected as the research methodology according to the below research relevance:

- i. Gives the researcher a neutral view to understand the differences among the RTPs which have different governance models in the KSA, therefore, allowing her to study the various RTPs' governance model phenomena in-depth within the context of KSA's culture, particularly given that the selected parks are at different stages of maturity and scattered regionally, which allows a broader spectrum of analysis of management practices.
- ii. The need to observe and study other real-life case studies that have different governance models and the different autonomy-levels of the RTP's CEO.
- iii. The research aimed to create a roadmap for RTP governance that matched its case study rather than test the theories of the Triple-helix and Cabrel-Dahab paradigms.
- iv. Alignment to the Saudi Vision 2030 in studying the governance model that best fits the Saudi Economy and boosts the opportunities and perceived values of RTPs in the context of the KSA.

#### **4.4.3. Unit of Analysis**

According to Yin (2006), the unit of analysis can be holistic or embedded. So, if the researcher is studying the organisation, there will be only one unit of analysis – the *holistic* unit. On the other hand, if the researcher is going to investigate a case study within the organisation's departments, then the unit of analysis will consist of multiple units of analysis and will be *embedded*. Here, the researcher regards each RTP as a holistic case study; therefore, there are three units of analysis, and the unit of analysis is driven by the research questions.

#### **4.5. The Research Strategies**

According to Saunders et al. (2009), the crucial factor in selecting the research strategy is its ability to guide the researcher to identify the real answers to the research questions and satisfy the research objections. Therefore, the rationalised selection of research strategy should be led by the research questions to facilitate the research timeline, resources and philosophical approaches. Therefore, this research intended to use multiple-case studies as the main research strategy to guide the researcher in answering the research questions. Particularly; the research questions require both quantitative (questionnaires) and qualitative (interviews) tools in data collection so that the answers to the research questions can be explored in a better way. Moreover, the case studies will help the researcher to collect more data and information on the selected research area. The researcher will also be able to conduct scientific experiments at the time of data analysis if case studies are used. However, the researcher may also face a problem – selection of an appropriate case study. There are some case studies that are not scientific, or do not support the scientific research. Therefore, this is one of the vital points that the researcher must consider while selecting the case studies.

##### **4.5.1. Multiple-case studies**

Eisenhardt (1989) defined 'case study' as a research strategy that concentrates on in-depth analysis within a single context. One of the main advantages of the case study is that it assists in exploring the sophisticated problems by mimicking actual phenomena, contributing to knowledge, and adding to the previous research studies.

Ghauri (2003) argued that the case study is most appropriate in ambiguous research projects where uncertainty is relatively high, particularly when the research involves theory building. Moreover, the customisation of the data collection process is the most notable advantage of a case study; therefore, the case study employs a vigorous data collection process that concentrates on the research rather than on the sample size. Ghauri (2003) claimed that a case study can be generalised if the research is using a deductive approach and the aim of the research is to generalise the findings of the phenomenon under investigation.

During the data collection phase and the field study, the current research focuses on investigating the identical questions among the three selected case studies in order to compare them with each other to reach to a conclusion. According to Ghauri (2003), the key concept of data collection in multiple-case studies is to 'replicate' the phenomenon in a meticulous manner in order to discover the various variables of the research study. Therefore, the researcher selected each case study to represent some certain criteria in the research and serve a specific purpose to construct a holistic framework for RTPs in the KSA.

According to Yin (2004), there are a number of advantages to employing the multiple-case studies: First, it will corroborate that the research is able to fulfil the life cycle of the case study research (such as design, selection, analysis and reporting) with multiple-case studies instead of a single case study, in addition to comparison among the three case studies. Moreover, it will help to eliminate personal points of view of the research. This is particularly important in this research as the researcher is a practitioner in one of the case studies". Second, the multiple-case studies increase the possibility of generalisation of the findings and reduce the criticism that the single case study sometimes receives from reviewers. Finally, the multiple-case studies will provide the research with a reasonable and diverse amount of comparative data for the purpose of analysis.

The reason behind the researcher's choice of the case study as the research strategy is that the case study strategy has significant advantages in answering 'what' and 'how' questions, such as '*What* are the different strategic and business management models adopted by successful RTPs?' and '*How* have these models satisfied the strategic visionary management of the parks and increased the performance growth rate of the parks?' Such questions need to be examined using a qualitative method by employing an in-depth interview approach and cannot be investigated via questionnaire. According to Saunders et al. (2009, p.146), "the case study strategy is most often used in explanatory and exploratory research. The data collection techniques employed may be various and are likely to be used in combination".

As stated above, the critical issue in case study research is the selection factor. The criteria employed when selecting the targeted population and sample case studies is crucial to the research because the findings will be affected by the criteria either negatively or positively. The population can be organisations, individuals or groups (Saunders et al. cited in Cooper 1984, 2009). After selection of the population, a selection of sample case studies follows. The criteria for selecting the case study should be appropriate to the research issue and questions. At the same time, they should be consistent with the theoretical framework and proposed variables that will be analysed during the study (Saunders et al., 2009).

The research design is defined as the steps followed to link the empirical data to the research questions. Accordingly, Yin (2003) identified five significant factors in designing a case study: 1) research questions, 2) the research hypothesis or proposal, 3) elements of analysis, 4) the debate on relationship between the data and the hypothesis or proposal, and 5) the criteria for translating the findings. Therefore, the case study research design will have more evidence of generalisability, validity and reliability by adopting these guidelines. Nonetheless, Eisenhardt and Graebner (2014) stated that multiple cases can generate vigorous theory due to the extensive level of observation and empirical evidence involved.

Moreover, the multiple cases provide the research study with deeply grounded identification of the core evidence and real-life situations presenting the holistic views of the phenomena, circumstantial considerations and diverse point of views.

Eisenhardt (1989) advocates for employing the multiple-case studies in building the theory due to the lack of empirical evidence and lack of literature in novel research studies (Eisenhardt and Graebner, 2014).

#### **4.6. The Methods of Data Collection**

The data collection methods are selected according to the research strategies and as the best fit to answer the research questions. The total number of participants is 90 with 30% response rate for the RTPs survey, achieved by incorporating the survey within the interviews by sending it to around 300 participants. Therefore, the following methods were chosen to gather as much as possible information to answer the research questions. The information about data collection, sample size, response rate, and timeline are detailed in [Sections 5.3](#).

##### **Primary data collection:**

- Interviews with RTPs' Directors and senior managers of different units under RTPs, such as the Technology Transfer Office, Entrepreneurship Centres, Investment Funds, and Business Development.
- Interviews with on-park tenants such as large corporate CEOs and senior managers, and entrepreneurs.
- Interviews with Saudi Governmental Policymakers such as the Deputy of Ministry of Economic and Planning, the Governor of the SMEA, and General Manager of ADAA.
- Observations during interview visits, attending meetings between Tenants' firms with the RTPs' management teams.
- Survey for RTPs' Directors to gather additional and supportive information which will enable the statistical analysis of the quantitative data collected.

Figure 4. 1 illustrates the primary data collection approaches implemented in the research. The figure identifies the different methods employed in the primary data



collection. The first, second and third layers list the organisations visited and the category of participant. The letters 'P' and 'O' indicate that the researcher was engaged as 'Participant', and 'Observer', respectively.

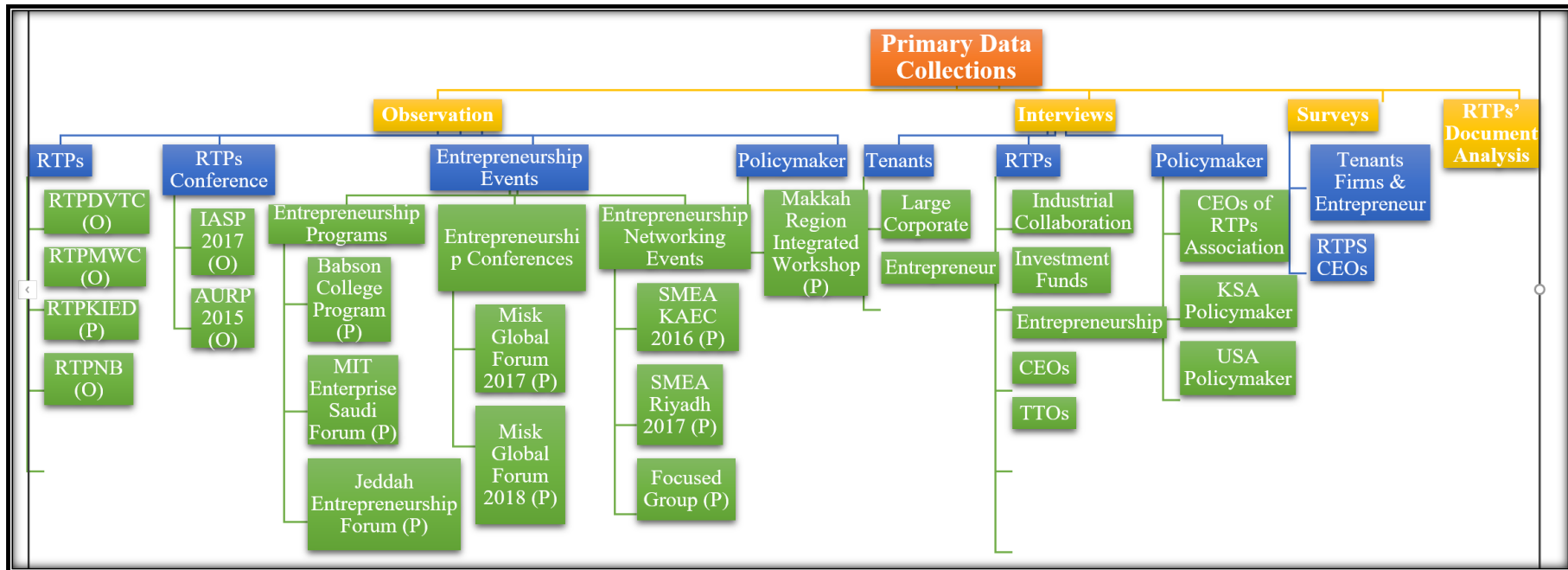


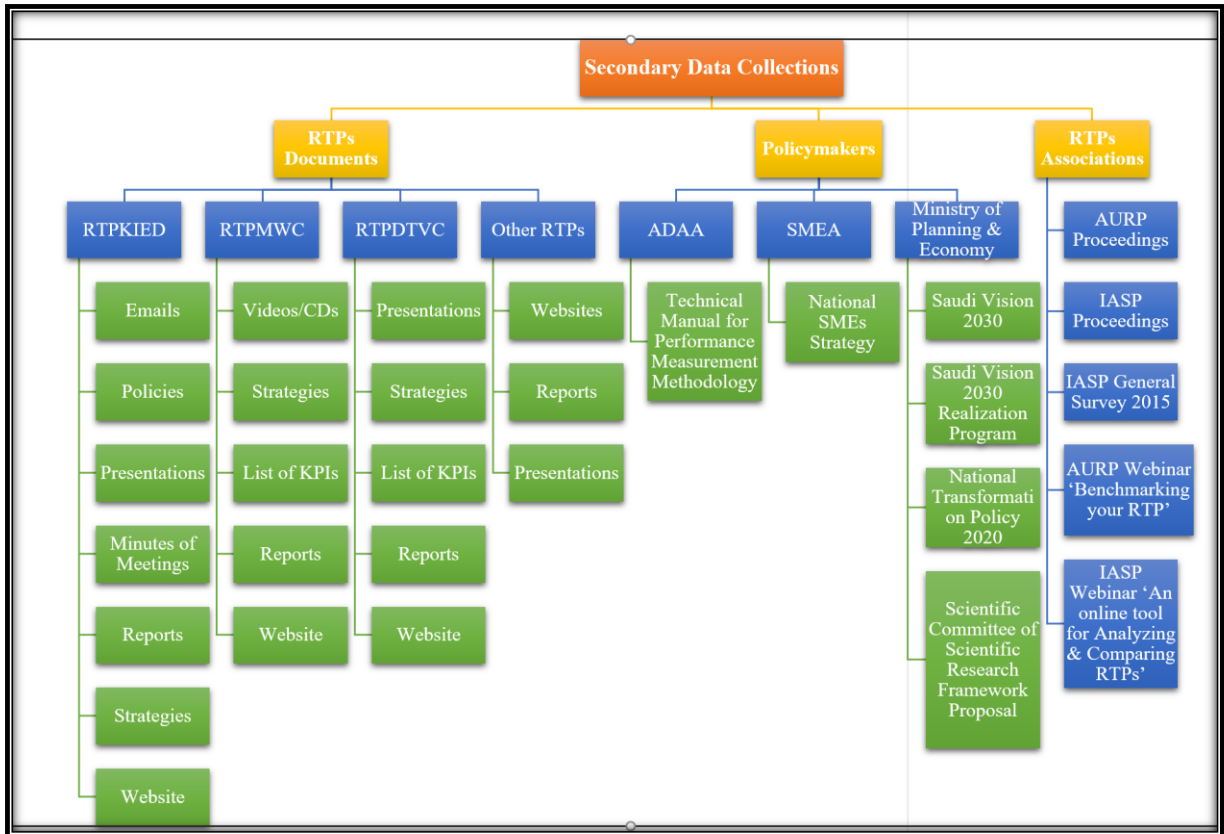
Figure 4. 1: Primary Data Collections Implemented in the Research Project

### **Secondary data collection:**

Secondary documentation has been reviewed to gain sufficient information to undertake the interviews, such as:

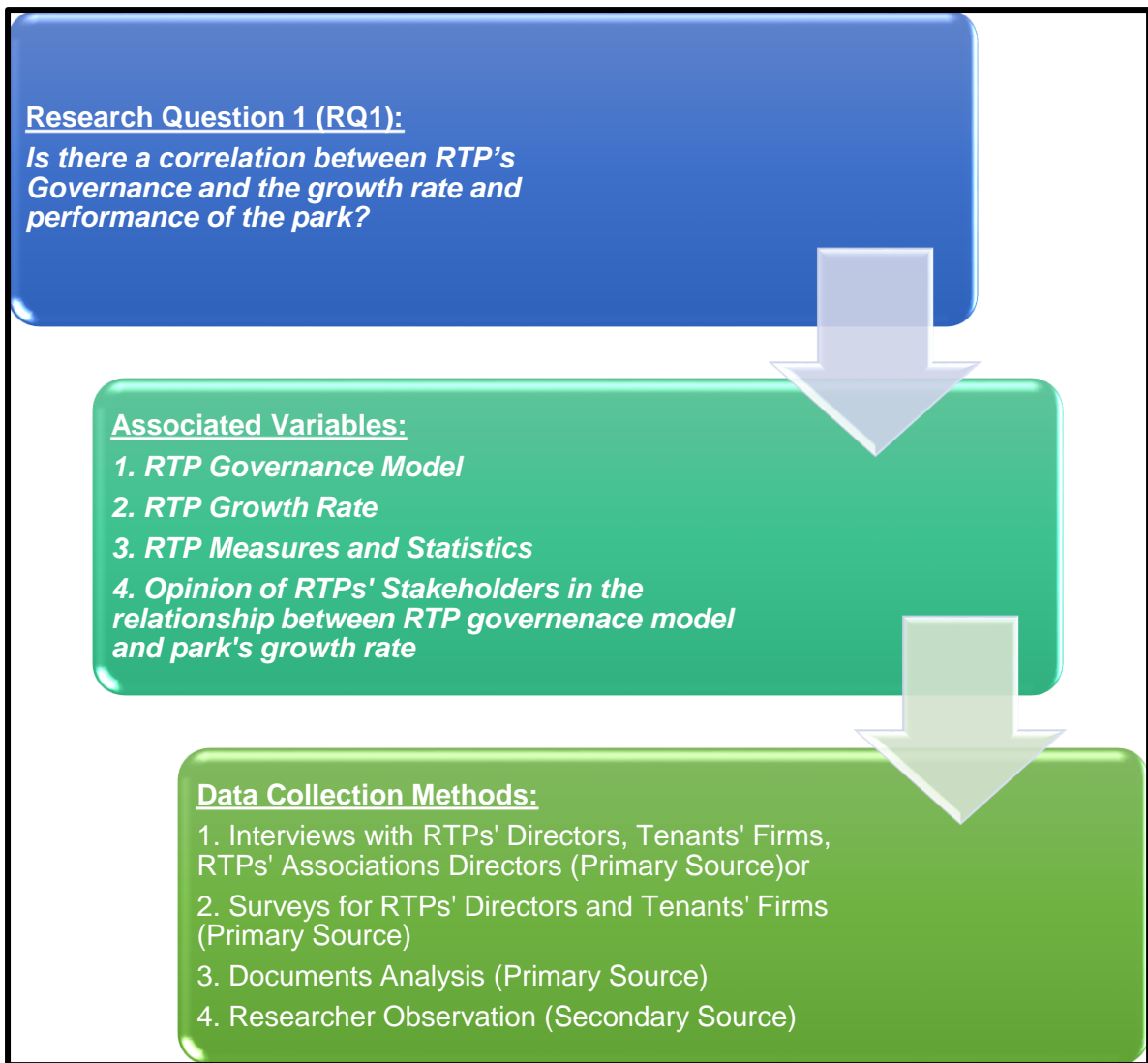
- i) The literature review of the performance, management and governance of RTPs affiliated with universities and research institutions.
- ii) The literature review of different strategic management and business models.
- iii) Official Annual Research Reports and performance documents of RTPs.
- iv) Empirical studies of research parks' performance and governance models.
- v) Notes, minutes of meetings, presentations and printed publications, and KPIs from strategy formulation and decision meetings identifying process, contents and sequence of events surrounding RTPKEID.
- vi) Internal policies and procedures, organisational structures, descriptions and list of services of the RTPs.
- vii) Flyers, brochures, and booklets of RTPs.
- viii) Contracts of RTPKEID with Tenant's firms.
- ix) Websites of RTPs.
- x) Webinars presented by RTPs Associations:
  - (1) AURP: "Benchmarking your research parks and identifying cluster strength for investment attraction success", and
  - (2) IASP: "An online tool for analysing and comparing science park strategies."

Figure 4.2 below illustrates the various secondary sources of data collection implemented in the research; these are shown in the first layer of the figure. The second layer lists the types of document, source of information, and the name of documents.



**Figure 4. 2: Secondary Data Collections Implemented in the Research Project**

To organise the data collection methods needed to elicit the answers of the research questions, the researcher introduces the diagram below to organise the data collection phase. The final discussions of these questions are detailed in Chapter 11.



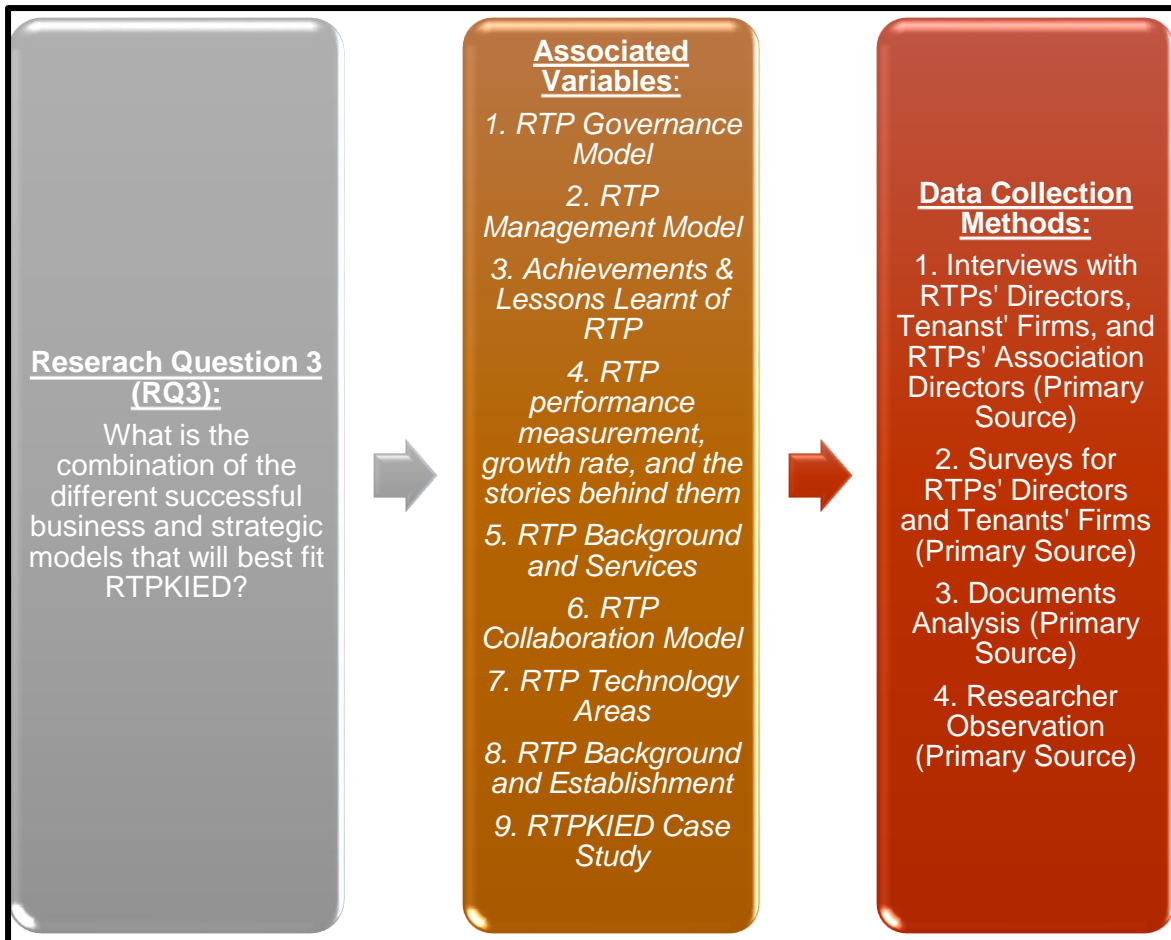
**Figure 4. 3: Associated Variables and Data Collection Methods to Answer RQ1**

Figure 4.3 above illustrates the associated variables and the data collection methods used to answer RQ1.



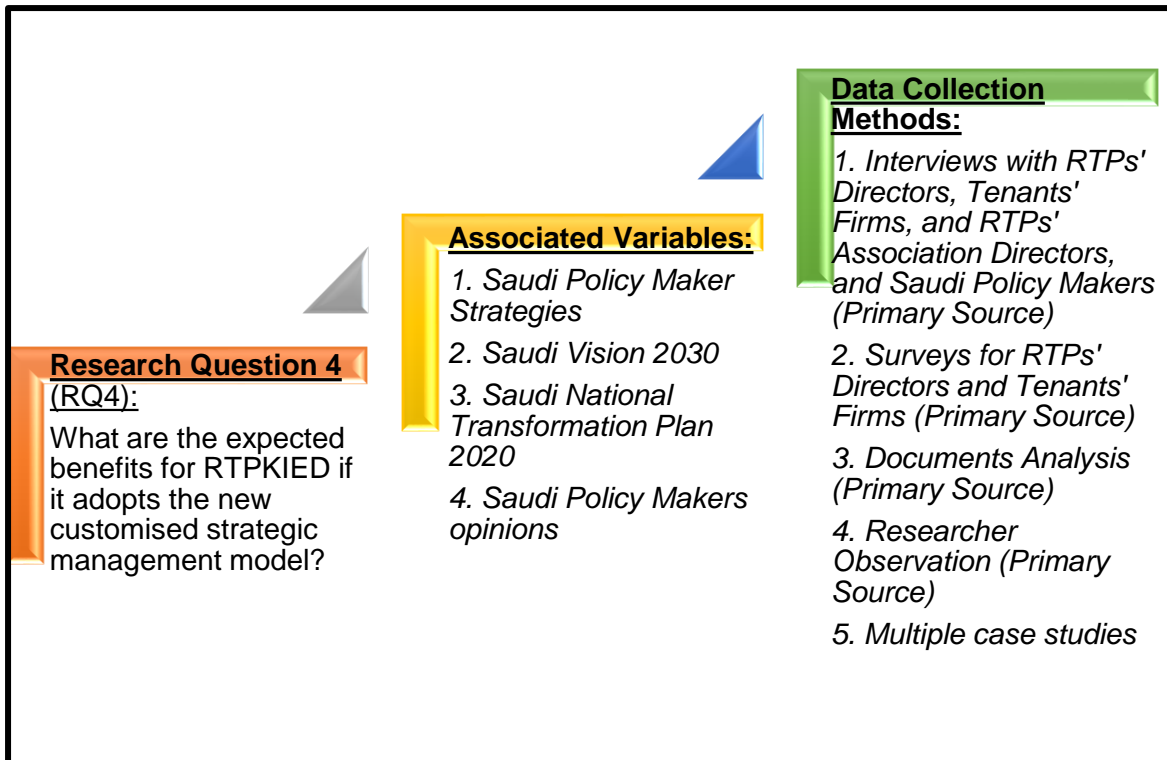
**Figure 4. 4: Associated Variables and Data Collection Methods to Answer RQ2**

Figure 4.4 above illustrates the associated variables and the data collection methods used to answer RQ2.



**Figure 4. 5: Associated Variables and Data Collection Methods to Answer RQ3**

Figure 4.5 above illustrates the associated variables and the data collection methods used to answer RQ3.



**Figure 4. 6: Associated Variables and Data Collection Methods to Answer RQ4**

Figure 4.6 above illustrates the associated variables and the data collection methods used to answer RQ4.

#### **4.6.1 Documentary Analysis**

In addition to using interviews as part of the case study strategy, the researcher plans to use documentary analysis and observations to explore the research questions related to the qualitative approach since many researchers are advised to triangulate the research study with diverse sources of data collection techniques to give the data findings more credibility. Data triangulation is when researchers combine two or more data collection research strategies to help in advocating the uncertainty manifesting from the pilot study. In addition to literature reviews, relevant documentation was reviewed to collect supporting information, such documents included

- i) Annual Research on parks; reports and performance documents.
- ii) Notes, minutes of meetings, presentation and printed publications, KPIs from strategy formulation and decision meetings identifying process, contents and sequence of events surrounding RTPKEID.



- iii) Internal policies and procedures from RTPKEID.
- iv) Contracts of RTPKEID with Tenants' firms.
- v) Websites of RTPs.

#### **4.6.2. Direct Observations**

Direct observation was promoted by many early social researchers such as Isaac Newton and Francis Bacon who determined that knowledge about the world should be acquired through direct observation (induction). Moreover, the direct observation provides the researcher with a holistic view and understanding of the case study rather than depending on abstract data (Yin, 2004; Laimer, 2014). Direct observation is useful in creating the roadmap of the research and making intangible observations of the RTP (Tian, 2013). The researcher employs direct observation mainly in RTPKEID since it is the case study of this research.

#### **4.6.3. Survey Research Questionnaire and Variables' Analysis**

The goal of distribution of the research questionnaire is to get insights into the linkage between the RTP's governance model and the performance of the park, and to analyse the factors of successful RTP affiliated with universities. The hypothesis that the researcher tests is related to RQ1: "Is there a correlation between RTPs' legal form (RTPs' Governance) and the growth rate and performance of the park?" The hypothesis is tested with the data collected from the questionnaires with the research parks using regression analysis. On the other hand, the Proposed Business, Governance and Strategic Models are generated from the data collected from the interviews with the RTPs' directors and RTPs' tenants' firms.

#### **4.6.5. Semi-structured Interviews**

Bryman (2006) conducted a study on the most used research strategies among 323 published journal articles from the period of 1994-2003 and found that 71.1% used semi-structured and unstructured interviews in their mixed-methods research. This research employs semi-structured interviews with open-ended questions that will be conducted considering three different opinions associated with RTPs: 1) RTPs' Directors, 2) RTPs' Tenants' firms, and 3) Saudi Governmental Authorities officers.

The semi-structured interview fits within this exploratory research study. According to Saunders et al. (2009) the exploratory research generally uses non-standard interview methods since the researcher wants to give more attention to specific questions related to the relationships between the RTP and the performance growth rate and the strategic and business models that the RTP's director adopts.

Moreover, the researcher wants to provide the participants with the opportunity to elaborate on the successful achievements of the RTPs and on the lessons learnt from the failures. All the interviews' answers were codified after the completion of the interviews using the qualitative NVivo program. On the other hand, Eisenhardt and Graebner (2007) claimed that the interviews are a significantly effective approach for eliciting empirical data in uncommon phenomena. Yet, it attracts immediate criticism that the data are influenced by the participants. To synthesise with the research study and to eliminate such bias, the researcher relied on the observations approach and documentary analysis (Storey and Westhead, 1995; Mariotto et al., 2014; Dasgupta, 2015).

#### **4.6.5. Sampling Strategy and Participants**

The sampling strategy used in this research is non-probability sampling. According to Saunders et al. (2009), during the research pilot survey, the non-probability sampling strategy is the concrete way to collect the representative sample, although it might not define the problem significantly. According to Creswell (2007), the number of interviews that should be conducted in qualitative research should ideally range between 25 and 30 interviews.

The researcher used quota sampling, which is a non-probability sampling technique. The selection of a sample for the interviews with RTP participants should be the CEO, the director, or the deputy of the RTP who are best able to answer the strategic visionary roadmap for the RTP and state what the achievements and lesson learnt are since the establishment of the park. Moreover, the duration of service and the seniority of the participants were the key criteria for sampling selection. On the other hand, the selection of the tenants' firm participants' criteria should be a mixture of founder and

co-founder of the start-up in case the tenant was an entrepreneur, or senior managerial level such as strategic business development manager of the large-scale corporate tenants' firms. Another factor that affected the interview selection criteria was the access to the RTP directors, tenants' firms, and governmental policymakers in the KSA which was acceptable for the selected case studies, bearing in mind the constraints of time and travelling to the RTPs and the collecting of sufficient data.

The research uses multiple-case studies of RTP; however RTPs from all the governance model types are included to participate in the interviews. This will provide insights of gathering the success factors for the best-fit recommendation of governance model to RTPKEID. In addition, the interviews and questionnaires include three types of participants: RTP Directors, RTP Tenant's Firms, and Saudi Governmental Authorities officers. The latter has a highly important role to align the research results and scope to the RTPs' policies within the context of the KSA and to recommend further research studies.

#### **4.6.5.1. Survey Participants**

RTP Directors are the best participants to provide the most accurate information about the RTPs' governance model. Usually all the RTPs' directors are members of the RTP governance board and they have the full information on all strategic directions of the parks.

#### **4.6.5.2. Interview Participants**

RTP Directors are the key participants involved in the strategy formulation and business and governance model of the RTP. By interviewing those regarding the RTP's strategy, business and governance model, the performance measurements and their relationship to the RTP growth will be identified. In addition, the lessons learnt and how these were overcome, and reported failures will contribute to the creation of the framework for the best strategy and governance model that fits RTPKEID. RTP's Tenants' expectations and needs are mandatory for any RTP to formulate the best strategy and governance model to serve the RTP's tenants since they are the key customers for any RTP.

#### **4.6.5.3. Critical Case Sampling**

Critical case sampling (Patton, 2002) is when cases are chosen on the basis that they demonstrate a phenomenon or position 'dramatically' or are pivotal in the delivery of a process or operation. The sample was selected based on the critical cases sampling for those that show a phenomenon in successful operations or process. These selected critical cases are widely appearing in the literature in such area of research (Saunders et al. 2009). Moreover, Patton (2002) appreciated the critical case sampling in evaluative research due to its value in shedding light on certain aspects of the operation or process, therefore enhancing the effect of the research (Ritchie et al., 2003). According to Creswell (2007, p.126), "One general guideline in qualitative research is not only to study a few sites or individuals but also to collect extensive detail about each site or individual studied."

Due to the nature of the research study, several Saudi authorities such as the Saudi governmental authorities, Authority of measurements, innovations and entrepreneurial were involved in the interviews. This assisted the research study to have a significant and practical impact on the advancement of RTPs in the KSA. The targeted participants from Saudi governmental authorities' officers were directors of King Abdullah City of Sciences and Technology (KACST) ([www.kacst.edu.sa](http://www.kacst.edu.sa), 2019), which is the main authority responsible for research and commercialisation in the KSA, ADAA, and the SMEA.

The below criteria formed the quota sample for the RTPs' directors' interviews:  
Position x Country x RTP's governance model

The RTP's tenants' firms' interviews: Position x Located on-Park

KSA governmental policymakers' in the KSA interviews: Highest Position x relatedness to RTP

#### **4.6.6. Pilot Interviews**

The pilot interviews helped enhance the interview questions and evaluate the misleading questions and provided the researcher with preliminary practise when dealing with the field study. Additionally, the selection of the pilot interviews sample

depends on convenient access (Creswell, 2007; Yin 2003). The advantage of pilot interviews is to utilise the collected data in the research data findings although following the pilot, slight revisions were made to/may be applied to it (Ritchie et al., 2003). The researcher planned to conduct pilot interviews with RTPSC's CEO, executive director of RTPD-IIT, CEO's ASURTP, and associate director of URTPWM. Meanwhile, the questionnaires were distributed to different research park managers with the assistance of RTPKIED. This would be easy as RTPKIED is a member of AURP and IASP that, collectively, have more than 2000 RTPs as members.

On the other hand, pilot interviews were conducted with the on-park tenants of RTPD TVC and RTPWMC. The final step involved interviewing the RTPs' directors. Therefore, the plan was to select two or three participants from each management model and arrange the interviews with directors of these RTPs.

#### **4.7. Ethical Considerations**

The researcher was introduced to the major RTPs' directors from the USA and other countries during the 2015 AURP International Conference while she was accompanying the RTPKEID group to the USA. This brief introduction eliminated the resistance and ethical issues which might have been raised by the participants as they trusted the RTPKEID; and particularly because the RTPKEID was the diamond sponsor of the conference.

On the other side, the ethical approval for the research was granted by ERGO Ethics Research Group Office by following the standard ERGO process to adhere to University of Southampton research ethics. The research was designed to follow the major ethical values, including quality and transparency, informed consent, voluntary participation, confidentiality and avoidance of harm.

According to the standard ERGO process, the below examples of practices have been addressed:

- Before the interview, the researcher explained the goal of her research, the sponsor of the study and how the participants can benefit from the research. She also provided the information sheet, and a brief of her research project to the participants, got the consent forms signed by the participants, and offered

to send the final reports to the participants. The briefing information sheet for potential respondents included a high-level description about the research study, the format and length of the interview, interview consent and sign-off, anticipated use of the findings and confidentiality, as presented in Appendix J.

- Respondents were invited to contact the researcher by email or phone call if they had further questions.
- At the start of the interview, consent was reviewed and signed by respondents.
- Respondents were acknowledged for their participation after the interview and given further opportunity to raise questions by follow-up email or phone call.
- The names of the Individuals and organisations were Anonymous in the presentation of findings, and discussion of findings with maintained individual and organisation anonymity and were coded.

#### **4.8. Conclusion**

To conclude this chapter, multiple factors influenced the research design that was implemented in the research to answer the research questions which started with empirically testing the relationships between the factors influencing the RTP's governance. This influenced the researcher to select the questionnaire as a form of quantitative data collection method with two main participants: RTPs' CEOs and Tenants' firms located on-park. The RTPs' CEOs survey was essential to test the correlations among each variable associated with RTP's growth and test its correlation to the RTP's governance. Moreover, the tenants' firms' survey was an additional authenticity added to the research to validate the data gathered from the survey of RTP's CEOs. Conversely, to study the RTP's governance and its relationship to RTP's growth in depth, the researcher selected three RTP case-studies from different RTPs' governance and cultures to enable the researcher to draw a concrete conclusion on the research study.



## CHAPTER 5: DATA ANALYSIS, DATA COLLECTION, AND CASE STUDIES' OVERVIEWS

### 5.1. Introduction

This chapter sets the scene on the data analysis and data collection, presents an overview of the three RTPs cases, and discusses how the researcher gained access to the sites of the cases to conduct the interviews, the surveys, and the observations. According to Eisenhardt (1989),

Investigators should formulate a research problem and possibly specify some potentially important variables, with some reference to extant literature. However, they should avoid thinking about specific relationships between variables and theories as much as possible, especially at the outset of the process.

### 5.2. Data Analysis

Data analysis is well-known in the literature for being a complex and difficult part of the process of qualitative research such as case studies, but it has been given less attention in the research literature. Many qualitative researchers strive to prove the solidity of their research findings or receive the appropriate guidance through the data analysis stage (Yin, 2006, Dierckx de Casterle et al., 2012). According to Mason (2002), there are three approaches in analysis of the interview data: literal, interpretive, and reflexive. In the *literal* approach, the researcher derives the data from the interviews in an interactive and a collaborative manner such as literal discussion, bearing in mind the flow of the interview. Conversely, in the *interpretive* approach, the researcher derives the data from the interviews in an expository approach in which the researcher assumes what the interview's data mean and by concluding the factors from outside of the interviews. Finally, in the *reflexive* approach, the researcher derives the data from the interviews by analysing the researcher's role and positionality within the communication during the interviews. It is worth mentioning that the selection of which approach to adopt depends to a great extent on the researcher's methodology and stance.



The key advice that the researcher gained from the literature is to combine the data collection and data analysis stages during the research life cycle as a non-linear and an iterative process, simultaneously. This enables the researcher to manoeuvre back and forth between the data collection and data analysis, to arrive at new strategies for data collection and to generate rich data. Thus, the process of data collection, data analysis, and report writing as an iterative process will definitely enhance and strengthen the research findings (Mason, 2002; Saunders et al., 2009; Easton, 2010; Creswell, 2013 ). Figure 5.1 illustrates the layer of case studies analysis used in this research project as inspired by the *Qualitative Research and Evaluation Methods* book by Patton (2002). It illustrates the layers of case studies analysis by building the larger case study units from smaller ones. Then the studies of individuals' case studies are deconstructed into studies of the RTP's tenants' firms which are considered as the smallest units of the RTP case study. The second layer is the RTP's divisions that have been studied, observed and interviewed during the field work. The third layer shows the level of the case organisation.

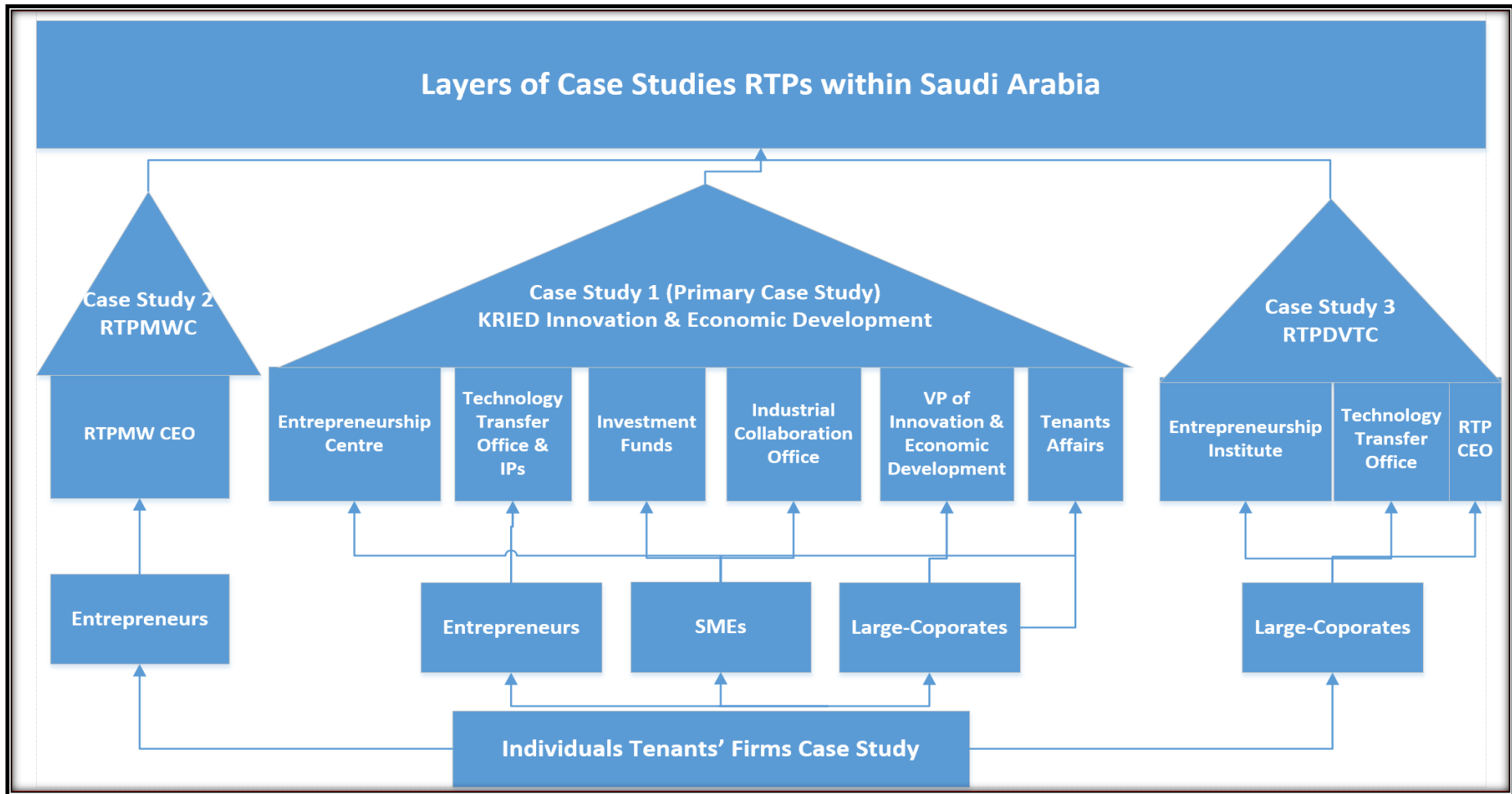


Figure 5. 1: Layers of Case Study RTPs within Saudi Arabia

### 5.3. Interviews and Data Collection Summary

Since the doctorate programme was funded by the researcher's employer, the access to the internal interviews and observations was gained through applying to the doctorate programme study system via the Human Resources department after coordination with the researcher's manager. After the approval process, the researcher gained internal approval from the Economic Development Department that will oversee the research project. The researcher met with the Vice President of the Economic Development Department and explained the research project, highlighting the main problem that the department wants to resolve via the doctorate research project. Finally, the researcher signed a Non-Disclosure Agreement with the Economic Development Department. Before the Pilot Study, the researcher requested access to external participants by approaching her study sponsor, who has multiple connections to RTPs' worldwide through the RTPs' associations and partners. The researcher was then connected with different key participants from RTPs' Associations, and two local RTPs to conduct the case studies. Each RTP met the criteria defined in the case study selection in section 4.3, pp. 48-50.

#### 5.3.1. Data Collections Timeline

Table 1 below shows the number of interviews by organisation and manager type, excluding preliminary context-gathering discussions.

**Table 1: Categorisation of Number of RTPs Interviewed**

<b>RTPs Stakeholders</b>	<b>No. of Interviewees</b>
Policymakers	9
RTPs' Directors	60
Tenants' firms (large corporates and entrepreneurs)	21
Total number of interviews	90

Table 2 below shows the timescale of the research project fieldwork where data were gathered between May 2017 and September 2017, followed by the remaining phases of data analysis and data findings.

**Table 2: Timeline of Research Project**

<b>Research Project</b>	<b>Duration</b>	<b>Start</b>	<b>Finish</b>
	<b>17.5 months</b>	<b>5/1/2017</b>	<b>8/31/2018</b>
Pilot Interviews	2 weeks	5/1/2017	5/12/2017
Send the Questionnaire to RTPs and Tenants' Firms	1 month	5/15/2017	6/9/2017
Interviews within the KSA	2 months	6/12/2017	8/4/2017
Interviews outside the KSA	2 months	8/7/2017	9/29/2017
Codifications	2 months	10/2/2017	11/24/2017
Analysis of Qualitative and Quantitative data	4 months	11/27/2017	3/16/2018
Generate Findings	3 months	3/19/2018	6/8/2018
Research Partners' Feedback	3 months	6/11/2018	8/31/2018

### **5.3.2. Sample Size and Response Rate**

A total of 90 semi-structured interviews were conducted with the main actors and stakeholders of the RTPs. The first group were the RTP's director/CEO and senior managers/directors of the different departments reporting to the RTP's director. The second group were RTPs' tenants' firms, who are the main customers for the RTPs in the three case studies. The third group were the policymakers of RTPs, divided into two categories: a) the local policymakers of the RTPs in the KSA, and b) the RTPs' association that networks and connects different RTPs from all over the world. Such grouping of the participants enabled the researcher to conduct data triangulation, to derive a holistic view of the research fieldwork project, verify the collected data from the RTPs' directors and match these with the data collected from the RTPs' tenants' firms and the RTPs' policymakers. All interviews lasted between one hour and two hours and interviews were accompanied by introductory and context-gathering

discussions and debates with all the three groups of the RTPs' actors. The interview design and techniques used were described in Section 4.6.3.

The researcher decided to transcribe the interviews in full to improve the process of the coding and analysis and to familiarise herself with the data. All the interview transcripts were stored as soft copies in a secure driver for each RTP. Some of the documents from the RTPs and the organisations were provided in hardcopy format. The researcher uploaded the interview transcripts, fieldwork notes, and documents from the organisations and the policymakers in electronic format to NVivo. The response rate for the RTPs survey was 30%, achieved by incorporating the survey within the interviews by sending it to around 300 participants, which accounts for 50% of the total population of 600 participants.

### **5.3.3. Coding Technique**

To adhere to the confidentiality and ERGO policy which was agreed with the participants, and to facilitate data analysis and referencing, each participant was given a code in the format RTP Y XXXX-ZZ, where (i) RTP represents the Research Technology Park, (ii) Y identifies the title of the participant as a Director, Consultant or Manager (RTPD, RTPC and RTPM. respectively), (iii) XXXX are the initials of the park, and (iv) ZZ are the initials of the first and last names of the participant. For example, RTPD-MW-FA is the RTP Director interviewed in MW, and FA represents the first and last letters of the participant's name.

### **5.4. Case-studies' Overviews**

This section provides a brief synopsis of the three RTP cases to set the scene for the presentation of the data analysis and findings in presented in Chapters 5 to 9. The analysis in Chapter 10 returns to the RTP cases in more detail and draws cross-case comparisons. For confidentiality reasons agreed during negotiation of access, the three organisations are not named in the research and are referred to as follows:

### **1. RTPMWC**

An investment joint stock company, fully owned by its associated university, which is the main governmental university at the Western Province of the KSA, at the Holy City. Its aim is to invest in tangible and intellectual assets and in knowledge-based production to practice its diversified activities on commercial basis and effectively contribute to develop the economic and knowledge-based economy.

### **2. RTPDTCV**

A wholly owned subsidiary of the main governmental university of the Eastern Province of the KSA. It is a key driver of the city's ecosystem, which was created to promote a knowledge-based economy in the city and in the region.

### **3. RTPKEID**

A department under a research-based, graduate university on the shores of the Red Sea in the Western Province. Established to help maximise the university's contribution to the economic diversification of the KSA and its transformation to a knowledge-based economy.

#### **5.4.1. Background about the Kingdom of Saudi Arabia, Western and Eastern Regions, and Jeddah Province**

The KSA has a rapidly growing economy and has been ranked one of the easiest places to do business in the Middle East. Jeddah Province is located in the Makkah area of the Western region of the KSA. The Red Sea is the economic and tourist capital of the KSA and is the first in terms of prestigious projects and. With a population of nearly 3.5 million Jeddah is the second largest city in the KSA after the capital, Riyadh, the largest city in Mecca and the largest seaport on the Red Sea.

#### **5.4.2. RTPMWC Case Study**

##### **5.4.2.1. Introduction to the Associated University**

The UQ University is prominent as an academy with great scientific reputation in teaching Islamic studies, in addition to modern scientific specialisations and applications. The university has had different specialisations and grants Bachelor's

degrees, higher diploma degree, Master's degrees and PhD degrees in Islamic studies, Arabic Language, Education, Social and Applied Sciences, Medicine, and Computer Sciences and Engineering. The university has about 30,000 students in the university campus, 4,389 of who are foreign students. The university is expanding and inaugurating new departments to meet the needs of the society and provide qualified students to serve in developmental plans in all fields. In parallel with the establishment of the university, the university campus buildings were being built. In these terms, the southern east of Makkah city that overlooks Arafat was chosen to be the new site of the university. According to the university's website, the university has 35 colleges and institutes, 12 research centres, and 5078 faculty members with around 1,429 full professors, associated and assistant professors. ([www.uqu.edu.sa/en/main/1072](http://www.uqu.edu.sa/en/main/1072), 2019).

#### **5.4.2.2. Introduction to the RTPMWC**

The RTPMWC is an Investment Joint Stock Company fully owned by UQ University, established under the royal decree dated 2012, to invest in tangible and intellectual assets and in knowledge-based production to practice its diversified activities on a commercial basis. RTPMTVC is the first innovation and entrepreneurship Park in Makkah and one of four in the KSA.

#### **5.4.2.3. RTPMWC Research Areas**

**The Crowd Management:** Modelling and Simulation of Crowds, Pilgrimage Safety and Security, Infrastructure and Facilities, Risk Assessment and Management

**Transportation and Logistics:** Effective and Efficient Transport of Goods, Effective and Efficient Transportation of People, Innovative Logistics Solutions

**Geo Informatics:** Spatial and Spatio-Temporal Data Geo-Visualisation, Geo-Spatial Human-Centric Sensing Systems, Spatial and Spatio-Temporal Cloud Environment

**Medical and Health:** Non-Communicable Diseases, Communicable Diseases, Genetics, Cell Therapy, Disability, and Environmental Health

**Information Technology:** Speech and Language, High Performance Computing, Computer Systems and Networks, Software Engineering and Innovated Systems

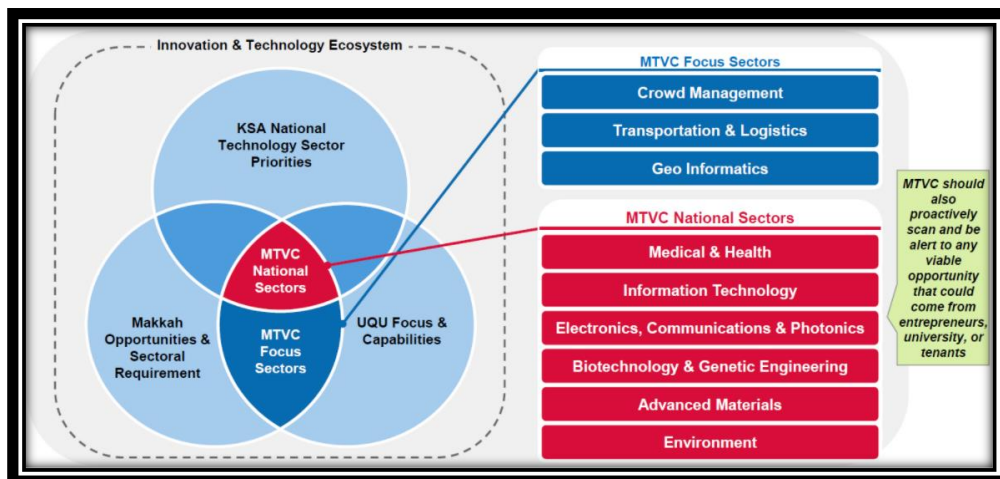
**Electronics, Communications and Photonics:** Wireless Communications and Wireless Sensor Networks, Information Security, Lasers and Applications, Advanced MEMS Sensors and Actuators

**Biotechnology and Genetic Engineering:** Medical (e.g., chronic diseases, infectious diseases, cancer, diabetes), Environmental

**Advanced Materials:** Membranes, Composite and Hybrid Materials, Polymers and Processing tech, Smart Materials, Coating, Ceramics, Metals and Alloys

**Environment:** Waste, Pollution, Air Quality, Degradation of Natural Resources

Figure 5.2 below shows how the technologies' fields are embedded within the innovation and technology ecosystem of the RTPMWC.



**Figure 5. 2: Technologies’ Fields Embedded within the Innovation and Technology Ecosystem of RTPMWC**

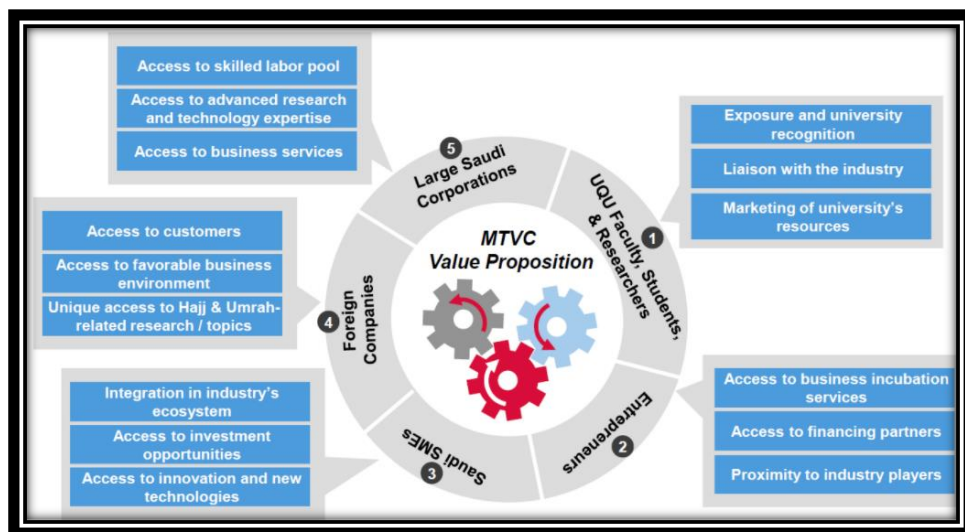
#### 5.4.2.4. RTPMWC’s Innovation Value Chain, Stakeholders, and Services

The RTPMWC had segregated their business lines into three categories: 1) By land and facilities services such as vacant university-owned lands and real estate assets. 2) By value-added services such as facilities management that cover all services related to on-park managing facilities (e.g., maintenance services). 3) By investment management services such as endowment fund management that provides



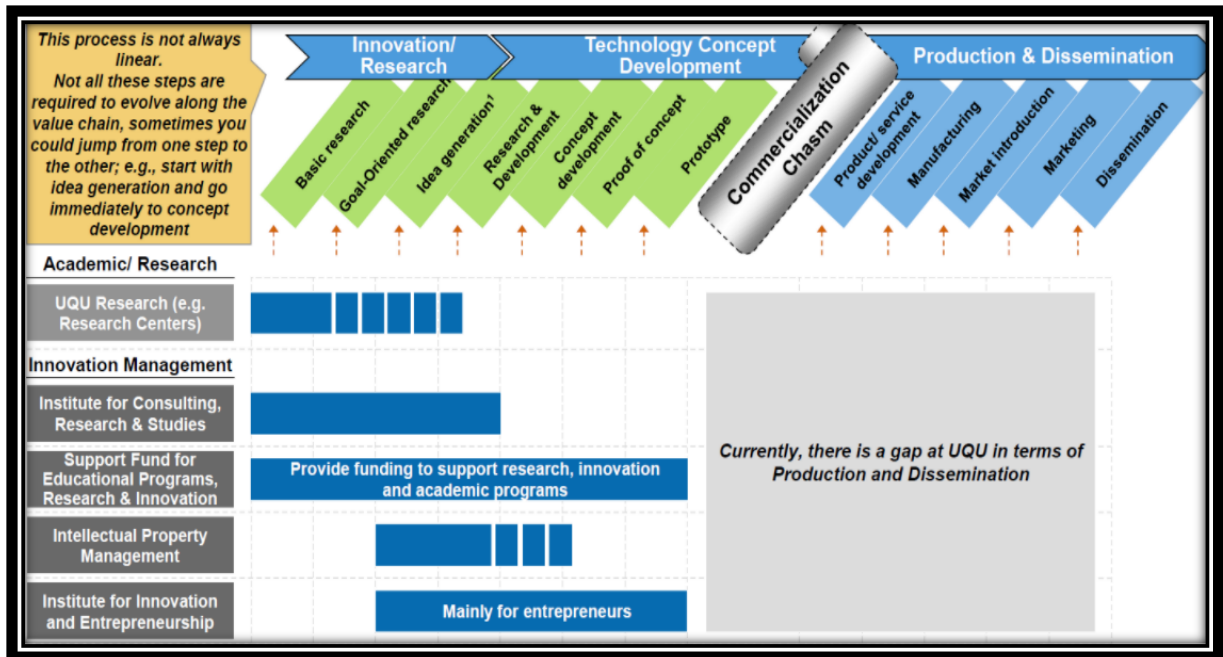
investment services for the university-owned endowment funds that comprise donations managed in perpetuity for the benefit of the university.

The RTPMWC's stakeholders and their interactions are demonstrated in Figure 5.3 below that divides the stakeholder into five categories related to the RTPMWC's values propositions: 1) the associated university's faculty, students, and researchers, 2) entrepreneurs, 3) local SMEs, 4) foreign companies, 5) and the large local corporations. Additionally, it illustrates the different services related to each stakeholder.



**Figure 5. 3: RTPMWC's Stakeholder Categories and Interactions**

The RTPMWC studied the innovation value chain to map the activities of the associated university to identify the gaps and the potential solutions. It identified a gap between the production and dissemination of the associated university that impedes the technology commercialisation value chain. Figure 5.4 below illustrates the mapping and the gap.



**Figure 5. 4: Mapping the Activities of the Associated University to the Innovation Value Chain**

Conversely, the RTPMWC mapped its services and functions to the innovation value chain and identified the mapping of each service and function of the park to the stages of the innovation value chain. Figure 5.5 illustrates such mapping, starting by mapping the first service of the RTP’s ‘usage of the facilities, labs, and other facilities shared with the associated university’ to the innovation research which include: 1) basic research, 2) goal-oriented research, 3) idea generation, and 4) research and development. Usually this stage may or may not be revealed in a collaborative research project. It depends on the initial results and outcomes of the basic research and usually it does not indicate at this stage if the research can be commercialised or licensed.

The second and third mappings occur between the main core functions of the park which are ‘RTPMWC managing and development’ and ‘Business Facilitation’ and overlap with the three stages of the innovation value chain: 1) ‘innovation/research’, 2) ‘Technology Concept Development’, and 3) ‘Production and Dissemination’, respectively. These start from the goal-oriented research all the way to the end-to-end innovation value chain process. The importance of these stages arose from the

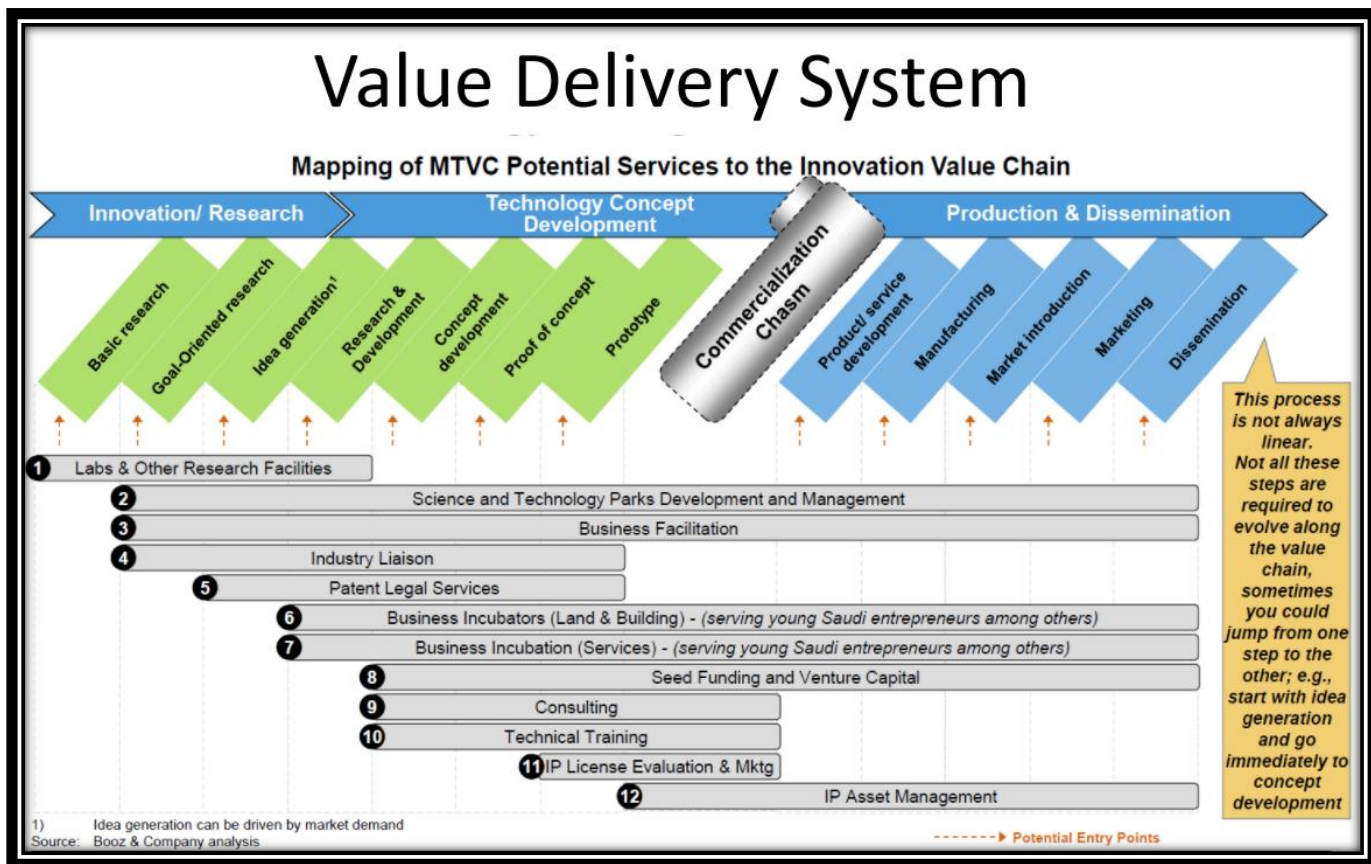
significance of the park in the innovation value chain and what activities, services and functions that RTP should focus its efforts on.

The fourth mapping occurs between the 'industry liaison' and the 'innovation/research' immediately after the basic research has been conducted as this is the first step where the RTP or the industry liaison officer should identify the goal-oriented research and the potential collaboration projects with the tenants' firms, the industry, or the start-ups or entrepreneurs. This stage overlaps the 'industry liaison' with 'patent legal services' as usually the industry liaison office coordinates the activities of the R&D between the stakeholders including the patents' registration and filing, and providing legal advisory services from the TTO. The fifth mapping happens between the 'patent legal services' and overlaps with 'innovation/research'. Then goal-oriented research overlaps throughout the end of 'technology concept development' as the process starts with goal-oriented research and its overlap throughout with the 'technology concept development' from idea generation, R&D, concept development, proof of concept, and prototype. The process ends with filing and registering the patents and initiating the discussions of IPs ownership between the industry/start-ups with the RTP and the associated university.

The sixth and seventh mappings occur between the 'Business Incubators lands and buildings' and the 'Business Incubator Services', which are considered as the second most important key services for the park after the park development and management, and the business facilitation services and functions.

The eighth mapping occurs between the 'Seed Funding and Venture Capital' and the 'Research and Development' in the Technology Concept Development stage all the way to the 'Dissemination' in the final stage, 'Productions and Dissemination'. Parallel to 'Seed Funding and Venture Capital', the ninth and tenth mappings occur between 'Consulting' and 'Technical Training' within the 'Technology Concept Development' stage and the 'Commercialisation Chasm'. The eleventh mapping, the 'IP Licensing and Evaluation Management' comes between the 'Proof of Concept' and "Commercialisation Chasm' under the 'Technology Concept Development' stage. The twelfth and final step in the innovation Value Chain Process is the 'IP Assets Management' that occurs between 'Prototyping' in 'Technology Concept

Development' all the way to the 'Dissemination' in the final stage, which is 'Productions and Dissemination'.



**Figure 5. 5: Mapping the Activities of the Associated University to the Innovation Value Chain**

RTPMWC sorted its services into four key categories to serve the different targeted market stakeholders: a) IP Services, b) Incubation Services, c) Park Land/Space Offering and Management Services, and d) Business Services. Figure 5.6 below demonstrates the categorisation of the RTPMWC's services according to the stakeholders' type, by highlighting the primary and secondary foci for the park to the different groups of stakeholders. It shows that the IP's License evaluation and marketing, and Patent legal services are focused on the associated university's faculty members, student, and researchers as the primary target audience, while the secondary target audience comprises the entrepreneurs, local SMEs, large

corporations and foreign companies. On the other hand, the ‘industry liaison’ of the same category focuses on the local SMEs, large corporations and foreign companies. The second category business incubation focuses on the entrepreneurs as the primary audience, with no secondary audience. The third category is divided into ‘Park Management’ and ‘Facilities Management’; both focus on local SMEs, foreign companies and large Saudi Corporations. The fourth category ‘Business Services’ provides consulting services to large Saudi Corporations as the primary audience and local SMEs and foreign companies as the secondary audience, in addition to technical training to local SMEs as the primary audience and foreign companies and large Saudi corporations as the secondary audience. The last sub-service ‘Business facilitation’ only focuses on foreign companies as a primary audience and local SMEs as the secondary audience.

MTVC Services Target Markets									
	A IP Services			B Incubation Services	C Park Land/Space Offering and Management Services		D Business Services		
	Patent Legal	IP License Evaluation & Marketing	Industry Liaison	Business Incubation	Park Management	Facilities Management	Consulting	Technical Training	Business Facilitation
UQU Faculty, Students, and Researchers	Primary Focus	Primary Focus							
Entrepreneurs	Secondary Focus	Secondary Focus		Primary Focus					
Saudi SMEs	Secondary Focus	Secondary Focus	Primary Focus		Primary Focus	Primary Focus	Secondary Focus	Primary Focus	Secondary Focus
Foreign Companies			Primary Focus		Primary Focus	Primary Focus	Secondary Focus	Secondary Focus	Primary Focus
Large Saudi Corporations	Secondary Focus	Secondary Focus	Primary Focus		Primary Focus	Primary Focus	Primary Focus	Secondary Focus	

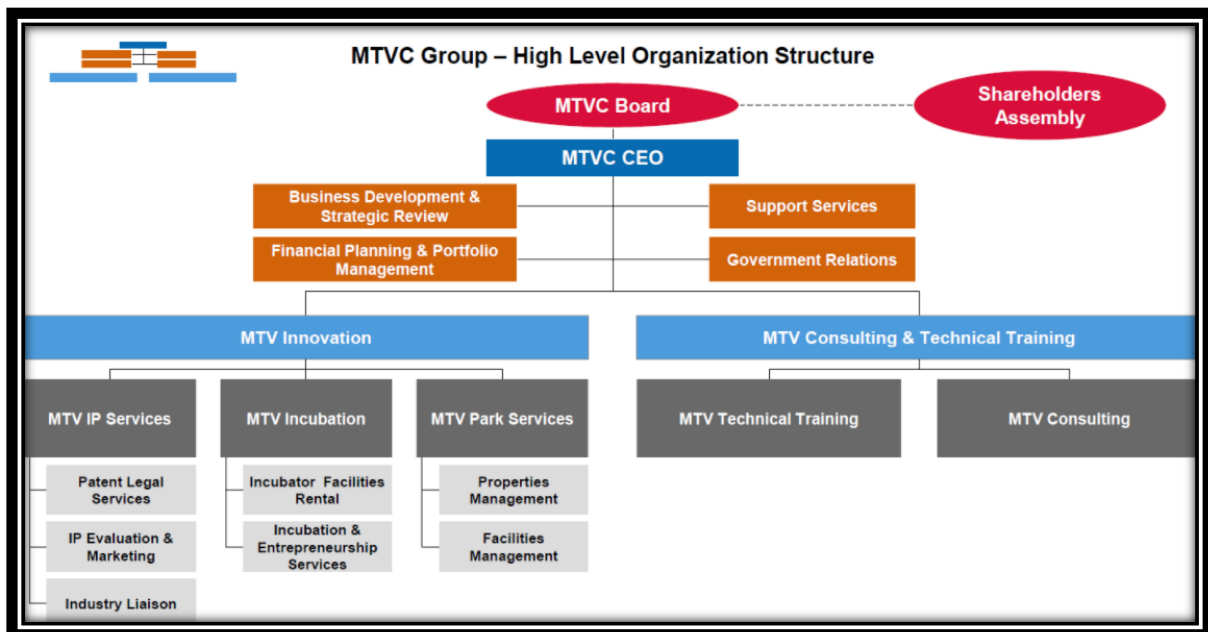
Target Segments: ■ Primary Focus ■ Secondary Focus ■ No Focus

**Figure 5. 6: Mapping the Activities of the Associated University to the Innovation Value Chain**

#### 5.4.2.5. RTPMWC’s Governance Structure and Model

The RTPMWC is wholly owned by its associated university, which is one of the main public universities in the country located at the Holy City of Makkah. Figure 5.7 below

illustrates the governance structure at the RTPMWC which is structured according to the RTPMWC’s services. Moreover, the mission of the RTPMWC is to fulfil directives of the KSA’s Vision 2030 national needs of increasing “local” content and empowering young Saudis in the process of diversifying the economy. Therefore, the aim is to develop commercially viable products in-house rather than rely on a third-party licensing partner which would be a non-Saudi enterprise, so this requires a knowledge-based entrepreneurial culture. To succeed through the technology readiness levels, the park must be managed carefully to reduce cost. Hence, there is the need for an agile model – “Blue Ocean” if possible – and the need for a lean first-to-market strategy. Thus, the implementation identified is to provide ‘value delivery system start-up services’ using the survey and key findings learnt for the RTPMWC. Although the consulting firm proposed an ambitious delivery model, and the plan was very useful in benchmarking the RTPMWC with major successful RTPs operational and delivery model, the classical implementation model was “inflexible”, linear, and consisted of rigid mapping of process to structural entities.



**Figure 5. 7: Mapping the Activities of the Associated University to the Innovation Value Chain**



#### **5.4.2.6. RTPMWC's Start-ups' Model and Best Practices**

The RTPMWC's market areas of focus and fit with strength of knowledge-based are focused within the areas of Hajj and Umrah, and ICT platforms. Therefore, the primary stakeholders identified are: 1) Knowledge-based start-ups, 2) talented young Saudis, and 3) the fact that SMEs account for more jobs nationally than large businesses do. Therefore, the RTPMWC consulted with Bozz & Co Consultancy Company to come up with the start -ups services delivery model and the best practices adopted by the RTPMWC. The recommendations are listed below:

##### **1. Lean start-ups:**

The park should stop or reduce any non-value-adding activities, make all value-adding activities more efficient and effective by including activities by start-ups or entrepreneurial ventures, and adopt the use of KPIs to periodically evaluate and measure the entrepreneurial activities by monitoring the red-yellow-green labelling to classify their status: green means continue, yellow means assess at shorter intervals, red means stop. In addition, it should use the KPIs to analyse the reasons behind the outcome of the measurements, and lastly, the analysis of KPI status of each activity should be acted upon and any lessons learnt from it documented.

##### **2. Agile Start-ups (Devised First for Software Development):**

The start-ups' services are offered in modular format that can be configured according to needs of start-ups. The park provides a services integration framework based on the start-ups value chain, and out-sourcing of activities to collaborator and partner companies especially run by young locals. This is seen as a strategic choice as this will offer services on demand to strengthen the competencies of the eco-system as a whole, and help develop these collaborating and cooperating companies commercially and economically.

##### **3. Implementation and Management Structure "Management Framework" for RTPMWC Start-up Services:**

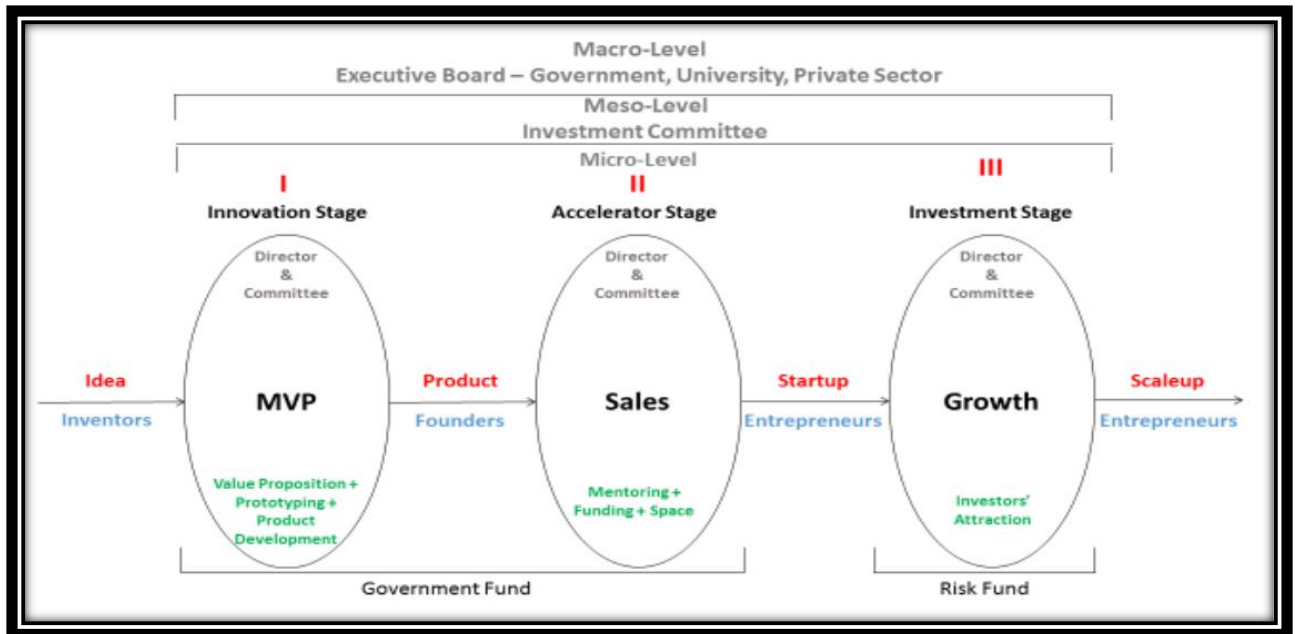
The value-driven management is unlike the managing processes and structure-based management, as the value is managed at three levels – Macro, Meso and Micro – and

each level has a leader or champion to perform the proper action. The Macro level refers to the enterprise level, which involves the inductive and conducive policies, incentives and knowledge-based entrepreneurial culture, handling for facilities and research IP ownership policies, the level of “Seed Funding” and types of services for supporting students, academics and their start-ups (business development, proof of concept, prototyping MVP, etc.).

Alternatively, the Meso level refers to the contextual level which involves the synergy of activities between technology push and market pull, clarity about the recipients of services and their priorities such as students, faculty members, entrepreneurs, start-ups, SMEs, the engagement with the private sector and in supporting services to start-ups, the requirement for a flexible and dynamic environment and support for office space, engineering and development facilities, and recreational space, among others.

Lastly, the Micro level refers to the operational-level by involving the clarity about the type of services, clarity about capabilities who provides start services, using in-house capability (which needs to be developed later on), outsourcing, clarity about the methods of offering and delivering start-ups’ services, programmed or on individual needs basis, free or fee based services, decision to have own premises or external, own facilitates or third party facilitates. On the other hand, the cross-organisational issues should consider the clarity of roles between entities as well as the responsibility of coupling between the entities, and “mind the structural gaps” and identifying the champions of gaps. Figure 5. 8 below illustrates the Start-up structural model and how the entrepreneurs raise funds for their start-up companies in the RTPMWC.





**Figure 5. 8: Mapping the Activities of the Associated University to the Innovation Value Chain**

The inventor usually initiates the process by submitting their idea to the park, which reviews the list of applications and selects the best ideas against a list of well-established set of selection criteria using the online application system that filters the ideas based on points against each selection criterion. The accepted ideas are evaluated by a committee from the RTPMWC to maintain the integrity and provide the opportunity to the inventors to present and pitch their ideas. On the other hand, the ideas that have not selected will be kept aside for the next cohort to be evaluated, and might be selected later. Once the idea is selected, the inventor will be enrolled on to the 'innovation stage' to develop the value propositions, prototype the idea and conduct the product development, focusing on the Minimal Viable Product. The next stage, the 'Accelerator stage', is when the inventor becomes a founder and starts developing product(s), so they will be eligible for office space, mentoring, and funding to generate 'sales' to their start-up companies. It is worth mentioning that the funds in these two stages are provided by the government. At the 'Investment Stage', the founders become entrepreneurs and their key focus is to boost the growth of the start-up company; therefore the entrepreneurs should attract and pitch for the investors to

raise funds to scale-up their start-ups' companies. The funds raised in the investment stage are considered as a risk fund or venture capital fund.

#### 5.4.2.7. RTPMWC's Performance Measurements

The RTPMWC pays significant attention to the performance measurement of the activities conducted on-park by the park management and the tenants' firms as well. Table 3 below shows the KPI figures used to assess and evaluate the performance management at the RTPMWC. Table 3 below shows there were zero values for measuring the performance during the initial phase of the park, and the park growth over the six years which is demonstrated by the below 2016 KPIs.

**Table 3: The Figures of RTPMWC's Performance Measurements**

<b>RTPMWC Performance Measurement (as of December 2016)</b>	<b>Year 2010</b>	<b>Year 2016</b>
<b>Invention Disclosures</b>	0	1150
<b>Filed Patents</b>	0	220
<b>Issues/ Registered Patents</b>	0	30
<b>Start-ups located on-park with initial sectorial focus</b>	0	15
<b>Start-ups who received initial Series A Funding</b>	0	22
<b>Commercialised on-park Patents in initial sectorial focus</b>	0	23
<b>Technical on-park products in initial sectorial focus</b>	0	19
<b>Technical jobs created by on-park start-ups in initial sectorial focus</b>	0	100+

#### **5.4.2.8. Conclusion on RTPMWC's Case Study**

This section includes the evaluation of the RTPMWC's model, overall lessons learnt and conclusion interviews with different stakeholders. Below are some of the main points raised from the lessons learnt:

- The requirements for start-ups to develop MVPs as early as possible was too aggressive and perhaps prematurely killed some projects with commercial potential
- The agile model would work more effectively if there are partnerships with sister organisations nationally to allow focus and expertise of services
- There was too much outsourcing in the early years at the expense of building in-house capability even though that would have taken longer to mature
- More dedicated and organised activities for engagements with the knowledge base would have identified more talent and would allow more effective sharing of facilities
- More structured multi-disciplinary programmes for developing local talents with knowledge-based entrepreneurship skills throughout the academic year would cultivate more successful projects with commercial potential in a sustainable manner; perhaps this remains the biggest challenges to sustainable development of the RTPMWC

Conversely, the success factors were:

- Focusing on specific market sectors and empowering start-ups to leverage the synergy between the strength of knowledge base, for university colleges in ICT and market sectors that are unique to Makkah with the aim of developing technologies that can lead to commercially viable products
- Developing knowledge-based Saudi entrepreneurs and developing the technical and business skills and know-how of young Saudis' knowledge-based entrepreneurial skills in its initial sectorial focus of smart services for Hajj and Umrah
- Indigenising and commercialisation of innovation and knowledge assets that can be monetised into high-impact economic value to create knowledge-based jobs

- The RTPMWC received the Makkah Distinguished Achievement Award for Science and Technology given by the Prince of Makkah Province with a testimony that the RTPMWC is now being recognised nationally to fulfil the requirements of Saudi Vision 2030.

### **5.4.3. RTPDTCV Case Study**

#### **5.4.3.1. Introduction about the Associated University**

King Fahd University of Petroleum and Minerals (KFUPM) University is one of the leading educational organisations in the KSA. It aims at being a preeminent institution known for its globally competitive graduates, cutting edge research, and leadership in energy discoveries. KFUPM was established in 1963 as the College of Petroleum and Minerals. Today, KFUPM offers 83 programmes to more than 9,000 students studying in its eight Academic Colleges including degrees of Bachelor of Science, Master of Science, Master of Engineering and Doctor of Philosophy. The rapid growth of KFUPM is related to the rapid economic and technical development of the KSA. It also reflects the rising expectations of the people of KSA, the expanding opportunities for the country's young population, and the increasing importance of the Kingdom as a major source of the world's energy. To meet these expectations, KFUPM is committed to make a difference in all that it does. This includes developing the main characteristics of its graduates and placing them ahead of their peers, focusing on research that addresses global trends with high scholarly impact, and engaging stakeholders across the society in endeavours aimed at contributing to the national prosperity ([http://www.kfupm.edu.sa/Default\\_en.aspx](http://www.kfupm.edu.sa/Default_en.aspx), 2019).

#### **5.4.3.2. Introduction about the RTPDTCV**

The RTPDTCV is an integrated ecosystem established among a unique set of stakeholders. The company facilitates the ecosystem in the Eastern Province of KSA by leading the activities of stakeholders and enabling intellectual and research projects collaboration. The RTPDTCV's vision focuses on driving an innovative, collaborative, and integrated ecosystem for knowledge-based creation.

The RTPDTCV's ecosystem aims to meet the following objectives:

1. Set overall knowledge economy plans and set supporting government policies that encourage innovation
2. Align higher education and economic policy to support technology transfer and innovation
3. Promote innovation and provide funding for academic and industry-relevant research activities
4. Conduct the full range of research needed to support innovation and the creation of a knowledge economy
5. Provide financial capital required to support commercialisation
6. Act as the 'engine rooms' for industry-focused research and innovative businesses
7. Complement innovation promotion activities, and support innovative businesses

#### **5.4.3.3. RTPDTV Research Areas**

The RTPDTV focuses on the research and fields of technologies that associated with solving the regional challenges, such as:

- A. Advanced Materials** such as “Corrosion, nanotechnology and polymer application” with sector areas as listed below:
- High Temperature and Aqueous Corrosion, Fuel Cell and Battery Systems such as “Identification of corrosion prevention and mitigation techniques in fuel cell systems by unconventional technologies.”
  - Corrosion Control such as “Identification of corrosion control and preventive solutions through coatings, inhibitors, advanced designs and processes.”
  - Corrosion Forms such as “Pursue advances in the understanding, detection and consequences of the numerous corrosion forms.”
  - Nanotechnology and Polymer Catalysis such as “Development of nanotechnology in polymer catalysis processes and technological advances in material and systems.”
  - Polymer Design and Functionality such as “Development of nanotechnology applications on polymer surfaces, manufacturing processes, designs, matrices and functionality.”

- Nano-Process and Nano-Material such as “Application of nanotechnology on industrial processes and materials through photonics and electronics advanced technologies.”

**B. Refining and Petrochemical Processes** such as “Catalysis and process analytics and devices” with sector areas as listed below:

- Refining Technologies such as “Development of refining approaches, manufacturing processes and means for emission reduction.”
- Fuel Formulation such as “Development of next generation technologies for clean fuel and biofuel production.”
- High Value Chemicals such as “Formulation of high performance and advanced chemical products and technologies.”
- New Energy Vectors such as “Pursue advances in available energy vector resources, transport, storage systems, conversion, usage, etc.”
- Measurement Devices such as “Development of the measurement and data acquisition fields through innovations and current technology advancements.”
- Automation such as “Development of automation technologies to enhance the control processes in various sectors of the O and G sectors.”
- Sensors such as “Pursue advances in the fields of sensors and detection systems in addition to the implications on various business segments.”

**C. Geosciences and Petroleum Engineering** such as “Reservoir engineering and drilling technologies” with sector areas as listed below:

- Geophysics and Geology such as “Study of data acquisition techniques, imaging, sequestration processes, forecast modelling and characterisation.”
- Drilling and Production such as “Development of drilling and production processes through advanced logging and exploratory technologies, components, etc.”
- Reservoir Engineering such as “Pursue advances in reservoir technologies including enhanced recovery performances, real-time intervention, optimisation techniques, etc.”

**D. Water Management, Production and Treatment** such as “Purification processes for treating drinking water, industrial wastewater and sewage” with sector areas as listed below:

- Water Treatment such as “Development of water treatment processes through advanced filtration, disinfection and purification techniques, coagulation, etc.”
- Wastewater Treatment such as “Identification of wastewater treatment solutions through the use of advanced membrane technologies, contaminant solutions, management systems, etc.”
- Water Desalination such as “Identification of desalination technologies and processes (membrane, thermal, etc.) and the effects of such technologies on energy and the environment.”

**E. Energy Efficiency and Renewables** such as “Renewable energy, energy efficiency, and carbon management” with sector areas as listed below:

- Renewable Energy such as “Pursue advancements in the fields of renewable energy by enhancing production capacity, energy harnessing and conversion.”
- Energy Storage and Efficiency such as “Pursue advancement in energy efficiency and storage systems through the application of advanced automation and control systems.”
- Carbon Management such as “Pursue improvements in the carbon emission supply chain and means to enhance carbon management and mitigate environmental effects.”

**F. Advanced Computing** such as “IT security, oil and gas applications and advanced reservoir modelling” with sector areas as listed below:

- Advanced Reservoir Modelling such as “Development of advanced applications that foster the ability to forecast, simulate and capture geological and reservoir related data.”

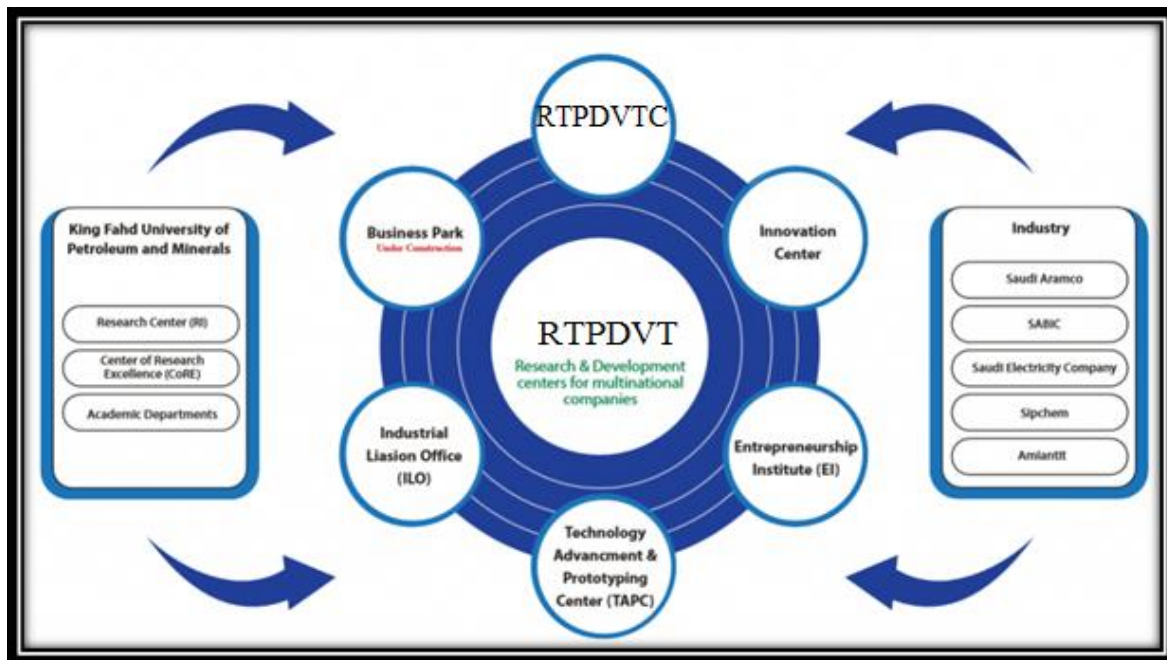
- Oil and gas applications such as “Development of advanced O and G computing applications including data acquisition and simulation, intervention and tracking and risk analysis.”

**G. IT Security** such as “Development of applications that ensure information security, back-up and crisis control, digital and network privacy, and accountability.”

#### **5.4.3.4. RTPDVTC’s Innovation Ecosystem**

Figure 5.9 below illustrates the components of the RTPDVTC’s innovation systems and its dual connections to its stakeholders from academia represented by the affiliated university including its main academic departments and the industry. The RTPDVTC is located at the heart of the innovation system facilitating the activities among the diverse actors of the park from the various departments of the associated university such as innovation centre, entrepreneurship institute, technology and advancement centre, industrial liaison office, and the business park. The RTPDVTC plays a major role as a mediator in facilitating the collaborations among the park’s actors from/to the industry, and the park’s actors and the associated university to bridge the gap between the university and the industry. These actors include but are not limited to academic departments, the research centres, and the centre of research excellence.





**Figure 5. 9: Components of RTPDTVC Innovation Ecosystem**

#### **5.4.3.5. RTPDVTC's Governance Structure and Strategic Model**

The RTPDVTC is wholly owned by its associated university as a subsidiary and the company operates and runs the park. Regarding the governance model, the RTPDVTC has a board of director governing the park, chaired by the rector of the associated university, board members from the private sectors and ARAMCO Company, which is a major tenant firm actor located on-park sitting on the board, and the CEO of the park responsible for the park's strategy and operation. However, the autonomy and authority are still controlled by the chairman of the board of directors.

Due to the proximity of the RTPDVTC to the associated university since the park's establishment, the park's goal is to fulfil its main goal on attracting the large-scale companies to locate on-park and collaborate with the major stakeholders and the associated university. The selection criteria play a major role in the park's strategic decisions, which are set and updated by the board of directors based on the innovation's history and commitment of the companies that would like to locate on-park.

Many companies are attracted to locate on-park to establish a connection with the university's talented resources and the majority came and are sustained because of the location of another RTP's tenant's firm. The RTPDVTC started to realise the importance of the entrepreneurial activities locally, regionally and internationally and introduced initiatives to attract the entrepreneurs from the university's human resources mainly from the students and the faculty members, in addition to opening the doors to entrepreneurs from the community to enrol on the partner's incubator. Also, the Entrepreneurship Centre is planning to conduct several activities and workshops to facilitate the attraction of entrepreneurial culture in the Eastern province community.

Currently, there is no governance model for the entrepreneurs and no selection criteria set by RTPDVTC, but the park included the start-ups and entrepreneurship within its governance model and goals to align with the Saudi Vision 2030 objectives. Therefore, the park is constructing the Innovation centre, which will have office and shared spaces for start-up companies, with conference rooms, catering services and facilities to enable the collaboration among the tenants' firms located on-park. The RTPDVTC is aiming to support introducing the 'work-live-play' concept at the park by planning the construction of Phase II by building additional multi-tenants' working spaces, accommodation such as a hotel, and food and beverages facilities to bring the vibe to the park.

The notable observation was that there no community life, no facilities for community services for tenants such as restaurants, cafes, banks or hotels, or any evidence for the "live-work-play" theme. Even for the park's services, there is no public transportation such as buses, bicycle lanes, etc., and only private cars are used to move within the park although the access to the park is easy and very smooth and does not require any gate pass or pre-approval request. Conversely, pre-approval is required to access the tenants' firms' buildings.

#### **5.4.3.6. RTPDVTC's Large-corporate Model**

The RTPDVTC facilitates the collaboration between the associated university and the tenants' firms by conducting the first meeting between the faculty members and the tenant's firm to discuss what areas of research the firm is interested in to work in research collaboration projects, such as design projects. Then they create projects for the students and the tenant's firm recommends what they can contribute to the project. Moreover, the RTPDVTC coordinates with the tenant's firm to provide facilities for the associated university's graduate students. Usually the access to the associated university is granted to the tenant's firm or to the faculty members using temporary project IDs to access the labs at the associated university or the labs at the tenant's firm's building. Some of the tenants' firms build special labs for the research collaboration projects and run experiments. The large corporate tenants do not utilise the services of TTO from the associated university due to their limited experience, nor from the park, due to the lack of autonomy of the park's management although the tenants' firms expected TTO to be the catalyst for technology transfer of the knowledge from/to tenants. A noticeable observation is that the associated university cannot be reached by walking, so the tenants must use their own private cars or the companies' cars to get to the university to access the labs and meet the students, researchers and faculty, which delays the collaboration between the tenants' firms and the associated university while running research projects.

Mainly, the environment setting is not built for collaboration, as each tenant's firm has its own buildings and security at the building's gate. The main building of the park is located at the northern side near the main gate of the park and surrounded by the stand-alone buildings of the large-scale tenants' firms. The buildings of tenants' firms were totally isolated from each other and the entry to the buildings requires pre-approval for any visitors or even other neighbours' tenants' firms. The park's building has offices for different departments within the park and some departments that are not under the governance of the park, such as entrepreneurship institute and the industry liaison office which are under the governance of the affiliated university. The majority of the tenants' firms are located on-park to be near their key client "ARAMCO R&D Centre" or to attract ARAMCO to be their client.

There is a lack of interaction between the start-ups and the tenants' firms due to lack of innovative ideas; therefore, the tenants' firms encourage the RTPDVTC to work more on providing graduate students, start-ups and academic spin-offs to proposed innovative ideas and solutions for the tenants' firms' current issues to enable collaborative research projects.

#### **5.4.2.7. RTPDVTC's Performance Measurements**

The performance measurements framework of the RTPDVTC has established a strong matrix of performance to measure the tenants' firms and growth, execution of the innovation strategies, and Corporate Social Responsibilities (CSR) activities. Part of the RTPDVTC's governance is to have an annual report on the performance measurements on each tenant firm's activities categorised by: 1) Research and Development Outcomes, 2) Technology Development, Transfer and Commercialisation, 3) Talent Sourcing, Development and Retention, 4) Tenants' Firms' Facilities and Laboratories, 5) Collaboration in Technology Development, 6) Academic Collaboration with the associated university, 7) Communication with key stakeholders (outside the associated university), 8) Tenant Innovation Strategy, and 9) Community Outreach activities. Some of the criteria are very effective to measure the tenants' firms' R&D, and ensure adherence to the park's strategic visionary management. On the other hand, the park should re-evaluate the basic services, the added-value services, and the tenants' firms' attraction strategies. Moreover, the park should collect and evaluate the integration of the tenants' firms to the park's strategic roadmap, by leading the entrepreneurial initiatives and integrating these within the strategic visionary roadmap and matching it with the tenants' firms' strategies.

A key observation is that the RTPDVTC performance measurements framework concentrates on the tenants' firms and their R&D activities from an academic perspective which shows significant micromanagement by the associated university of the park's governance model. On the other hand, the park should provide the tenants' firms with either access to shared services with the associated university or build shared facilities and labs for the tenants' firms, not measure the maintenance of the facilities and labs built by the tenants' firms in order to attract these firms to remain

on-park. Conversely, the park does not have strong performance measurement internal to its services, communications, collaboration and facilitation efforts relating to the tenants' firms, which should be the focus to make sure the strategy's park is executed successfully.

#### 5.4.3.9. Conclusion on RTPDVTC's Case Study

This section includes the evaluation of the RTPDVTC model, Overall Lessons Learnt and Conclusion Interviews of different stakeholders. Below are some of the main points raised from the **lessons learnt**:

- The environment setting is not built for collaboration, as each tenant has its own buildings and security at the gates – i.e. the buildings of tenants' firms were completely isolated from each other and the entry to the buildings requires pre-approval for any visitors or even other neighbours' tenants' firms. However, the access to the RTPDVTC is very smooth and easy for the external visitors.
- The main building of the park is located at the northern side near the main gate of the park and surrounded by the stand-alone buildings of tenants' firms. The park's building has offices for different departments within the park and some departments not under the governance of the park, such as the Entrepreneurship Institute and the Industry Liaison Office which are under the governance of the affiliated university.
- The majority of the tenants' firms are located on-park to be near their key client "ARAMCO R&D Centre" or to attract ARAMCO to be their client.
- There were too many outsourced services in the early years at the expense of building in-house capability even though that would have taken longer to mature.
- The park needs more dedicated and organised activities for engagement with the knowledge base that would have identified more talented human capital and would have allowed more effective sharing of facilities.

On the other hand, there were a number of **success factors**:

- The park goal was focused on developing excellent relations with the large-scale corporates and facilitating the collaboration between the associated university

and the tenants' firms mainly in the oil and gas sectors and the areas associated with ARAMCO's businesses.

- The park has strong KPIs for measuring the performance of tenants' firms in aspects focused on the park's businesses.
- The park is progressing effectively in running structured multi-disciplinary programmes for developing local talents with knowledge-based entrepreneurship skills through the technology transfer office and industry liaison office by:
  - a. Conducts in-kingdom and out-kingdom technology showcases for the patents and prototypes that will benefit the industry
  - b. Collaborates with other TTOs in other universities (such as MIT)
  - c. Patents' registrations
  - d. Coordinates with the industry for licensing of technology, training the trainers of other TTI departments in universities (in collaboration with SMEA)
  - e. Consulting with the investment fund authority and other governmental authorities
  - f. Provides venture capital funding to the local entrepreneurs
  - g. Conducts tenants' firms' show-day for students of the associated university to present the innovations required by the parents.

#### **5.4.4. KRIED Case Study**

##### **5.4.3.1. Introduction to the Associated University**

This is a graduate research-based university of science and technology renowned by global benchmarks and rooted in the KSA. The associated university integrates research and education, leveraging the interconnectedness of science and engineering, and works to catalyse the diversification of the Saudi economy through economic and technology development. It is located 80 kilometres north of Jeddah on the Red Sea, only minutes south of the main Economic City at the province, and along a future high-speed rail line connecting to the Jeddah International Airport, among other stops. It is a research centre, a university town and an important source of regional growth.

#### **5.4.4.2. Introduction about KRIED and its Collaboration Model**

The KRIED vision is to enable technology development and transfer, spin-offs and job creation as it promotes a spirit of enterprise encompassing innovation and opportunity, passion and vision, and risk and reward. It is poised to become one of the Kingdom's economic and innovation hubs.

The park currently covers roughly 2.7 million square metres of space near the heart of the associated university's campus. All buildings within the park have a minimum of LEED Silver certification as defined by the United States Green Building Council. Buildings conserve water using a local desalination plant and have been designed to optimise energy performance.

Its mission is to help maximise the contribution to the economic diversification of the KSA and its transformation to a knowledge-based economy. The KRIED is at the heart of the associated university's mission, and through partnerships with industry, entrepreneurial training and technology transfer support it turns that vision into a reality. It targets to serve three stakeholders to achieve the innovation mission of Industry, Innovators and Entrepreneurs, and aspires to provide a unique environment in which knowledge-based businesses can flourish for the benefits of local, regional and international economies. It offers flexibility to accommodate tenants of diverse capacities and research interests, creating a research community that is unprecedented in the region.

The focus of the KRIED is to be the hub and the enabler in managing the knowledge flow and technology transfer stream between its associated university's research, faculty members, students, postdocs, the private and public sectors, the government, and the society. It emphasises this goal; thus, it should have a robust strategic management model that satisfies the goal and avoids ending up simply managing urban development. Moreover, the KRIED will achieve its vision by offering a mentored environment to existing and start-up companies while encouraging and supporting educational outreach programmes to the broader community.

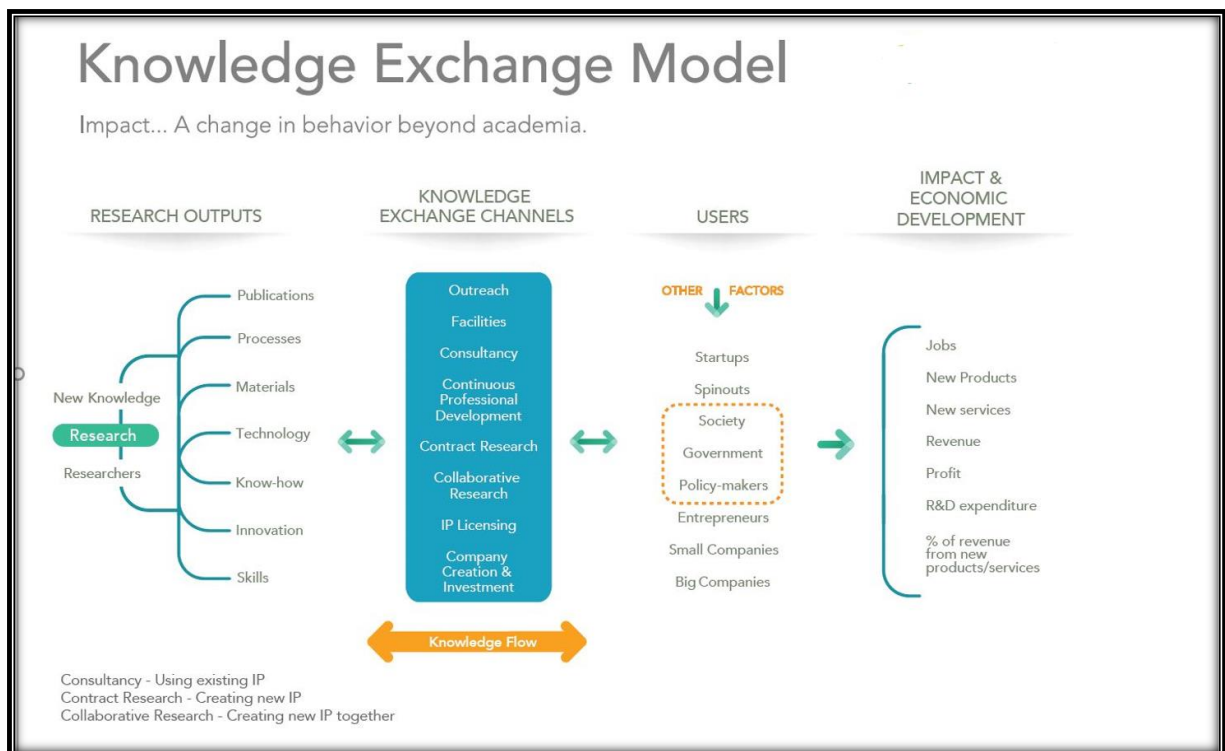
The associated university's business model is built on the California Technology university model, but because KSA's economic-social environment has different contextual factors, the model will not fit the KRIED's growth over the long term. Therefore, this model will not guarantee the sustainable development growth for the KRIED.

The KRIED has four departments with around 40+ employees serving its mission, which comprise: 1) Industrial Collaborations, 2) Technology Transfer Office, 3) Investment Fund, and 4) Research, Technology and Innovation Park. The park has two tenants' firms under construction, and 12 operational tenants' firms' located on-park.

Overall, the tenants' firms have 280+ staff living located on the park campus. The park sorted its tenants' firms into four different categories, which have been benchmarked with the SMEA's standards: 1) very small, 2) small, 3) medium, and 4) large. Ultimately, the KRIED's goal is foster the knowledge exchange model between the different actors and stakeholders of the research and entrepreneurship and the associated university's resources (researchers, faculty members, students, spin-offs, start-ups, infrastructure, technologies, and discoveries in the form of intellectual properties).

Figure 5.10 below illustrates the proposed collaboration model after working with the various stakeholders, including the researcher to model KRIED as the first pilot in standard RTPs' governance in the KSA.





**Figure 5. 10: Components of RTPDTCV Innovation Ecosystem**

The below services are provided by the park to supports its tenants' firms and start-ups:

- Research Support
- Facility Support
- Business Services
- Community Services
- Women in Entrepreneurship
- Entrepreneurship in Residence

The list of full services provided is in Appendix G.

#### 5.4.4.1. KRIED Research Areas

The main themes of the research areas are: 1) Water, 2) Food, 3) Energy, and 4) Environment.

#### **5.4.4.1.1 Biological and Environmental Science and Engineering, Bioscience**

- Environmental Science and Engineering
- Marine Science
- Plant Sciences

#### **5.4.4.1.2. Computer, Electrical and Mathematical Science and Engineering**

- Applied Mathematics and Computational Science
- Computer Science
- Electrical Engineering

#### **5.4.4.1.3. Physical Science and Engineering, Chemical and Biological Engineering**

- Chemical Science
- Earth Science and Engineering
- Materials Science and Engineering
- Mechanical Engineering

#### **5.4.4.2. KRIED Objectives**

- To support the associated university's mission and create a strong connection between the Park and the associated university
- To create a centre for incubation and entrepreneurship for industry and company growth within the Park
- To attract global researchers to the KSA
- To establish a clear timeline for long-term growth
- To help diversify the Saudi economy
- To establish partnerships with businesses with the aim of encouraging discovery and collaboration (RTPKEID, 2017)

#### **5.4.4.3. The Current Problems facing KRIED from the Perspectives of KRIED's Different Departments**

The Economic Development division reports directly to the President in the university's organisation structure. One of the limitations in the KRIED's governance is its dependence on the structure of the associated university since it is part of its organisation structure directly reporting to the President of the associated university. The leadership team is looking for more opportunities to utilise the capabilities of the economic development division and expand its growth rate, and attract more research institutions and large-scale companies to relocate on-park. It is also looking for alternative solutions to increase the volume of academic spin-off from the university due to the unique situation, location and culture. In particular, tenants' firms are living in the RTPKEID community, thus there are limited housing units to accommodate RTP's tenants in addition to security restrictions due to the increased number of business and personal visitors of RTP's tenants. Moreover, there are a limited number of service providers for RTP's tenants according to the contractual agreement. Currently, the university's organisation units such as government affairs, information technology, facilities and community and schools cannot sustain its services to the RTP's tenants' firms with the expected increase in tenants' firms located within the community, as these units are also serving the university's staff and faculty members' community.

##### **5.4.4.3.1. Entrepreneurship Centre**

The Entrepreneurship Centre was established in 2010 and its main focus is on start-ups' creation. It was managing two main programmes run by external parties: 1) Venture lab, which is a bi-annual programme, and 2) Speakers' series run by third-parties partners, such as Cornell University and Babson Business School, in addition to the 'Winter Enrichment Program' that runs three times per year. Since 2014, the Entrepreneurship Centre has become less reliant on the third parties by implementing several entrepreneurial tools such as: 1) Business canvas, 2) Lean start-up programme, and 3) Design thinking training series.

On the other hand, there are several programmes initiated by the Entrepreneurship Centre to engage, enable, and promote the Entrepreneurial culture and collaborate with the stakeholders from the different sectors, such as:

- 1. Corporate Innovation Programmes:** offer a variety of teaching and learning opportunities for large and medium-sized businesses. These opportunities are designed to help Saudi companies develop an “intrapreneurship” mind-set, create an innovation culture and accelerate new products or service developments that will help diversify the regional economy. The Innovation Academy is a suite of executive, management and staff education modules taught by experienced practitioners. It is designed for corporations, government bodies, non-profits and businesses in the Kingdom. The Academy’s aim is to help
- 2. Saudi organisations create new products, services and internal process improvements, leading to job creation and export potential.**
  - a) REVelate:** is the flagship programme of the Innovation Academy. It is a three-day programme designed to help a wide variety of organisations in the Kingdom apply innovation methodologies and entrepreneurship techniques within their corporate environments to improve efficiencies and increase competitiveness. It is an incentive for corporates to build the business model and explore the feasibility of the projects to solve the issues they are facing in the business to develop ways of using lean start-ups methodology. The programme to date has served 24 corporates including around 80 projects.
  - b) Bespoke REVelate:** Specialised and customised workshops for individual corporates delivered at your company according to the company’s own schedule and premises. It covers subjects like 1) Design thinking (one-day and three-day workshops), 2) Ideation and creativity, and 3) Customised management and staff training in areas like strategy, leadership and lean thinking.
- 3. TAQADAM Accelerator Program:** is the only multi-university start-up accelerator programme in the Middle East. It is designed to attract technology-based start-ups to help them execute their business models, deliver valuable

products or services, and create local jobs. It is delivered by KRIED to the Kingdom with sponsorship from the SABB bank. The programme equips entrepreneurs with the tools and support required to successfully launch a technology-based company through mentoring, marketing, ideation, fundraising and product design. Accepted start-up teams receive up to \$25,000 in grant funding and access to the co-working space at the KRIED.

4. **9/10<sup>th</sup> Program:** is a Nationwide Accelerator Program for full-time local entrepreneurs, for need-driven or gap-filling projects which run three times per year in partnership with the Ministry of Labour.
5. **STEAM Innovation Challenge:** is a programme designed for a 48-hour challenge targeting Saudi University students, with up to three problem areas identified by partner organisations and mixed student teams. On the last day, the students pitch their ideas to the partner's organisations and the KRIED's mentors.

Entrepreneurship Centre secures the funds for the entrepreneurs from different sources such as: internal KRIED innovation fund and] funding from the private sector such as Wamda Capital, Waeed, Ride Venture, and STC Venture.

Since the KRIED is a part of a university's structure, and the university is a non-profit university, all the programmes are conducted for free and only the corporate programmes are funded just to cover the operational expenses. On the other hand, Entrepreneurship Centre uses the UBI Assessment tool to measure the growth rate and performance of the Entrepreneurship Centre. The key elements employed in the performance measurement reporting are based on quantitative data only.

The governance model can directly correlate with the overall performance and growth of the RTPs, as it provides the entrepreneurs with easy access to the RTP and enables the Entrepreneurship Centre to get more people and logistics on and off boards. Moreover, it allows the start-ups to relocate on-park by providing them with flexible accommodation such as flexible studios. Conversely, the business model of the Entrepreneurship Centre increases the KRIED's performance and it is a key growth

strategy as it is one of the key drivers of innovation, job creation and, most importantly, market creation and building the entrepreneurial culture.

Regarding the services provided by the Entrepreneurship Centre and in addition to the mentoring and coaching of entrepreneurs, the centre provides prototype-labs to create their initial prototypes using the Makerspace lab. In case the start-ups need to use other facilities from the associated university, they can request access and use the budget which is allocated to them from third-party funds.

#### **5.4.4.3.2. Investment Funds**

The goal of the KRIED's investment fund is to invest in technology start-ups and make a meaningful impact on the economy through the start-ups. The investment fund team provides all the tenants' firms on-park with investment consultation services. In case the invention has been developed at the associated university's facilities, then the IP of the invention disclosure will be owned by the associated university. However, some of the researchers do not get their research or invention funded by the sponsored research office of the associated university, so they seek funding to spin-off from the Entrepreneurship Centre or investment fund office, so they will be directed to TTO, where they have to register the invention first. Therefore, the investment fund office started to network start-ups from outside the associated university to interact with the tenants' firm for the sake of investment or co-investment by organising Arabia venture forum on a yearly basis since the year of 2017.

*“30% Saudi start-ups and 70% international start-ups to bring inventions in the new technology: some of them: they are in the market already.” [RTPKIED-RTPM-SS]*

The investment fund team agrees that there is a correlation between the governance model and the KRIED's growth and performance, due to several reasons. The most important reason is that the investment fund is for purely economic functions, so in order for the investment fund to achieve high performance and growth, it needs to collaborate with other investment in funding and co-investment in start-ups. However, the major challenge is that the inflexibility of the governance model affects the growth and reduces the number of investors to co-invest in the park's start-ups. An additional

reason is that the governance model significantly impacts the autonomy of the KRIED's management and delays the decision-making process, particularly in investment funding; therefore, the investment fund team does not have the authority to make decisions and instead must wait for a long approvals process to obtain the investment decisions. The governance model treats the KRIED's employees as other regular employees at the university, which caused a high turnover from investment fund employees, as there is a limited benefit package and lack of incentives for them. Also, they have to extend their normal working hours as they deal with multiple locations to close the investment and co-investments deals, all of which contributes to the high turnover. Nevertheless, the investment fund office's mission cannot be fulfilled due to the governance model that lacks sufficient economic settings to allow the office to achieve its mission by affording it sufficient autonomy to seek external and international investors to invest in the start-ups. Therefore, more than 50% of the office is networking and collaboration.

The funds released to the start-ups are divided into three categories: 1) Seed Fund, which is fully covered by the investment fund office through the associated university, with share capital or other returns; 2) Growth funding sources, which occur after the start-ups have completed the prototype, initiated sales, or signed a contract with a potential customer; Fifty per cent of the funding sources are from the investment fund office through the associated university and the remaining 50% come from the private sectors. 3) Additional funding sources come from public funds such as the Small Medium Enterprise Authority, and venture capitalists or investors, divided by 50% from each source.

The measurement of the funds provided to the start-ups is crucial to track, monitor, handle the risks of the start-ups growth and measure the performance and progress of the start-up companies. Sets of KPIs are required by the board of trustees of the associated university to monitor and control the growth/decrease in the number of academic or students' spin-offs generated from the different divisions and research centres. Therefore, the investment fund office is eager to measure the performance of their activities in two ways:

## **2) Measurement of the Start-ups:**

- Measurement of the ROI, although the measures are non-quantifiable at early stages of the tech-start-up companies due to the technical and research nature of the companies. However, the measures tend to be more qualitative and intangible in nature such as the flow of cash, or how quickly the start-ups spend the funding: so by spending the fund too quickly might mean that the start-up is fast. Meaning that funding may be spent on unnecessary expenses. Additional measures can be useful for tracking the progress and performance of the start-ups such as opening a new market, signing new contracts and hiring new staff, particularly fresh local graduates who contribute to the Saudization. Major proof of performance growth is opening a subsidiary branch inside and/or outside the Kingdom, or when the start-up companies have been running the business for more than four year with no breakeven.

## **3) Measurement of the activities of the investment fund office:**

- Percentage of the Saudization employment
- The number of full-time, part-time and contractor's employees working for the start-ups
- The percentage of growth of the start-up companies

Regarding collaboration and partnerships, the Investment Fund Office collaborates frequently with the associated university and other stakeholders and partners to attract investors to invest or co-invest in the start-up companies and collaborating with other investment funds to allocate start-ups in the KRIED. Moreover, it collaborates with other RTPs in the KSA to co-invest with the start-ups of the KRIED to allocate start-ups in the RTPKEID to expand in the KSA market. Additionally, it collaborates with the commercial arm of the major research institutes in the Kingdom such as TAQNIAH and venture capital companies. These collaborations are in the form of regular monthly meetings with government entities such as SAGIA, SMEA, and Public Investment Fund to innovate, improve the Kingdom's investment ecosystem, highlight the importance of regulation, confer business accelerator licenses, and review the Saudi



regulations. Additionally, there are collaborations, partnerships and co-investment with key industrial corporate players in the KSA such as ARAMCO and SABIC in some projects. Moreover, there is collaboration with other universities, which resulted in a start-up called QD solar company co-invested in by two international investors.

#### **5.4.4.3.3. Technology Transfer Office**

The Technology Transfer Office was established in 2009 to identify the inventions from researchers, faculty and students, and to protect the inventions by copyrights, patents or trade markers – whichever was considered the best solution. In addition one role of the TTO was to commercialise innovation and inventions. Since 2009, the services had a broad scope to include start-ups and tenants' firms as well, although there is still limited guidance for tenants' firms and the services focus only on the associated university's inventions. The reason for this is that there is a conflict of interest if the TTO serves the tenants as the objectives might potentially impact the associated university's objectives from legal perspectives. Therefore, the TTO should focus on those objectives by serving only the associated university's researchers, faculty and students. The IPs are fully owned by the associated university according to its governance model.

From the perspective of the TTO director, most of the concerns of start-ups and tenants' firms are related to local legal issues and consultancy services and these expenses should be paid by the tenants' firms and should not be provided as a service from the TTO. Therefore, the TTO does not collaborate with universities inside or outside KSA unless there are joint projects funded by these universities.

Yet, TTO does not collaborate with any local legal authorities to provide services to the tenants, start-ups or academic spin-offs located on-park, nor does it support other universities or entities. The researcher linked this to the lack of autonomy due to the restricted governance model that only focuses on the university.

The TTO director's perspective that the patents do not create barriers that hinder innovation and research as their value-added are in the licensed technology process. Therefore, KSA must consider stronger examination criteria and filtering processes for

filing and registration of patents to improve the technology license process and recruit qualified patent examiners.

According to Etzkowitz and Leydesdorff (2000), the academic model of technology transfer has been criticised by generating unrequired expenses spent on the patents which delays the formation of the ASOs firms.

Regarding the performance measurements and evaluation, the TTO uses SOPHIA software to evaluate the performance of the TTO and is geared for commercialisation by implementing several qualitative and quantitative KPIs. These include: 1) The number of new commercial products that are available to the general public as a result of university technology transfer (total of 25 commercialised already in different stages); 2) the number of patents filed (280 filed patents); and 3) the number of registered patents (more than 100 US patents issued under the name of the associated university through the TTO), and there are recommendations to potentially use the number of intellectual properties (IPs), although there is no current track for IP numbers as of today.

The TTO director agrees that there is a correlation between the governance model and the KRIED's growth and performance, as the RTP should focus on serving the public from the perspective of research publications, patents and technology licensing, therefore impacting the wider society, not from the perspective of owning a company simply targeting revenue. Although, the governance model impacts the realisation of the technology licensing process and extends the duration of the commercialisation process due to the nature of the basic research process. The TTO signs the master Non-Disclosure Agreement (NDA) with the tenants' firms to handle the restrictions and confidentiality of the associated university's research when the tenants' firms of the park access the facilities of the associated university such as core labs and research centres to perform their R&D activities or collaborative projects.

#### **5.4.4.3.4. Industry Liaison and Engagement Office**

The main goal of the Industry Liaison and Engagement Office is to create strong, productive and authentic partnerships with industry based on research. This is important to the role of the associated university in supporting the diversification of the

economy in the KSA. The tool used to build these relationships is a platform that creates value for the university and its industry partners. The main programme for the university-industry collaboration programme enables the companies to collaborate with the park and the associated university on an off-park model by utilising 11 research centres, 150 faculty, and 310 research staff, because targeting people and projects relevant to companies' research needs can be overwhelming.

The companies enrolled in the programme will gain access to vast expert resources, with a team of dedicated on-campus business development specialists who provide 1) customised collaboration services, 2) share tailored information on potential research projects with the faculty in line with company's business direction and R&D needs, 3) organise match-making workshops for your company to discuss collaborative research with our faculty and researchers who are at the forefront of pioneering research and emerging technologies, and 4) sit on the board of the university-industry collaboration programme. This programme is considered the main medium that aligns the park's economic development activities with the industry and grants the companies special access to collaborate in research with the associated university, the programme's partners, the major quasi-government agencies, and the tenants' firms located on-park. It is also responsible for recruiting talent for internships and jobs, and offering early access to the associated university's IPs which offers the opportunity to learn and participate through investment or in the creation of spin-off companies. It also facilitates of interaction with policymakers in the KSA, and helps those involved to participate in corporate innovation trainings to accelerate ideas.

There are two types of membership:

**1. Honorary Membership:**

The honorary membership is available only to relevant Saudi government and quasi-government agencies. Extending KICP Honorary membership to these agencies depends largely on their engagement level with the associated

university, their alignment with economic development mission, and/or on industry members' recommendations.

## **2. Strategic Membership:**

The strategic partnership is open for the industry and private companies with commitment to a long-term relationship with the park and the associated university to have the opportunity to fully benefit from this partnership. Annual membership fees are used to deliver a variety of benefits and services to KICP members and to support KICP initiatives, as well as RTPKEID-wide initiatives.

### **5.4.4.3.5. Tenants' Firms' Affairs**

The park has four different categories of tenants' firms: 1) very small, 2) small, 3) medium, and 4) large. The role of the Tenants' Firms' Affairs team is to match-make between the tenants' firms such as large-corporations, entrepreneurs and SMEs, and the talented resources from the associated university such as faculty members, researchers, students, staff and academic spin-offs. Additionally, the Tenants' Firms' Affairs team coordinates the on-park tenants' firms' services and requests with the different departments of the associated university, such as engineering and project management, information technology, community and housing, facilities, governmental affairs, and human resources and finance. Each department at the associated university has a set of services to be provided to other departments and the tenants' firms, and the services agreement and level of services available are provided by each department.

## **5.5. Conclusion**

While differing in size, and target audience, the three case RTPs outlined in this chapter – RTPMWC, RTPDVTC, and RTPKIED – have in common the challenge of creating an effective ecosystem. All three RTPs have invested heavily in commercialisation activities, creating an entrepreneurial culture to positively impact the Saudi economic, while placing greater emphasis on funding entrepreneurs.

The rapid growth of the two RTPs with governance model 'owned by a university' have showed the particular challenges of establishing the parks' infrastructures and core facilities while providing value-added services to their on-park tenants' firms.

Conversely, RTPKIED's challenge was in expanding the park's services to expand the services due to the limitation of the governance model 'under the structure of the university'. The benchmarking between the case RTPs and other international RTPs are explored more fully in Chapters 9 and 10, where RTP's findings are presented. Having introduced the RTPs' backgrounds, the research focus now turns to the way in which the data were analysed in practice, and how the findings were established, which is the subject of the next chapter.



## CHAPTER 6: ANALYTIC STRATEGY AND DATA ANALYSIS

### 6.1. Introduction

The purpose of this chapter is to explain the evolution of the analytic strategy and data analysis and how this leads to the development of the findings, which are presented in detail in Chapters 7, 8, 9 and 10.

The chapter first explains the analysis strategy, and second presents the qualitative data analysis structure including the recommendation of how the main case RTP will process the inputs, and outputs and identifying the deliverables of the outputs, in addition to the components of analysis behind the strategic governance and business model for RTPKEID. Third, the chapter describes how the researcher utilised the software in qualitative data analysis, and how the qualitative data analysis was carried out in practice, including data summarisation, reduction, categorisation, and the coding levelling.

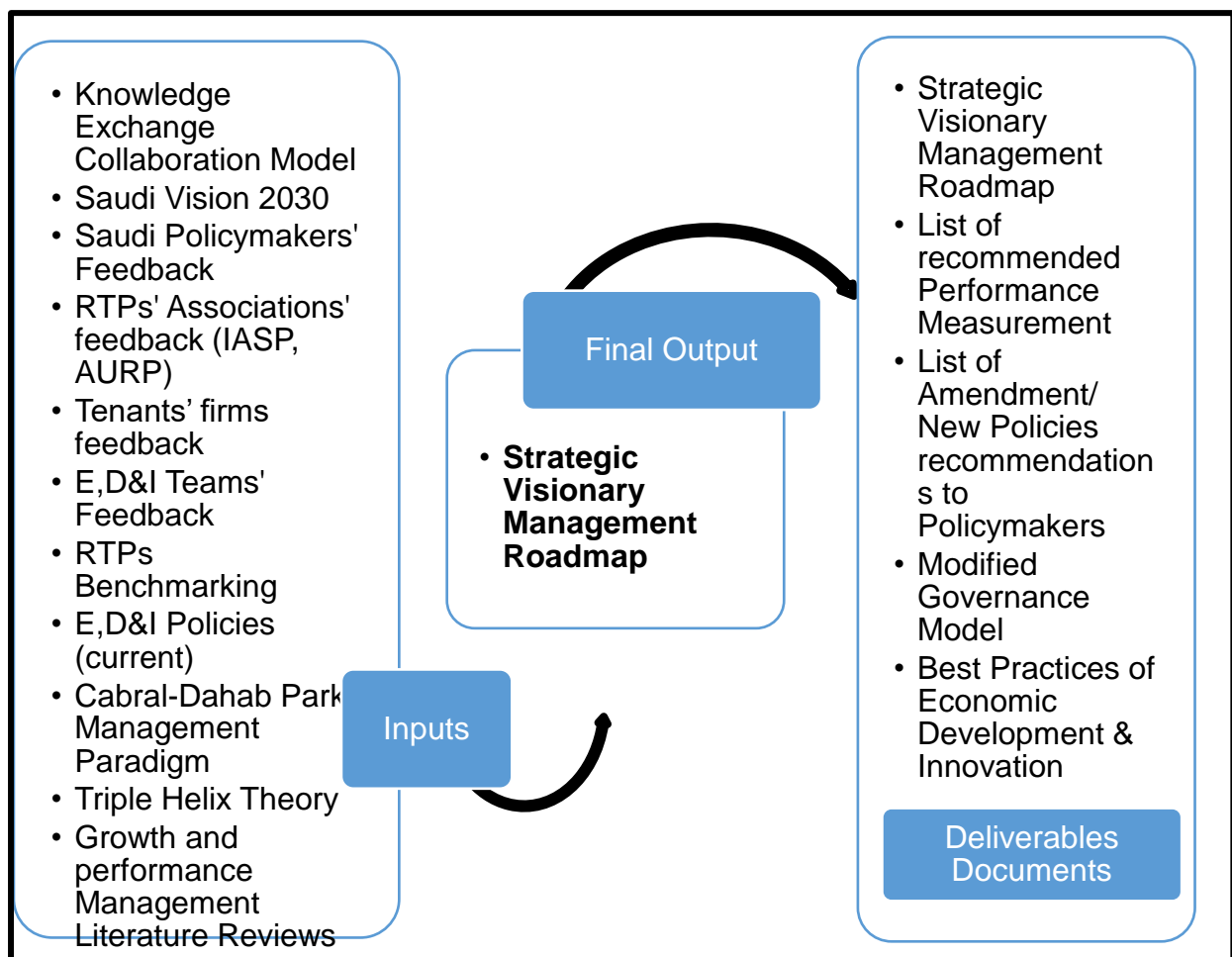
### 6.2. Analytic strategy

Analytic strategy was influenced by Eisenhardt's (1989) process of inductive theory-building from multiple cases, which was adapted in the light of the case study context and research aims. Although published over 20 years ago, and written from a positivistic perspective, her work continues to be widely cited and applied in management case study research. Ravenswood (2011) has been described as a "cradle-to-grave inductive template" (Harrison and Easton, 2004, p.181). Indeed Eisenhardt (1989) described it as a roadmap for developing theory from case study research, synthesising and extending previous work on case study design, qualitative analysis and grounded theory building. The researcher drew particularly from the section on the process from field data collection to reaching closure. This included overlapping data collection and analysis; within-case and cross-case analysis and pattern-searching; iteration between data and theory to shape findings; and comparison with literature to strengthen the emergent theory. According to Creswell (2007) relating the nodes into broader categories, and demonstrating and compare in the data by utilising the graphs, tables, and charts are the key foundations of qualitative data analysis. In addition, taking some notes, photographs and video recordings

describing how your fieldwork progresses aids the researcher in the process of data analysis and helps in reflexive and interpretive readings of the data (Creswell 2007).

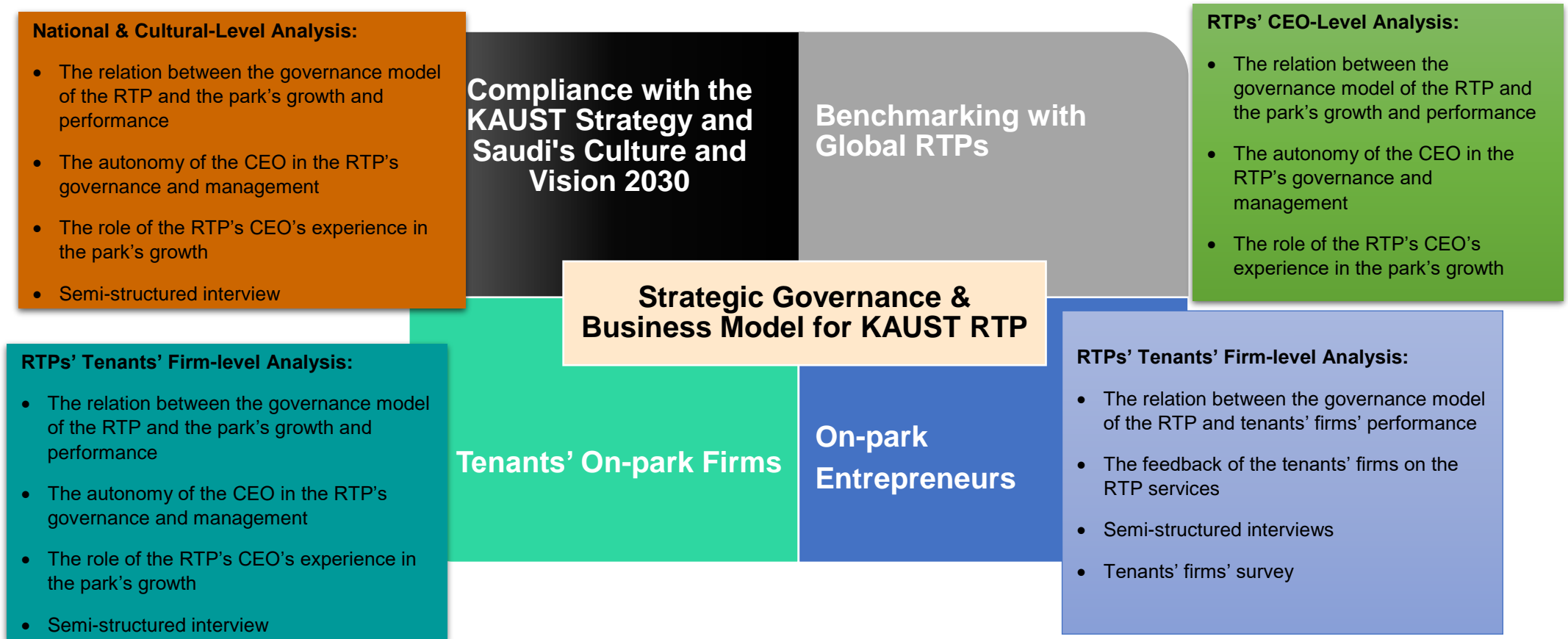
### 6.3. Qualitative Data Analysis Structure

To guide the literature reviews and set the basis of analytic strategy of the research project, the researcher introduced the conceptual framework in Chapter 1 (Figure 1.2). The diagram in Figures 6.1 and 6.2 below demonstrate the level of analysis undertaken to create the strategic governance and business model for RTPKEID. When the researcher linked that back to the original figure 1.2, the diagram represents three dimensions – quantitative data analysis, qualitative data analysis, and analysis of the case organisations and adherence to Saudi vision 2030. Therefore, the diagram shows the components that the strategic governance and business model for RTPKEID will be based on.





**Figure 6. 1: Strategic Visionary Management Roadmap for RTPKIED**



**Figure 6. 2: Components of Analysis behind the Strategic Governance and Business Model for RTPKEI**

The data analysis comprises four stages: The first stage of the analysis focuses on the RTP Directors' participants. The focus in the first stage was to investigate the relationship between the governance model of the RTPs and how it impacts the park's performance and growth rate, what the value-added services of the RTPs are, how RTPs' directors measure the RTPs' performance and what obstacles they are facing from the governance model of their RTPs. **These findings are reported in Chapters 8 and 9.**

The second stage of the analysis focuses on the tenants' firms 'Large Corporates' and 'Entrepreneurs' located on-park and their perspectives of the RTPs' governance model and how it can affect the performance of their businesses either positively or negatively. Additionally, the tenants' expectations and how the RTPs can improve their performance are analysed. **These findings are reported in Chapter 10.** The third stage of the analysis considers the perspectives of the Saudi policymakers on the governance model of the RTPs and its impact on the overall economic development and growth of the national level, and under which governmental body the RTPs governance should fall. The analysis also linked the RTPs to the Saudi Vision 2030 and how the role of various governmental bodies in boosting the performance of the national RTPs.

The fourth stage analyses the variables that improve the strategic visionary management model for the RTPs. These factors were identified in the literature review, the findings of the interviews, observations, surveys, and documents analysis. The purpose of this stage was to define the contextual similarities and differences of the various governance models and the selected case studies, which contributed to different patterns of success and lessons learnt, which in turn contributes to the development of the strategic visionary roadmap for the RTPKEID. These findings are reported in Chapter 9. The fifth and final stage of the analysis compares the three selected case studies to narrow down the previous findings to the Saudi cultural context. The findings are reported in Chapter 10.

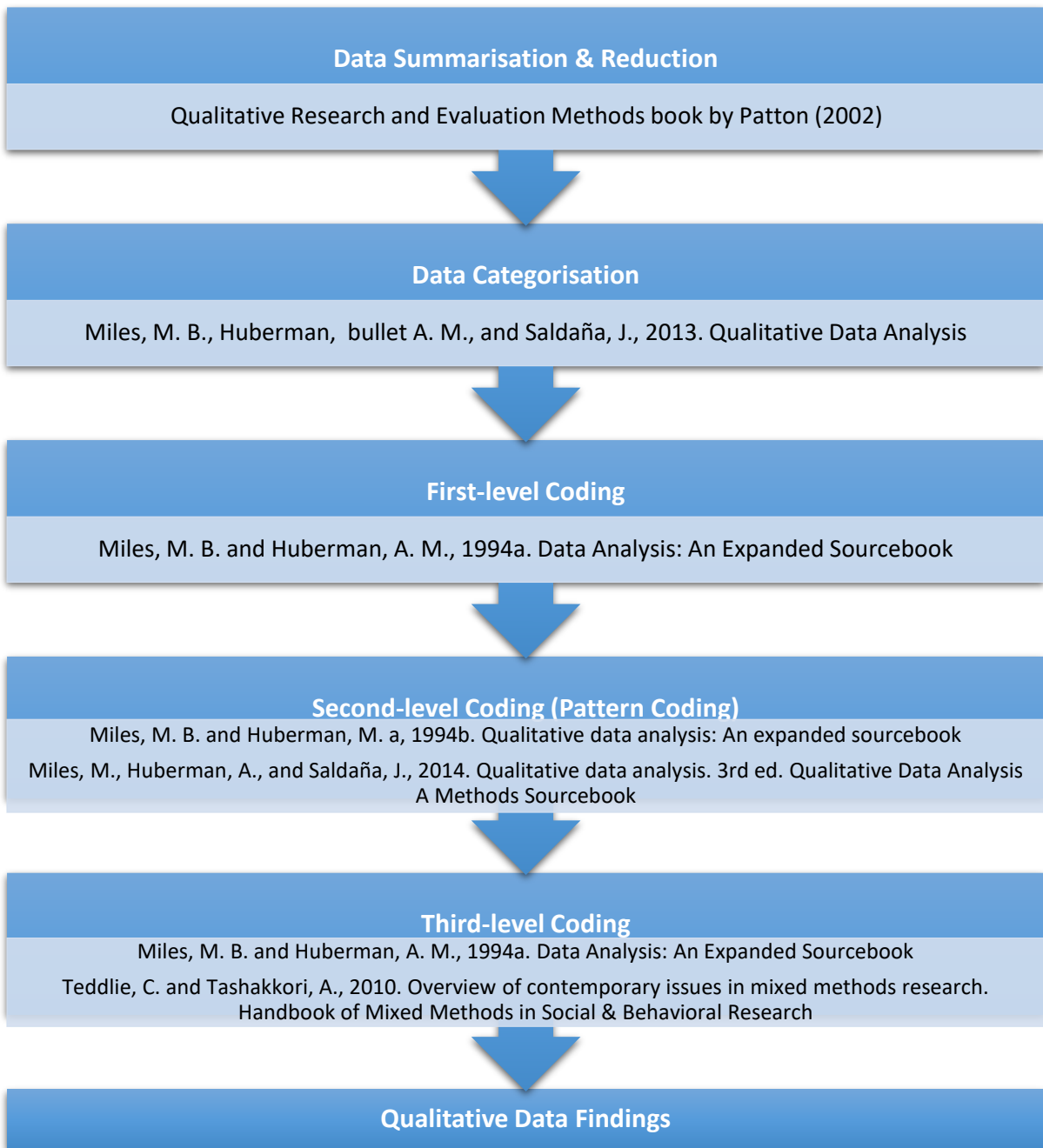
#### **6.4. Use of NVivo software for Qualitative Data Analysis**

The researcher selected the NVivo Software after benchmarking with other qualitative software packages such as Atlas.ti and MAXQDA. The NVivo software was used for data coding and to maintain all the interview transcripts, observations documents and conference presentations and proceedings, and the case studies documentations. It was selected over the other software as it is the official software for qualitative data in Southampton University, so the researcher was able to benefit from the software license. Moreover, NVivo helped the researcher to store, organise and analyse the qualitative data and, due to its similar functionalities to the Microsoft software family, the researcher had no difficulties in using it. According to Creswell (2007) NVivo has a secure function as it saves the database and files in one single file which provides the researcher with the ability to store files with different languages, and ease the process of searching and editing the files directly via the software. In addition, it enabled the researcher to find a specific paragraph or a part of an image and assign it to a single code or multiple codes.

The software programs provide a means for organising codes hierarchically so that smaller units, such as codes, can be placed under larger units, such as themes. It also enables the researcher to write notes and memos during the analysis process, which will be utilised later during the report-writing stage. The linking of codes and relationships in visual presentation assists the researcher during the development of the coding framework and validating the use of codes.

#### **6.5. Qualitative Data Analysis Coding**

According to Miles, Huberman and Saldaña (2013), deductive coding is concerned with developing an initial list of codes based on the conceptual framework, research questions, main variables, and hypothesis prior to conducting the research fieldwork. Figure 6.3 below demonstrates the process of how the qualitative methodologies on which the researcher based her qualitative data analysis on and how the qualitative data analysis developed. Additionally, the figure mentioned the major qualitative analysis schools used during the analysis to come up with the qualitative data findings.



**Figure 6. 3: Development of Qualitative Methods and Data Findings**

### **6.5.1. Data Summarisation and Reduction**

The researcher started the data analysis with the data summarisation and reduction step by summarising the key points from the interviews, the documents collected from different RTPs, and the observations from the conferences. Moreover, the range of data from different sources was categorised and organised into main categories: Observations, Case studies, Interviews, and Policymakers folders. The next step was to standardise the format of the semi-structured interviews and enter the documents into NVivo. The coding of the data started while the data collection was still ongoing. The coding was based on multiple nodes: the RTPs' Directors' interviews, the RTPs' Tenants' Firms' interviews, the Saudi policymakers interviews, the observations from the IASP and AURP conferences and networking, and the case studies observations.

The researcher and her supervisors decided to conduct the qualitative data analysis of the interviews, observations, and case studies within the same coding and analysis in order to utilise as large a dataset as possible, which will help identify the clusters of codes and emergent themes and result in a comprehensive qualitative data analysis. On the other hand, they decided to create a separate section for the three case-study analyses for better organisation of the thesis structure, as the case studies from the three RTPs were only focused in the context of KSA RTPs and should be aligned with the Saudi Vision 2030.

According to Saunders et al. (2009), there is no single way to analyse the qualitative data but there are some common steps the researcher can use to organise their qualitative data analysis process such as summarising, categorising/grouping, and structuring/ordering using narrative. Moreover, the reflective diary kept by the researcher throughout the research project helped her to analyse the data to understand the collected data, incorporate the relevant data drawn from the various sources, draw the major patterns of the data in order to explore them in depth, and test or develop the theory in the light of the patterns that have been drawn from data. Finally, conclusions can be drawn.

### 6.5.2. Data Categorisation

The researcher started the data categorisation with five initial codes that emerged from the collected data and which were based on the research questions. The codes evolved after the reading of the observations of the conference proceedings and presentations of the AURP and IASP, the RTP directors' interviews, the RTP tenants' firms' interviews, the interviews with policymakers, the analysis of the documentation provided by policymakers, and the analysis of the documents and internal memos and observations of the case-studies. The codes were expanded to 11 categories; however, during the review and coding cycles; this was reduced to a final 10 categories with four sub-categories, as many codes appeared to fall under main themes and become sub-codes.

### 6.5.3. First-level Coding

The first-level coding for the RTPs' Directors used the **Magnitudes Coding** method which uses "symbolic codes applied to existing coded data or a category to indicate their intensity, frequency, direction, presence, or evaluative content". The reason for selecting the Magnitude codes at the first-level coding stage was because it is very effective in mixed-methods studies to improve explanation and to provide quantitative measures for indication of conclusions. However, the researcher did not use it in the second-level coding as the qualitative data analysis phase became more numerical and distracted the researcher from focusing on the qualities of the findings expressed by the participants during the interviews and the observations. Conversely, **In Vivo Coding** was used for maintaining the original dataset collected during the field work and distinguishes the participants' codes by putting them between quotations so they become jumbled with the codes created by the researcher. The **Descriptive Coding** was used to present the vast amount of collected data from different sources, which makes it useful for studies with a wide variation of data forms such as field notes, interview transcripts, and documents among others. Moreover, **Hypothesis Coding** was used for the application of predefined codes generated by the researcher to evaluate the researcher's hypothesis where the codes are established from a theory predicting what will be drawn out of the data before the codes have even been

analysed. This method was selected by the researcher for its suitability in hypothesis testing of the qualitative data ( Miles, Huberman, and Saldaña, 2014).

According to Miles and Huberman (1994) “the coding is the analysis”. However, other researchers such as Charmaz (2006) view the coding as the backbone of the analysis, which leads to ideas being generated from the dataset.

The researcher considered four questions from the interview’s script to define the in-depth analysis of the correlation between the governance model and the park’s growth rate. These are Questions.4, 9, 10, and 11 which coded are into the following main headers: (i) Strategic and Management Model of RTP, (ii) Governance Model of RTP, (iii) Benefits of and Reasons for the Correlation between the Park's Governance Model and its Growth Rate, and (iv) the Correlation between the Park's Governance Model and its Growth Rate. These were to validate the RTP’s director’s answers by considering the main questions: 1) Was there evidence of a lack of autonomy of the RTP’s director? 2) Was there evidence that the perspective of the RTP director regarding the correlation between the governance model of RTP and the performance and growth rate of the park conflicted with the answer provided by the RTP director in regards to the benefits that can be gained from changing the registration ‘type’ of RTP and not being under the University’s structure? (i.e. the participant disagrees with the correlation between the governance model of RTP and the park’s growth rate, but he/she lists benefits of changing the governance model). Or: 3) Was there evidence regarding the perspective of the RTP director in the correlation between the governance model of the RTP and the performance and growth rate of the park conflicting with the answer provided by the RTP director regarding the RTP’s measurement? (i.e. the participant has no measurement tools in place to measure the RTP’s performance and growth rate conflicting with his/her perspective on the correlation between the governance model of RTP and the park’s growth rate).

The first level of coding focused on the RTPs’ directors’ interviews. This level was created in a separate folder; it extended from 5 to 11 “codes” created out of the scripts



of the interviews and derived from the interviews' questions and the answers of the participants "in-vivo".

The most important part of the interviews with the RTPs' Directors analysis from the researcher's perspective is to find insights from the written answers and non-verbal communication that happened throughout the interviews' durations and synthesise the answers of the other questions to interpret the data to reach a conclusion. The narrative summations of the interviews in NVivo helped the researcher to easily access and retrieve the data to analyse the RTPs' directors' perspectives. Since the researcher read and analysed the qualitative data of the interviews in a combination between literal, interpretive, and reflexive readings approaches, it was crucial to read the data in a literal approach to retain the content in the same structure and maintain the language being used by the participants.

#### **6.5.4. Second-level Coding (Patterns Coding)**

As a second-level method, pattern coding is a way of grouping those summaries into a smaller number of categories, themes or constructs. For qualitative researchers, it is an analogue to the cluster-analytic and factor-analytic devices used in statistical analysis by our quantitative colleagues. Pattern codes are explanatory or inferential codes, ones that identify an emergent theme, a configuration, or an explanation. They pull together a great deal of material from first-level coding into more meaningful and parsimonious units of analysis. They are a sort of meta-code. For reliability testing of the coding, the researcher reached out to the participants to verify the coding.

During the second level of coding, the researcher changed the reading approach to interpretive approach to analyse what the overall interview setting was done, including the verbal and non-verbal communications and the impressions and reactions of the participants. The researcher realised that many codes should be embedded as sub-categories of the main codes by adopting a simultaneous coding method, where a single piece of information from the dataset can be decoded into more than one code. Moreover, the researcher explored the patterns in the data for the categorisation taking

into consideration the commonalities and contradictions within the codes (Saldana 2008).

The researcher adopted Rubin and Rubi's (1995, pp. 241,251) method while conducting the second-level coding "by refining the content of each category (working within) from the data before starting comparing them with each other (working across)". The researcher then drew analogies among the categories to distinguish between the proposals based on their perceived relevance in order to incorporate them into the findings (Saldana 2008). The second level of coding assigned to sort the data is suitable for all qualitative data, particularly for studies with multiple participants and sites, and studies with triangulated data. The researcher used the sub-coding to sub-categorise the data into more taxonomies to identify the interrelations among the data. Moreover, the researcher applied the patterns' findings using the attributes defined by Saldana (2008) such as similarity, differences, correspondence, causation, and frequency. The second cycle helped the researcher to *decode*, which is the contemplation of a piece of data to decipher its meaning. Conversely, *encoding* is the definition of giving datum a suitable code for classifying it (Saldana, 2008). The first level of coding highlights the salient categorisations of the qualitative data by grouping the categories into sub-categories to draw out the patterns, themes and concepts from the data to draw conclusions and build theory. The source of the datum was created in a separate folder with 11 main "codes" created out of the scripts of the interviews, literature review, observations and case-study field notes. Throughout second-level coding the diagrams, minds maps, memos, charts, queries and annotations from NVivo were used to grasp analytical concepts for further exploration. Pattern codes can emerge from repeatedly observed behaviours, actions, norms, routines and relationships; local meanings and explanations; common-sense explanations and more conceptual ones; inferential and "metaphorical" clusters; and single-case and cross-case observations.

#### **6.5.5. Third-level Coding**

The final main categories after reduction are presented below:

- Strategic and Management model of RTP

- Governance Model: with six sub-headers: Consortium of different bodies, Non-profit research park, Company with Share Capital, Company owned by the University, Part of University organisation structure, and Other
- Goals of RTP
- Background of RTP
- RTP fields of technology
- Funds' Sources
- Charged Services
- Measurement of RTP
- Benefits of and Reason for the Correlation between the park's Governance model and its growth rate
- Types of RTP Measurement: with three sub-headers: Qualitative and Quantitative Measures, Qualitative Measures, and Quantitative Measures
- Correlation between the park's Governance model and its growth rate: with three sub-headers: Agree, Neutral, and Disagree

## **6.6. Conclusion**

The chapter presented the direction and proposed deliverables of the results of the qualitative data analysis for the main case study RTP. It also explained the different types of data coding and showed the details of the qualitative data analysis from data summarisation, pattern coding, and the results of the coding levels. Therefore, the chapter revealed the major categorisations of the qualitative data analysis throughout the three coding levels.



## **CHAPTER 7: BENCHMARKING STRATEGIC MANAGEMENT MODELS OF SUCCESSFUL RESEARCH AND TECHNOLOGY PARKS TO CREATE A FRAMEWORK FOR A STRATEGY MODEL FOR KRIED**

### **7.1. Introduction**

This chapter presents the identified findings from interviews and observations in all three case RTPs, in addition to the findings from the interviews with RTPs' directors from the other countries, and observations of different RTPs. The chapter begins by showing how these findings map on to the model that was introduced in Chapter 5. Therefore, the researcher focused on extensive benchmarking of 61 RTP organisations in the Middle East, Turkey, North and South America, and Europe. The benchmarking study was conducted through documentary analysis, questionnaires, observations, semi-structured interviews and site visits. The benchmarked organisations were compared based on their governance model, performance measurements, commercialisations and strategies.

This benchmarking highlights major challenges and perspectives of RTP organisations regarding the RTP's governance model and its impact on the economic development and the park's growth, and the engagement in commercialisation of high-tech products. Thus, based on their distinct governance models and an in-depth analysis, the researcher synthesised the impact of governance model on the park's growth and the economic development. Moreover, the researcher evaluated the performance measurements of the benchmarked organisations based on RTPs' quality of services, tenants' firms' KPIs, collaboration, and the overall impacts on economic development to the communities, particularly for technology entrepreneurs. (Malek, Maine, and McCarthy, 2013)

According to the European Commission (2013), performance is one of the key elements in benchmarking RTPs among different innovation ecosystem areas since it shows major differences in performance outcomes. Additionally, governance models of RTPs, including an experienced leadership team, are one of the major elements in benchmarking RTPs in various innovation ecosystems. Moreover, the findings explored the benchmarking analysis in certain similarities and variances associated

with the different types of RTPs' governance models, commercialisations and performance measurement. The benchmarking analysis goal is to investigate the effectiveness of those RTPs which can ultimately provide the best possible governance model for the KRIED. The findings presented in this chapter address the following research question – “What is the combination of the different successful business and strategic models that will best fit KRIED?” – Which will be answered by benchmarking the below components of the governance models of various RTPs from different countries and regions:

1. Governance Model Type
2. Commercialisation Policies
3. Performance Measurement

## **7.2. The Analysis of the Benchmarking Results**

### **7.2.1. The Advantages and Disadvantages of Different RTPs' Governance Models**

To improve the quality of RTPs' collaborations, entrepreneurial culture and advancement of various programmes in a holistic governance model in the USA, an association of universities technology managers, AUTM, was established to facilitate exchange of ideas and enable the networking among all RTPs' managers across the USA regardless of the RTP's governance model. That can be applied in the case of KSA for the improvement of RTPs' governance on a national level.

#### **7.2.1.1. The Perspectives of RTPs' CEOs Regarding 'Triple-Helix' RTP's Governance Model**

The Triple-helix governance model combines the academia, government and industry to create a knowledge-based economy by intersecting organisational domains, where each organisation contributes to the success of the shared vision.

#### **1. RTPSC**

The Triple-helix RTP is usually governed by multiple shareholders and stakeholders who share the same vision. The RTP works as a facilitator to bring shareholders and institutions together to leverage the resources, attracting potential partners by building

innovative programmes, and collaborating with other institutions, hence creating the ecosystem. The shareholders consist of non-profit organisation, hospitals, universities, and research institutions, private companies and governmental agencies. The election of the director of the board is annual and transparent; the shareholders are also serial entrepreneurs and the board members are highly qualified and experienced in their respective field of technology. Such mixture of outside influence creates the right level of governance for the park and boosts the RTP performance and growth. Additionally, partnership with the RTP contributes to the economic development beyond the territory of the region without the need to become a shareholder of the park and participate in the governance model. The RTP's board meet on a quarterly basis. The board chair is selected by the board members.

## **2. RTPBPMU**

The Triple-helix RTP model is considered the essential role of the public university and its mandate is to sustain the economic development of the region. The focused and specialised field of technology plays a key role in enhancement of the RTP government model due to the specific policies related to the sole field of technology and simplifies the process of governance. The governance of the park is considered an affiliated RTP independent company with a different consortium of board members.

On the other hand, it makes the selection of specialised board members of RTP much more difficult, particularly in the rare field of technologies. For example: in the RTP specialised in Biotechnology, the RTP manages its governance by selecting the board of directors from real estate developers, financiers, CEO-level in life sciences, the private sectors, and the university.

The land-usage and grants are more flexible and have different modes in the governance in Triple-helix. The deal is to lease the lands to real estate developers and they own the building and lease it to tenants' firms and service providers. Another governance model is related to the land-grant where the government owns the land and gives it to the state. Thereafter, the state would enter into a land-grant agreement with the university to work with farmers to increase the productivity of the state's economic development. Moreover, the associated university can transfer the lands to

the RTP governance and all the projects should be examined by government representatives such as the Mayor, which builds trust and social collaboration to create trust and networking among all the RTP's stakeholders and partners. One of the directors suggested adding 25c tariff per square foot to be paid to the community's fund to invest in the schools, community buildings, schools' buildings, etc.

There is a direct benefit from the relations between the RTP governance model and the growth of the park. Conversely, in some cases, the weaknesses of the governance model might be the ambiguity of responsibilities among the board of directors which means that nobody is taking charge, which can happen in any governance model, but its risk increases in the Triple-helix model. Therefore, the goal is to create an honest, robust and flexible matrix of responsibilities among the board members to connect the university to the RTP and other actors without creating bottleneck and isolation between the stakeholders. The responsibilities of the board of RTP are concentrated on the park's land-use. Conversely, the retention and the attraction of the start-ups are under the management of the RTP leadership in order to provide them the autonomy and flexibility in governing the RTP.

### **Success Factors:**

The RTP board of directors along with the board members took the right decisions for the park, which had a highly successful impact. They

- Restructured the projects' function under the research policies
- Restructured attraction and marketing strategy functions under the management and staff of the park to maximise the opportunities of RTP, creates the community-building activities, enabling the relationships between the stakeholders of the park, and empower the 'live-play-work' theme to enhance the attractiveness and quality of the park.
- Identified funding sources to finance incubator and co-working spaces for early-stage entrepreneurs and spin-off

One of the identified methods to secure funds for the early-stage start-ups was to partner with the government to start financing the incubator, particularly for early-stage



entrepreneurs and spin-offs. This incubator was opened to the public and was managed by the university under supervision of the College of Engineering. But the failure root cause was the lack of amenities at the incubator. Therefore, the start-ups could not collaborate effectively; that is why the live-work-play theme emerged, and the model changed. Therefore, 'Live-Work-Play' is considered one of the major aspects of RTP governance strategic decisions in major RTPs in the USA. To make this happen and to support the park's start-ups, RTPBPMU contracted with one of its incubated alumni to open his own company by providing studios to in-residence entrepreneurs under the name of the "HINMAN CEO program".

The park also partnered with 'We work' which is a co-working space that is for-profit companies that lease land from the university and provide flexible pricing for the park's start-ups. Moreover, one of the solutions identified by the RTPBPMU regarding the future for talent recruiting is to hire them as part time and then convert them to full time when they graduate.

The importance of the governance model is mostly associated with the mission of the university, which is to expand human knowledge, and recruit enough talented resources. Therefore, the RTP must tweak the governance model to attract pools of talented resources and bring many other stakeholders and actors to sustain its innovation, engage the community, and enable flexibility.

### **3. RTPD**

This is a ***real example*** of RTP's governance model for successfully applying the Land-use. The strategy was implemented by the governance model of Triple-helix RTP that has multiple forms regarding land-use: 1) RTP leases the lands from the university and it owns the building and leases the building to tenants and university;, 2) the lands owned by the associated university and attract real estate developers and investors to run projects linked to students' hiring, research collaboration projects, and innovative collaborations, and 3) private developers own the buildings and develop the building innovation communities "Health, energy, environment, Fintech" and lease these to the university.

The university President always sits on the board of directors as a member and has a voting right. The competitive advantage of the Triple-helix model starts with what the stakeholders demand, aligning these demands with the university's capabilities, and remaining totally independent from the university's governance to allow for more autonomy and flexibility in handling the RTP's operation and management, hence creating the RTP's policies to attract the companies' tenants to operate their businesses in a flexible manner. The involvement of the community, private companies, the public sector, and small enterprises is a crucial step towards producing the best outcome for the economic development of the country.

Moreover, the Triple-helix model establishes many businesses and hunts for technology start-ups that cannot be done by the university as it is totally dependent. Thus, the TTO was established on-park but managed by the university. Since the university did not want the risk of commercialisation, it created the two RTPs. One of the RTPs was established to deal with the community issues and generate funds that are reinvested into the university by 100%, and the major park focuses on the majority of big companies. The Triple-helix governance model allows for flexibility in the policies controlling the RTP. For example, the community organisations such as banks are encouraged to re-invest a percentage of their revenues in the community and the RTP which is a tool for economic development.

There is a regulation model in the USA that encourages and engages the banks to pay back to enhance the local economic development by creating jobs, creating tech start-ups, and other such initiatives. The RTP uses such regulation to seek funds from the banks to construct and operate RTP's infrastructure and activities.

#### **4. RTPNASA**

The governance model is mostly contractual based on case-by-case and adheres to USA federal and state laws; therefore, it depends on removing the bureaucracies in the governance model.

## 5. RTPGTS

The key success factor for the RTP governance model is that the park always collaborates and arranges programmes with the corporates to facilitate the corporate innovation. Since 1996, the governance in Atlanta State has hosted parties from government, universities and private sectors. That enabled the next growth stage led by the GT Foundation to emerge.

Regarding the land-use, the GT foundation owns the land and leases it to private companies to develop the city. Additionally, the park established a college of business next to the continuous education and hotel and businesses, and the service providers.

Regarding the funding part, every year, there is a budget request to public universities (with the approval of the board of the region) for Georgia State (including 26 public universities).

RTPGTS has no governance as it depends on the real estate developers to build. Therefore, the GT foundation manages the RTP construction and establishment, as the anchor for the RTPGTS. So, the key is: Who wants to influence what? Therefore, the innovation district does not need to have governance. Moreover, the GT foundation collaborates with other RTPs and corporates from other states at clusters or at the innovation districts as the formation of multiple committees will complicate the spontaneous economic development. As a result, the companies will be willing to learn from each other.

RTP requires parties that want to be very thoughtful in running their start-ups effectively and influence companies to grow, like innovator learning from innovator, not to engage in marketing activities with no real economic development or growth to benefit the state. Nevertheless, if the GT foundation has governance without engaging the stakeholders, there will be conflicts and delays in the growth. The more multiple stakeholders there are, the more opportunities and opinions that enrich the growth of the park will be provided. Conversely, there are some cases where the real estate developer did not bring any value-added to the RTPGTS, nor start-ups growth. Therefore, the RTPGTS's stakeholders decided to conduct bi-weekly meetings among

all the stakeholders and partners (RTPGTS stakeholder, GT foundation, and the university) to discuss the potential benefits of real estate developers to the park and the start-ups. In conclusion, the best way is to keep the governance spontaneous, not add any committee to make it more agile, and adopt the innovation process.

## **6. RTPLSTP:**

The diversity of stakeholders in the Triple-helix governance model who share one goal and following the same strategy brought new ideas to attract tenants' firms to locate on-park. That goal cannot be met by the RTP alone! A variety of effective communications channels among the different stakeholders engaged in the Triple-helix governance model enables the RTP's collaborations and success factors, which gives the Triple-helix model value-added among other models. Moreover, the Triple-helix model significantly contributes to the RTP performance by:

- Increasing the growth of the park
- Boosting the economic development
- Efficient development of the park's infrastructure
- Attracting the private sectors

## **7. RTPMIT**

The RTPMIT has no RTP per se, as they created the central square-university park within the boundary of MIT, which was an initiative for using the land owned by the university and leased to real estate developers for 80 years. The park is fully operated by the real estate developers with some governance policies from the university. Therefore, the park has become a unique case, as the stakeholders facilitated and empowered the scientists to create the ecosystem by establishing their start-ups and collaborating with multiple universities and schools. The university's schools encourage industry to sponsor research.

## **8. RTPSV:**

Since the researcher alone cannot govern the business or RTP, the argument here is to focus on a consortium of stakeholders to deliver the RTP's vision by engaging all

the stakeholders. The main goal of the RTPSV is to encourage start-ups and tenants' firms and contribute to their growth, and vice versa.

The diversity of consortia of Triple-helix enables the achievement of the vision and strategy, and creates funding opportunities for RTP's start-ups. Such diversity identifies several potentials leading the RTP to internationalisation by attracting international companies to locate on-park, and the collaboration will happen spontaneously. Conversely, other governance models such as 'RTPs under university structure' have numerous obstacles and cannot manage the STP due to complex bureaucracy and lack of flexibility.

Mainly, RTP's governance depends on the policies and commitment, which is an example of the Triple-helix governance model that allows RTP's board of directors to have autonomy over the park's management, boost economic development, create an impact on society, and enable RTP to become globally recognised.

#### **7.2.1.2. The Perspectives of RTPs' CEOs Regarding 'Under University Structure' RTP's Governance Model**

The decision-making, authority, and the approval processes in the 'under university structure' governance model are always controlled by the university board of trustees. An example of such governance control can be 'tenants' firms' selection criteria', i.e. any tenants' located on-park should be approved by the university. The major advantage is that RTP and the university report to the same organisation, which makes it easier to communicate between the park's staff and the talented resources. However, this advantage varies depending on the effective level of communications and collaboration among the RTP's staff and the ability of the talented resources at the university to collaborate in order to turn RTP's vision into reality. In reality, this is the most difficult aspect in such an organisation, as the main focus of the faculty and researchers is to publish research papers instead of commercialise their research.

## **1. RTPIIT**

The advantage that can be gained from the governance model depends heavily on the RTP's governance model. For example: if the park governance model falls under the Triple-helix, then the park will have a higher growth rate. On the other side, the university's RTP has more influence on RTP's decisions. Moreover, the Triple-helix governance model enables the collaboration between several universities that leads to the creation of ecosystems, increases RTP's revenue, and has a more flexible management style.

## **2. RTPWU**

The partnership of the public and private partnership in the Triple-helix governance model boosts the economic development, increases the growth rate of the park, and leads to efficient development of the park's infrastructure. However, changing the governance model of RTP requires fundamental changes in policies, and procedures, and embedding some of the local regulations into RTP's governance.

## **3. RTPUCD**

Currently the park, TTO, and corporate liaison offices are under the governance of the associated university, but the university is evaluating the governance model to be a 502c non-profit organisation as a separate and an independent entity to manage the park and have a consortium of different stakeholders, such as the Triple-helix governance model for more flexible governance. Thus, the university created a group that is responsible for the innovation and entrepreneurial initiatives, reporting directly to the university president. Moreover, the new reporting team is forming a new entity and consulting with the RTP's consultants to change the governance model of the UC Davis Research & Technology Park to be an independent and a standalone entity.

## **4. RTPNCSU**

The NCSU associated university is affiliated with Centennial RTP State by providing the land to the university not only to expand the university's economic development impact on the city, but to establish a partnership with RTP to improve the economic development department under the structure of the university, as well as to enhance the real estate activities under the report of the real estate VP. Although RTPNCSU has the governance model 'under university structure', the park has been adopted a

modified version of 'Non-profit' RTP to facilitate the park's management and autonomy.

Regarding the land use governance, the lands are owned by both the university and the state, so if there is an expansion then the state funds the infrastructure cost, or the university can raise it from different sources.

Such governance structure enabled the RTP to report to the university's president as a non-profit organisation, which is considered more flexible than the governance model 'under the university's structure RTP', particularly in that the mission of economic development of the university is to open the doors to the private enterprises and entrepreneurs to help them grow to create the entrepreneurial ecosystem. Moreover, the 'non-profit' RTP governance model enables the flexible interactions with the TTO, facilities, and the faculty. Such close interactions and collaborations give the feeling of ownership for the benefits happening within the same organisation by the university's talented resources, and the benefits are not transferred to another body which can be considered as a separate entity 'RTP'. On the other side, the RTP's director has the autonomy and authority to manage and govern the park without referring to the university. Regarding the delegation of authority, it is very important to the RTP's director to control it along with the autonomy of governing the park to set the policies according to the university policies, and that makes it responsive to the need of tenants' firms. Therefore, the main function of the park is to correct the process of the different departments at the university to work effectively with the tenants' firms to provide the best services.

## **5. RTPJH**

The RTPJH formed a strategic partnership with the real estate developer which has been in place for several years, as the land is owned by a real estate developer that leases the building to the RTPJH.

The RTP's growth is impacted by RTP's governance model, but there are two sides to such impact by being part of the ecosystem and being part of the JH associated

university. One of the impacts is that the policies and conflicts of interest lead to less autonomy of the park, which in turn leads to a lack of fund-raising activities for the start-ups, leading to dislike of the 'non-profit' governance model. Conversely, in the case that a university professor who has invented a new type of vaccine wants to create an academic spinoff start-up around his invention, the federal fund supports the research, but the professor should raise funds individually to grow his/her start-up.

## **6. BC**

BC has an Incubator, which is considered as a micro-entity of the ecosystem. The two primary benefits from it are networking and advisory and mentoring. Moreover, the governance of the board consists of successful entrepreneurs, lawyers, regional representative, international companies' representative, and the government, venture capitalists whose main job is to seek access to experienced people as part of the innovation and getting the right stakeholders on the board, by trying to focus on the shared goal of the incubator's vision, which is developing a university-based entrepreneurship ecosystem.

The main mission of the incubator is growing new ventures, creating new jobs, and upholding the principles and practices of successful business incubators. The majority of the board must be entrepreneurs on the other hand, so the economic development department should play the role of setting expectations of what is needed from each board member.

## **7. RTPHU**

In general, the review mechanism of the selection criteria of tenants' firms is based on peer review and internal review. There are also internal and external committees to get a more diverse view of all the RTP's board members. The growth of the RTP will come spontaneously as long as the RTP governance model adopts flexibility and autonomy, independence, and the ability to assess the independence of RTP governance, and how the relationship between the RTP and the university is set. That is because the innovation governance must be independence. Moreover, the



governance model of the RTP should pay attention to the charges of the tenants' firms to be based on the percentage of the revenue of the tenants' firms, to be as flexible as possible and to consider the diversity of the tenants' firms' located on-park. Furthermore, the collaboration and harmony among the RTP's stakeholders and it is the role of the RTP's director and the to get the right stakeholders of the RTP together and then think of what the activities are that the RTP will provide to its tenants' firms such as manufacturing and assembly, among others.

At present, HU does not have a park per se; however, there are incubator and accelerator 'iLabs'. Moreover, HU's associated university is collaborating with many institutes in commercialisation such as MIT, and Boston College. Conversely, it allows the faculty members to work at the industry as consultants and it can get the outcome of the projects' reviews.

In the meantime, the RTPHU is in the process of establishing an "enterprise research campus", which is a new idea and will be settled within the HU's associated university's landscape boundaries. The governance model of the RTPHU has not yet been decided; however, it will inherit some characteristics of the HU's associated university's governance such as "decentralisation" and "autonomy". The idea is to have a "RTPHU enterprise research RTP" as a facilitator for the industry-related activities. Regarding the selection criteria, it will be according to specific research collaboration projects and peer review conducted by the RTP.

The decision on the best-fit governance model is still considering several operational issues such as infrastructure, construction, utilities system, and how the various operational aspects that need to be authorised will cooperate and run. In particular, the desire of the park's governance is focusing on creating RTP with mixed-use of urban development and co-working spaces to create the 'live-work-play' theme.

Regarding the use of the land, although it is owned by the HU's associated university, the central administration will be responsible to decide the type of the governance of the park. Conversely, the RTP's board of directors should always be flexible and

responsive to having multiple real estate developers to collaborate on the development of the park. However, the gray area of the RTP's governance is deciding on what will be handled and operated by whom: the university's departments or the real estate developer companies, or the city?

Therefore, the governance model is crucial to the success of the park, as the regulations will be affecting the growth and relocation of the tenants to the park, as the rules should be improving the performance measures of the park and should not be pivoting the goal of the park to management of an urban area. As a result, due to the restrictions in the governance model, the real estate developers will not accept the restrictions on rules and policies; also the construction costs are already high so imposing more burdens on them will deter them from contributing.

## **8. RTPRU**

The RTPRU's lands are owned by the university along with 11 buildings. The RTP's strategy was to attract large corporates such as IBM and GE to re-locate on-park; however, there was a lack of attraction due to the lack of attention given to the park and poor R&D activities. Therefore, the RTP changed its strategy to lease the park to small companies to collaborate with the campus resources and come up with new commercialised ideas, following which they become eligible to locate on-park. Moreover, the university's management strategy was to concentrate on the residential entrepreneurship programmes, incubator, community on-campus, and local meetup for students and the broader community.

The priority was to focus more on the RTP and residential incubator. However, to cut the costs, the university governing the RTP decided to switch the strategy to a virtual incubator, but the results have not been satisfactory or practical, as several proximity issues occurred from such a virtual setting. The lesson learnt from the virtual experience is that the most important driver for tenants' firms to locate on-park is to have a sense of community and access to the RTP's decision-makers so the park can align their strategy to the tenants' firms' strategies. On the other side, the RTP is considering the entrepreneurial funnel strategy which is a model that can be adopted when the RTP's management considers the different stages of the entrepreneurship

process with transition gates and structural governance. Such strategy will enable the connections between different staff, scale-up the entrepreneurs, and provide them with fruitful support.

The RTP's impact does not focus mainly on the regional economic development, since it is under the structure of a private university, and there should be more incentives and support towards the entrepreneurial culture and commercialisation process from the government and public agencies.

## **9. RTPKIED**

Governance encapsulates the tone and practices of what is happening inside the RTP – i.e. reducing the space rent, and facilitating the processes and policies to attract the tenants' firms, among other aspects. All decisions that govern RTP will contribute to the growth of the park. The governance model that is associated with and engages with the university is the engine of the growth and competition. However, the type of the governance is a major variable because it can contribute to the RTP's growth and collaboration with the park's stakeholders. The more flexible the RTP's governance model that enables engagement with a diversity of the RTP's stakeholders is, the greater the RTP's collaboration and growth are. Such diversity of Triple-helix model formulates new ideas and discusses RTP's strategy execution's issues to get them resolved before they become big problems.

### **7.2.1.3. The Perspectives of RTPs' CEOs Regarding 'Non-Profit' RTP's Governance Model**

The decision-making, authority and approval processes in the 'non-profit' governance model are always controlled by the board of directors. Such governance usually consists of the university, government, private sectors, NGOs, and the community. In some cases, it is considered as a form of 'Triple-helix' governance model due to the diversity of stakeholders.

## **1. RTPASU:**

If the park is under a 'university structure' governance model, then the university will make it difficult for the park to operate and execute its strategic visionary plan due to complex policies. This is particularly the case when working with private sectors, because such complex processes take too long to negotiate the deals and can pose challenges to tenants' firms and entrepreneurs. In addition, it increases the stress on the RTP's staff to operate effectively when dealing with external bodies such as those from the private and public sectors. Therefore, having a consortium governance model will make the process more flexible and create more collaboration opportunities with stakeholders.

#### **7.2.1.4. The Perspectives of RTPs' CEOs Regarding 'Company with Capital Share' RTP's Governance Model**

The decision-making, authority and the approval processes in the 'Company with Capital Share' governance model is always controlled by shareholders of the RTP company, where every shareholder has a percentage of capital share in the company and the RTP runs as an enterprise focusing mostly on the financial growth.

##### **1. RTPBISFSPA**

Usually, if the RTP falls under the university's structure, then the university imposes a complex governance model that will not make the RTP eligible for public funds; thus, the RTP misses out on funding resources. Additionally, it is more dynamic to have a Triple-helix or consortium governance model to create the economic development of the tenants' firms' located on-park.

Overall, the consortium governance model has less bureaucracy, higher response rate to the companies, a flexible management style, and possesses more capabilities to identify talented resources – i.e. linking relationships from the park to tenants' firms directly will make the process more flexible and will create more collaboration opportunities with other bodies external to the RTP. Moreover, a consortium and an entrepreneurial governance model provide more sustainability to the RTP and could permit the development of a service platform based on the needs of companies with a real marketing approach.

## **2. RTPTH:**

The major advantage of the Triple-helix as the RTP's governance model is that it combines the advantages of public and private domains. The public stakeholder will enable the effective collaborations of the RTP by seeking partnerships with local, regional and international governments, and other universities and R&D institutions. On the other side, private sectors drive the business to grow and motivate private sectors to invest in the park and locate on-park, therefore, increasing the revenue of the park and adopting a more flexible management style.

### **7.2.1.5. The Perspectives of RTPs' CEOs Regarding 'Company Owned by the University' RTP's Governance Model**

The decision-making, authority and the approval processes in the 'Company owned by University' governance model depend on the relationship between the RTP's CEO and the University President. There are no formal or governance policies that control the relationship. That is one of the disadvantages of such a governance model which is controlled by the university board of trustees and the university's president.

## **1. RTPDTVC**

RTPs with the Triple-helix governance model are mostly regarded to be less bureaucratic, have a high response rate to the companies' and entrepreneurs' needs and expectations, and possess flexible management style. Moreover, it has been noticed by several RTPs' management teams that the correlation of the park and its governance model demonstrates the dilemma of the main issues of RTPs. This means that, if the university manages the park, this usually leads to conflicts of interest between the two major factions 'Publications' and 'Commercialisations'. Moreover, there is a major difference between management styles of the university and the industry. Usually the consortium governance model enables the collaboration with other universities and R&D institutions, increases the revenue of the park, increases the independence of tenants' firms, boosts the collaboration with other RTPs,, and facilitates the flexibility in working with international companies to bring the RTP to its optimum goal – globalisation.

## **2. RTPMWC:**

The advantage of the consortium governance model is the total independence of all the governance and management of the park from the associated university. Part of the RTP's governance should be the independence of setting up, controlling and evaluating the selection criteria for tenants' firms' entrepreneurs. Additionally, the RTP's governance should focus on the commercialisation, collaboration and networking activities with and among internal and external tenants and entrepreneurs, the market and the investors. On the other hand, the affiliated university should not have any governance or power over the park's operational model to lead the RTP to flexibility in its management style as the university should focus on the research activities and registering the patents and IPs. Therefore, the park governance and management should operate as a company not as a research institute. That said; the legal and governance model of the park will definitely impact the growth and performance measurement of the park. The more flexible and independent a model the park has, the more growth it will experience. Moreover, the collaboration between several entities to attract tenants' firms and start-ups will increase the revenue of the park, enable a more flexible management style, increase the alignment of the RTP to the innovation's strategy, and improve the expansion of the park.

### **7.2.1.6. The Perspectives of RTPs' CEOs Regarding 'Government/Free Zone' RTP's Governance Model**

#### **1. RTPISTC:**

The advantage of the Government/Free zone RTP model is that it is fully funded and supported by the government and provides incentives and exemption from taxes. However, it depends on the flexibility of the country-specific regulations in regards to RTPs and entrepreneurial activities.

Table 4 below demonstrates various entrepreneurial programmes provided by the RTPs of different governance models:

**Table 4: The Entrepreneurial Programme of Different RTPs' Governance Models**

<b>RTP Governance Model</b>	<b>Entrepreneurial Programme</b>
<i>Triple-helix</i>	<p><b>Proof of Concept Programme:</b> Helps entrepreneurs create their own start-ups by receiving white papers, where the commercialisation is validated by the external independent bodies. At the end of the year, the entrepreneurs pitch and get investments based on the selection criteria of external independent bodies.</p>
	<p><b>Special Clinics:</b> Educates the stakeholders on specific emerging technologies' topics such as innovation in virtual reality, AI, etc.</p>
	<p><b>Phase I Venture:</b> Takes promising research and converts it to a company by having the professor as a founder and having equity in the company but business manager is appointed to run the company.</p>
	<p><b>Innovation Hub for Start-ups:</b> Open for the stakeholders and the public.</p>
	<p><b>Monthly Events for RTPs' Stakeholders:</b></p> <ul style="list-style-type: none"> <li>• Conduct monthly events conducted to public community</li> <li>• Conduct tenants' consulting events to share and exchange experience and ideas among the tenants</li> <li>• Recruitment of interns to work in the tenants' firms.</li> </ul>
	<p><b>Entrepreneurship Programmes:</b></p> <ul style="list-style-type: none"> <li>• Continuous education open for the community</li> <li>• Virtual office hours for free and consultancies</li> </ul>
<i>Non-Profits</i>	<p><b>Academic spin-off Programmes:</b></p> <ul style="list-style-type: none"> <li>• Given lower licensing fees</li> </ul>

	<ul style="list-style-type: none"> <li>• Create the logos and the identity of the company on a free basis</li> <li>• Allow the faculty members to dedicate 25% of their working time to entrepreneurial and spin-off activities to provide them with flexibility to establish and develop their spin-off</li> </ul>
<p><i>Under the University's Structure</i></p>	<p><b>Incubator Programmes:</b></p> <ul style="list-style-type: none"> <li>• Supply of entrepreneurs (how to attract the local entrepreneurs back to the country, tracking Alumni, RPI Engineering alumni, reconnect the alumni, alumni mentoring programmes)</li> <li>• Networking and virtual networking</li> <li>• Funding sources</li> <li>• Source of IPs</li> <li>• Engage the stakeholders who are leading the economic development bodies in the country to be enablers for the networking</li> <li>• 'Entrepreneur of the year' programme</li> <li>• Virtual networking and mentoring including physical meeting once a month</li> <li>• Developing a new talented entrepreneurial culture building in the university and schools' curricula</li> </ul>

### **7.2.1.7. The Commercialisation Policies and Processes of Different RTPs' Governance Models**

This section demonstrates the comparison between the difference between the RTPs' governance models regarding their commercialisation policies and processes

#### **A. Under Triple-Helix**

##### **RTPSC:**

There is no right or wrong commercialisation policy or process; it depends mainly on the RTP objectives and decision-making of the RTP members' board of director and



stakeholders. For example, one of the Triple-helix RTPs sets a governance of commercialisation to the following scenario:

If a professor from any university associated with the Triple-helix RTP wants to create a start-up company, he/she approaches the funding office run by the RTP and owned by the university. The equity will be split at 51% for the professor, and 49% for the university. The RTP will look for a CEO, who will be an entrepreneur and who then will be given 20%. Then the company is registered legally. The RTP sets several milestones for the CEO to achieve, such as obtaining 2% of the company's equity after he/she has pitched the company to investor, obtaining 5% of the company's equity when he/she successfully secures funding from the investors, and obtaining 20% of the company's equity after two years of achievement. Usually, the CEO of the start-up company can negotiate the terms and conditions related to his/her percentage equity and the CEO benefits alongside the RTP and the university.

Another commercialisation policy that is widely used in the USA RTPs associated with one or more universities is that the IPs are always owned by the university and the professor who is officially considered as a paid employee of the university can negotiate the terms and conditions with the university. The origin of this policy lies in a USA Federal legislation called the 'BAYH-DOLE Act'. It describes the main reasons for the university's professors seeking to publish their inventions to get promoted in their academic careers and obtain academic titles because of the IPs instead of the federal government. Therefore, the universities can claim ownership of the IPs and the faculty members can share the IPs with the universities. This law, launched in 1981, enabled the universities to create TTO and own the IPs. But ownership of the IPs will not generate revenue for the university, although the universities thought they would greatly benefit from of the ownership of IPs. Unfortunately, they do not because most faculties are only doing basic research that cannot be applied more broadly. In addition, even if the universities want to commercialise the IPs, they cannot do this alone as it should be attached to another technology, and requires a great deal of collaboration and cross-functionalities, which is very limited in RTPs with a "non-triple-helix" governance model. Nowadays, the perspective has changed, particularly among

young professors, as they realised the need to collaborate with multiple stakeholders to commercialise their IPs.

The commercialisation process in the Triple-helix RTPSC is explained below:

The ideas are collected electronically from all the schools of the universities associated with the Triple-helix RTP on a monthly basis (around 380-450 ideas) and these ideas are reviewed by 28 investors without any commitment to invest. Then five ideas are selected to be pursued further and develop prototypes. Afterwards, the ideas receive investment after going through selection criteria set by the RTP. Nevertheless, the IPs ownership policy might be the main reason for delaying the commercialisation process, and the more flexibility and trust is built among the RTP's stakeholders, the more commercialisation projects will shine and grow. An example is when the IPs ownership delayed the commercialisation project of a new gene editing technology technique, where a debate between Harvard University and California University took place in the court over ownership of the patents.

#### **RTPNASA:**

There are major research projects between the park, Stanford University and KACST, international joint research and funded projects, or companies locating on-park. There are also joint research projects without exchange of funds, fitting the RTPNASA's vision, strategic direction, and benefit to be unique to the park.

Therefore, the park does not take the IPs ownership under its responsibilities, although Park's confidentiality agreements are very restrictive.

Although the legal department is setting the IPs, the conflict resolutions and liabilities, to enable flexibility in the process, every three years, the park conducts a review of the policies to add more flexibility to the restrictions of confidentiality. Thus, it is recommended that only spin-offs seek IPs with the university by 100% and the licensing equity of the university depends on each case.

#### **B. Under University Structure:**

#### **RTPJH:**

Since the RTP is under the structure of the university, the IPs are 100% owned by the university; however the active licensing and revenue is distributed to the inventor and other stakeholders. Additionally, the university governance in the RTP is to have an equity in the start-up company if the start-up has no IP registered; however, if the start-ups have IP for the established company, then the university must have 15% of the start-up's revenue. On the operational side, there are no incentives for the staff for closing the deal for IPs and helping to license the IPs to start-up outside the USA.

#### **RTPHU:**

Regarding the commercialisation policy, the HU-industry liaison office governs, manages and encourages industry to license IPs, and then fund the research projects and manage them independently.

#### **RTPRU:**

Since the RTP falls under the university's structure, it fully owns the patents. However, the licensing and royalties resulting from the license are 50% for the university, 35% for the inventor, and 15% for the academic department which the inventor reports to. Nevertheless, it is difficult to convince the faculty members to commercialise their inventions as they usually prefer to publish the research outcomes, and sometimes they can remove the parts of the research to be licensed. Therefore, the park should put in more efforts to create a more encouraging environment to disseminate the culture of commercialisation among their university's faculty, researchers, and students. To facilitate the creation of academic spin-off, the university takes around 5% as equity from the spin-offs to provide the support for faculty members to create their start-up company around their inventions.

The RTP follows a provisional patents process, which can be described as the following:

- A placeholder patent filed and awaiting the 'due diligence stage'
- A committee consisting of investors, angel investors, and venture capitalists evaluate the ideas during the incubation period
- The committee decides to move to a due diligence stage

- External consultants along with four to five professors either approve or reject the due diligence
- The committee decides on whether to license the technology to a large company or whether a start-up company should be created around the invention.

### **C. Non-Profits:**

#### **RTPSV:**

The RTP has a shared governance policy with all the universities that are collaborating with it, to allow the professors to dedicate 20% of their time to conduct any consultations during the university's work hours. The success factor in the commercialisation aspect of the governance strategy of RTPSV is that the patent law court cases are firmly established, so there are policies for IP protection and patent protection. The RTP has collaboration with external TTOs.

#### **7.4. Conclusion**

This chapter benchmarked in detail the key three main factors of the RTP's strategic visionary management model according to its governance model: 1) Perspectives of RTPs' management regarding RTP's governance model and its influence on boosting the growth of RTPs' increase the performance, 2) entrepreneurial programme of different RTPs' governance models, and 3) Commercialisation policies and processes of different RTPs' governance models. The researcher benchmarked these factors based on all the collected data sources from the interviews, the surveys, the observations, and documented analysis throughout the research project lifecycle.

## **CHAPTER 8: QUANTITATIVE DATA ANALYSIS**

### **8.1. Introduction**

This chapter employed the quantitative research design to execute what was planned in Chapter 4 in detail. The goals of this chapter are focused on presenting the below:

- Describe the quantitative research methodology as part of the mixed-methods such as the population, sample demographics, the final survey after refining it throughout the pilot phase, and the response rate and sample error
- The medium of distributing the questionnaire to the participants and the list of RTPs' CEOs who participated from different countries. The full list of participants' countries can be found in Appendix J
- The design and structure of the survey and the tools used for the statistical analysis
- The main statistical analysis conducted to investigate the correlations between the variables in the data between "Governance model of RTP" and the main variables related to the RTP's growth and performance rate.

## **8.2. Quantitative Research Methodology**

The population of RTPs' directors who participated in the survey are members of IASP and AURP. The size of the research population of 600 RTPs is from 57 different countries. After the pilot survey was conducted, the researcher removed some questions that seemed to be irrelevant to the research study and modified some values of the multiple choices in the questionnaire. For example, the researcher found out that the ownership of the lands is not always under the RTPs' properties, so the question was modified to: Floor area of completed buildings (m<sup>2</sup>) owned by the park. After the pilot survey, the research found that the questions "Number of on-park employees" and "Number of service providers' on-park" will not benefit the main objective of the survey in validating the relationship between the RTPs' governance model and RTP's growth and performance measure; therefore they were removed.

## **8.3. Quantitative Sample Design**

This research employs a sample of 300 research and technology parks, science and technology parks, and areas of innovation, from 57 countries (Austria; Belarus; Belgium; Botswana; Brazil; Canada; China; Colombia; Croatia; Denmark; Estonia; Finland; France; Germany; Greece; India; Iran; Italy; Japan; Latvia; Lithuania; Malaysia; Mexico; Namibia; Norway; Oman; Pakistan; Panama; Poland; Portugal; Qatar; Russia; KSA; Singapore; Slovenia; South Africa; South Korea; Spain; Sweden;

Switzerland; Taiwan; Thailand; The Netherlands; Tunisia; Turkey; United Kingdom; Uruguay; United States of America and Venezuela). The sample represents 50% of the population, with an error limit of 4% and a 95.5% confidence level ( $\alpha$ ). The sample gathered from interviews, surveys, document analysis, and the RTPs' reports.

**Measurement instruments:** The data collection was carried out via the online secured survey system called "Form Stack" which was sent by email to all the participants.

#### 8.4. Survey Design

The questionnaire consisted of 30 questions; there were 27 closed questions and three open questions distributed into eight sections:

- Governance and Strategic Models of RTP
- General information about the RTP
- RTP's Services
- Measurements of Innovation Performance and Growth Rate of the RTP
- Background on the RTP's management team and its activities
- Level of innovation activities on-park
- Collaboration of RTP with Universities and other Stakeholders/Partners

The main sections are the governance and strategic models of the RTP, and the measurement of the performance and growth rate of the RTP, as these are the main two variables that the researcher is interested in testing regarding the relationship among them to validate whether the hypothesis is valid or not. The remaining sections are designed for the questionnaire to validate and support the test of the hypothesis. Question 2 is considered the most important and mandatory and asks about the Governance Model (registration type) of the RTP. The reason that the researcher added question 3 to both the interview and the survey – "In your opinion, do you see any relationship between the park's governance model (legal registration type of the park) and the growth rate of the park?" – is to guarantee that the participants' explanation of the relationship between the governance model and the performance and growth rate of the RTP are covered in the data collection stage.

Question 4 relates to the growth rate and the performance of the RTP to confirm whether the RTP is only dependant on external funds or it also participates in funding itself. The questions on the “General information on the RTP” were designed to validate the autonomy of the RTP’s Director and the RTP’s growth and performance. For example, question 1 about “whether the RTP has its own identify or whether it is part of the Affiliated University or other organisation” and question 6 about “the set criteria for locating tenants’ firms on-park and who set them and how often these criteria are used?” were added specifically to validate whether the RTP’s governance model is dependent on or independent from the affiliated university, whether the RTP’s director has sufficient autonomy over the RTP’s governance and management, and to test the maturity of the RTP.

The RTP’s Services section contains the list of most popular RTPs services divided into: 1) Business Support Services, 2) Research Services, 3) Information Technology Services, 4) Development Services, and 5) Facilities, Utilities and Community Services with a focus on the “Live-Work-Play” theme. The RTP’s Services section was added to collect data to map the top services of global RTPs, which will help in preparing the strategic visionary management roadmap for RTPKEID and who can provide these services. Moreover, the RTP’s services section objective was to validate the performance measures of RTPs. The same section was designed in the RTPs’ Tenants’ Firms’ Survey to validate the responses from the RTPs’ Directors regarding the services they provide to their tenants’ firms against the responses of the tenants’ firms.

The Measurements of Innovation Performance and Growth Rate of the RTP section is as equivalently important to the RTP’s Governance and Strategic Model section as it is considered as the second variable that the researcher is interested in testing the hypothesis for. This section consists of obtaining information from the participant related to performance and growth rate of the RTPs, such as number of IPs licenses, registered and filed patents of the RTP, percentage average growth rate of RTP, percentage average growth rate of RTP’s tenants’ firms, and percentage average growth rate of RTP’s start-ups.

**Statistical analysis and data exploitation:** The data obtained from the online questionnaire were analysed using the Statistical Package for the Social Sciences (SPSS) and Microsoft Excel.

As a first stage of the data analysis, the data were exported from “Form Stake” to an Excel sheet and the researcher cleaned up and validated the data to avoid any errors due to poor completion of the questionnaire or the data importation process. Following this, the researcher coded the data into numerical format in the same Excel sheet and copied and pasted this into a SPSS file. She then mapped the descriptive data to numerical values and labelled them in SPSS.

### **8.5. Correlation Analysis Using SPSS**

The correlation coefficient and cross-tabular correlation tests were run on the data. The bivariate correlations were calculated to investigate the correlations between the variables in the data, mainly between “Governance Model of RTP” and the below variables, which relate to the RTP’s Growth and Performance rate:

1. Number of tenants’ firms (large-scale corporations) located on-park
2. Number of start-ups/entrepreneurs located on-park
3. Percentage average growth rate of RTP
4. Percentage average growth rate of RTP’s tenants’ firms
5. Percentage average growth rate of RTP’s start-ups
6. Number of IPs licenses
7. RTP’s collaborations with the stakeholders

The researcher excluded the exploration of the correlation between “RTP Governance models” and both number of registered patents and number of filed patents, since they do not contribute significantly to the RTP growth rate. However, the researcher along with the supervisor decided not to test the causality between the “governance models” and “average growth rate of the RTP” since there are multiple factors contributing to the park’s growth.



### 8.5.1. Correlation between RTP Governance Model and number of Operational Tenants on-park

Table 6 below demonstrates bivariate correlation between RTP’s governance model and the number of tenants' operations on-park since P-value= 0.02 is less than 0.05 proves a significance correlation between the two variables using significance level ( $\alpha$ ) =10%.

**Table 5: Bivariate correlation between RTP’s governance model and the number of Operational Tenants on-park**  
**Chi-Square Tests**

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	41.578 <sup>a</sup>	25	.020
Likelihood Ratio	38.147	25	.045
Linear-by-Linear Association	.672	1	.412
Number of Valid Cases	61		

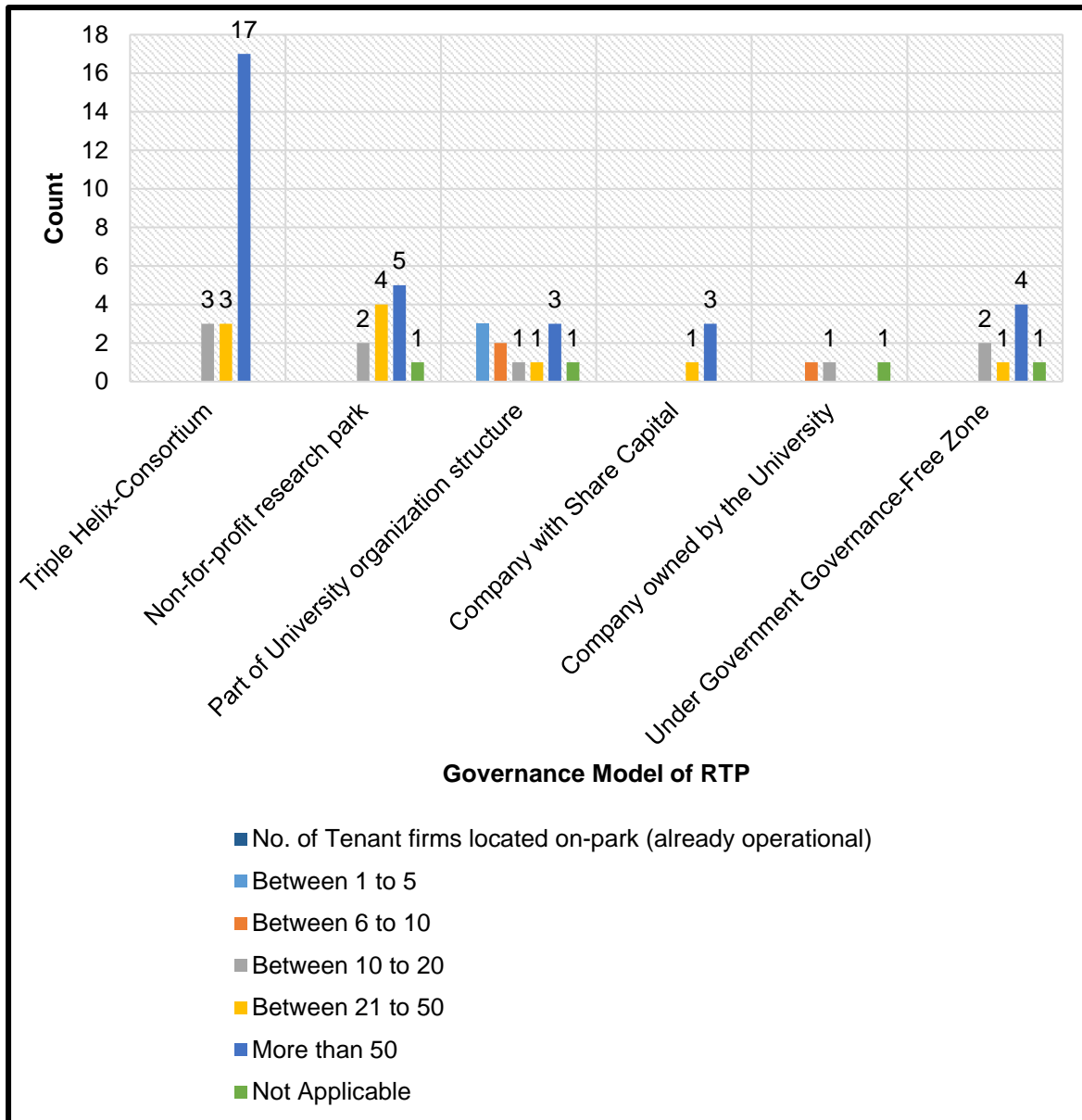
Table 7 below demonstrates the percentage of on-park tenants’ firms that are already operational. It clearly shows that “Company with Capital Share”, “Triple-helix”, “under Government/Free Zones”, and “Non-Profit” RTPs’ types account for the highest percentages, respectively. Usually the RTPs’ of “company with capital share” and “Triple-helix” are attractive for the tenants’ firms to locate on such parks as they benefit from tax-exemptions and other benefits tailored specifically for large companies.

**Table 6: Percentage and Number of Operational on-Park Tenants according to RTP’s Governance Model**

**Governance Model of RTP \* Number of tenants’ firms located on-park (already operational) Cross Tabulation**

			Number of tenants’ firms located on-park (already operational)						Total
			Between 1 and 5	Between 6 and 10	Between 10 and 20	Between 21 and 50	More than 50	Not Applicable	
Governance Model of RTP	Triple-helix	Count	0	0	3	3	17	0	23
		% within Governance Model of RTP	0.0%	0.0%	13.0%	13.0%	73.9%	0.0%	100.0%
	Non-profit research park	Count	0	0	2	4	5	1	12
		% within Governance Model of RTP	0.0%	0.0%	16.7%	33.3%	41.7%	8.3%	100.0%
	Part of University organisation structure	Count	3	2	1	1	3	1	11
		% within Governance Model of RTP	27.3%	18.2%	9.1%	9.1%	27.3%	9.1%	100.0%
		Count	0	0	0	1	3	0	4

Company with Share Capital	% within Governance Model of RTP	0.0%	0.0%	0.0%	25.0%	75.0%	0.0%	100.0%
	Count	0	1	1	0	0	1	3
Company owned by the University	% within Governance Model of RTP	0.0%	33.3%	33.3%	0.0%	0.0%	33.3%	100.0%
	Count	0	0	2	1	4	1	8
Under Government Governance-Free Zone	% within Governance Model of RTP	0.0%	0.0%	25.0%	12.5%	50.0%	12.5%	100.0%
	Count	3	3	9	10	32	4	61
Total	% within Governance Model of RTP	4.9%	4.9%	14.8%	16.4%	52.5%	6.6%	100.0%
	Count							



**Figure 8. 1: Operational on-Park Tenants according to RTP’s Governance Model**

**8.5.2. Correlation between RTP Governance Model and number of Start-ups on-park**

Table 8 below demonstrates bivariate correlation between the governance model and the number of start-ups on-park since the P-value= 0.003 is less than 0.05 which proves a significance correlation between the two variables using significance level ( $\alpha$ ) =10%.

**Table 7: Bivariate correlation between the governance model and the number of Start-ups on-park Using Chi-Square Tests**

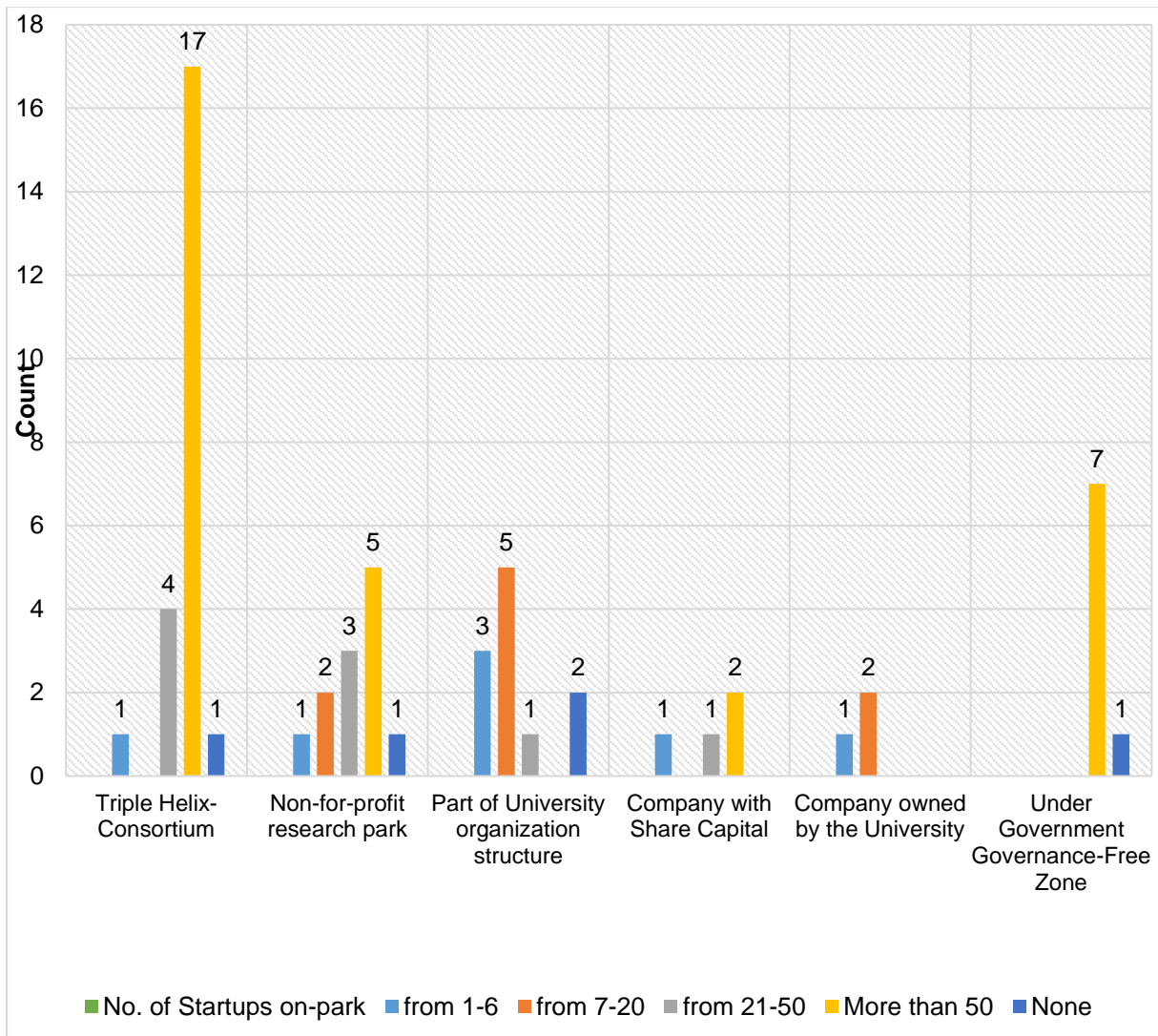
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	41.481 <sup>a</sup>	20	.003
Likelihood Ratio	49.730	20	.000
Linear-by-Linear Association	.474	1	.491
Number of Valid Cases	61		

Additionally, Table 9 below demonstrates the percentage of on-park start-ups, obviously showing that “Government/Free Zones”, “Triple-Helix”, “Company with Capital Share”, and “Non-Profit” RTPs account for the highest percentages, respectively. The results prove that it is logical to have the governmental RTPs as the highest since the benefits provided by governments and free zone, according to the collected data mostly attract more entrepreneurs to locate on such type of RTP.

**Table 8: Percentage of Start-Ups on-Park According to RTP's Governance Model Cross Tabulation**

		Number of Start-ups on-park					Total	
		from 1-6	from 7-20	from 21-50	More than 50	None		
Governance Model of RTP	Triple-helix	Count	1	0	4	17	1	23
		% within Governance Model of RTP	4.3%	0.0%	17.4%	73.9%	4.3%	100.0%
	Non-profit research park	Count	1	2	3	5	1	12
		% within Governance Model of RTP	8.3%	16.7%	25.0%	41.7%	8.3%	100.0%
	Part of University organisation structure	Count	3	5	1	0	2	11
		% within Governance Model of RTP	27.3%	45.5%	9.1%	0.0%	18.2%	100.0%
	Company with Share Capital	Count	1	0	1	2	0	4
		% within Governance Model of RTP	25.0%	0.0%	25.0%	50.0%	0.0%	100.0%
	Company owned by the University	Count	1	2	0	0	0	3
		% within Governance Model of RTP	33.3%	66.7%	0.0%	0.0%	0.0%	100.0%

Under Government Governance-Free Zone	Count	0	0	0	7	1	8
	% within Governance Model of RTP	0.0%	0.0%	0.0%	87.5%	12.5%	100.0%
Total	Count	7	9	9	31	5	61
	% within Governance Model of RTP	11.5%	14.8%	14.8%	50.8%	8.2%	100.0%



**Figure 8. 2: Start-Ups On-Park According to RTP's Governance Model**

### 8.5.3. Correlation between RTP Governance Model and RTP's Average Growth Rate per RTP's Governance Model

Table 10 below demonstrates a non-significant bivariate correlation between the governance model and the average growth rate with P-value = 0.087 greater than 0.05 using significance level ( $\alpha$ ) = 10%. However, due to the diversity of RTPs' governance models and the maturity of the parks, measurements on the RTP's growth rate are lacking, as most of the RTP's management teams do not reflect on the performance measurements of the parks. Instead they are selecting various KPIs related to tenants' firms' growth, RTP's expansion and constructions, and number of tenants and start-ups located on-park. During the observations field work, the researcher noticed that



there is no standard performance measurement framework for measuring the performance of the RTPs due to the range of RTP governance models. Therefore, the growth rate of the RTP should be measured by combining multiple variables related to each governance model. Most of these variables should be considered as standard while measuring the performance measurement of the RTP's growth rate, as listed below:

**Table 9: Percentage of Start-Ups on-Park According to RTP's Governance Model using Chi-Square Tests**

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.040 <sup>a</sup>	25	.087
Likelihood Ratio	37.517	25	.052
Linear-by-Linear Association	1.978	1	.160
Number of Valid Cases	61		

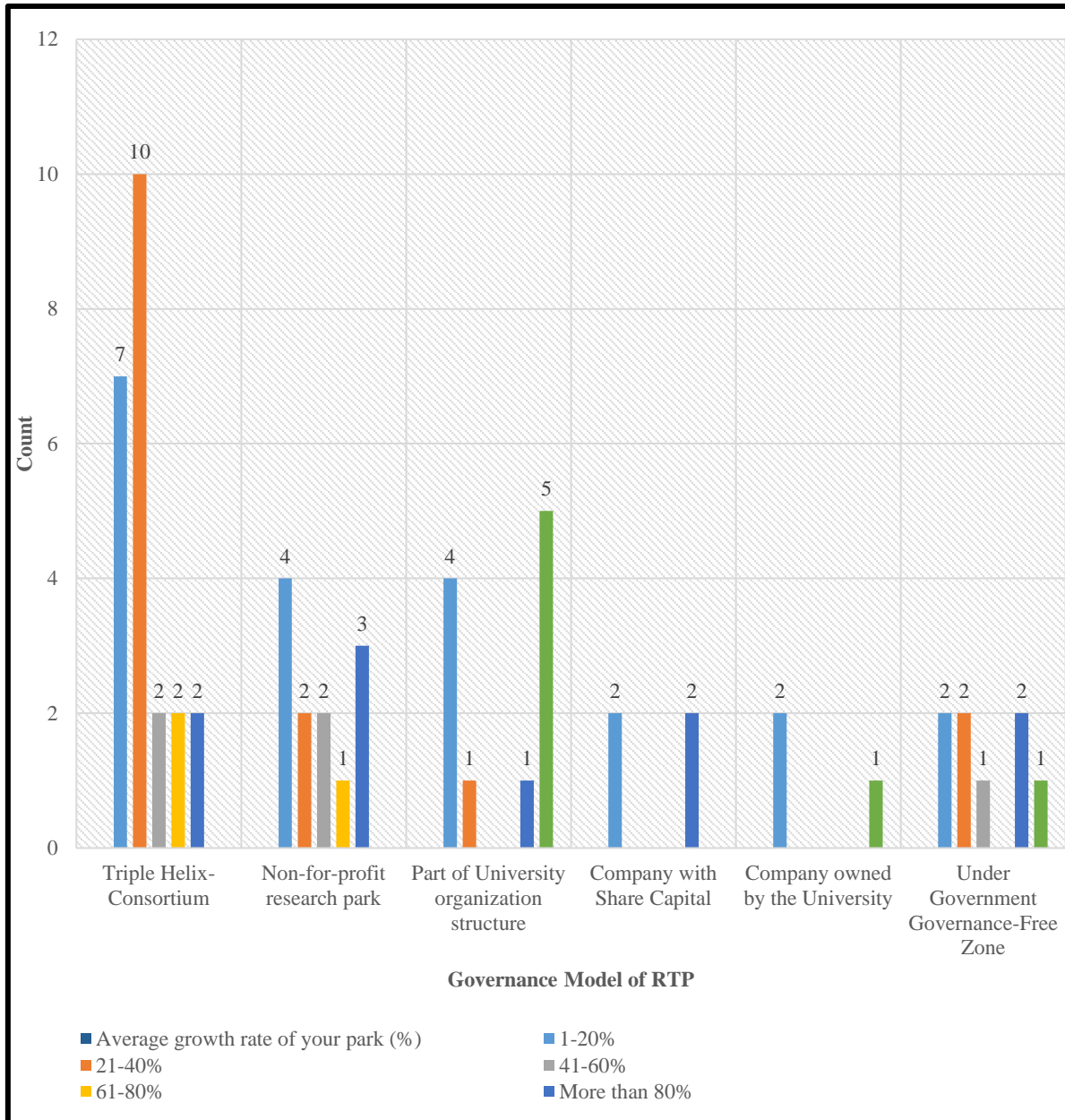
Table 11 below demonstrates the number and percentage of RTP's growth rate according to its governance model, obviously showing that "Triple-helix" and "Non-profit" RTPs count for the highest growth rates among the RTPs' governance models, respectively. It is logical to have the Triple-helix RTPs as the highest since they consist of multiple and diverse stakeholders with shared goals; they mainly aim to increase the financial sustainability of the park and positively impact the local, regional and national economic development.

**Table 10: Percentage of RTP’s Growth Rate According to RTP’s Governance Model Cross Tabulation**

			Average growth rate of your park (%)					Not applicable	Total
			1-20%	21-40%	41-60%	61-80%	More than 80%		
Governance Model of RTP	Triple-helix	Count	7	10	2	2	2	0	23
		% within Governance Model of RTP	30.4%	43.5%	8.7%	8.7%	8.7%	0.0%	100.0%
	Non-profit research park	Count	4	2	2	1	3	0	12
		% within Governance Model of RTP	33.3%	16.7%	16.7%	8.3%	25.0%	0.0%	100.0%
	Part of University organisation structure	Count	4	1	0	0	1	5	11
		% within Governance Model of RTP	36.4%	9.1%	0.0%	0.0%	9.1%	45.5%	100.0%
	Company with Share Capital	Count	2	0	0	0	2	0	4
		% within Governance Model of RTP	50.0%	0.0%	0.0%	0.0%	50.0%	0.0%	100.0%
		Count	2	0	0	0	0	1	3

	Company owned by the University	% within Governance Model of RTP	66.7%	0.0%	0.0%	0.0%	0.0%	33.3%	100.0%
	Under Government Governance-Free Zone	Count	2	2	1	0	2	1	8
		% within Governance Model of RTP	25.0%	25.0%	12.5%	0.0%	25.0%	12.5%	100.0%
Total		Count	21	15	5	3	10	7	61
		% within Governance Model of RTP	34.4%	24.6%	8.2%	4.9%	16.4%	11.5%	100.0%

Figure 8.3 below demonstrates the cross-tabulation comparisons made to explore the correlations between the RTP’s governance model and the percentage average growth rate of RTP represented by RTP growth rate variable.



**Figure 8. 3: RTP’s Average Growth Rate per RTP’s Governance Model**

The “Triple-helix” governance model type accounted for the highest governance type that demonstrated a correlation between the governance model and the average growth of RTPs with a total of 23 RTPs of the type “Triple-helix”. Among the different

types of RTPs, “Triple-helix” RTPs showed the highest growth rate between 21% and 40% compared to other RTPs’ types. The second highest governance model type was demonstrated by “non-profit RTP” with a total of 12 RTPs; three of these RTPs had a growth rate of more than 80%. On the other hand, “Part of university structure” RTP type showed the lowest with only two RTPs having a growth rate between 21% and 80%. The data for five RTPs were not applicable.

#### 8.5.4. Correlation between RTP Governance Model and Average Growth Rate of RTP’s Tenants’ Firms

According to Table 12 below, the bivariate correlation test showed a significant correlation between the RTPs’ governance model and the average growth rate of the RTP’s tenants’ firms with P-Value= 0.004, which is very similar to what was observed during the qualitative data analysis as most of the RTPs under governance model with the majority of RTP’s shareholders from private sectors are mostly business-oriented; they have strong strategy to attract tenants to locate on-park and have marketing departments on-park.

**Table 11: Average Growth Rate of RTP’s Tenants’ Firms According to RTP’s Governance Model Using Chi-Square Tests**

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	48.162 <sup>a</sup>	25	.004
Likelihood Ratio	48.936	25	.003
Linear-by-Linear Association	2.060	1	.151
Number of Valid Cases	61		

On the other hand, Table 13 below shows a significant correlation between the average growth rate of RTP’s tenants’ firms when the RTP budget is funded by the private sector with P-Value= 0.005 when we measure against significance level ( $\alpha$ ) =10%. That means that the less flexible governance model RTP has fewer tenants’ firms operational on-park and the more flexible governance model of RTP has more tenants’ firms operational on-park.

**Table 12: Correlation between Average growth rate of RTP’s Tenants’ Firms and RTP funded by the Private Sector**

		Governance Model of RTP	Average growth rate of the park's tenants' firms (%)	Who provides the budget for RTP (Private sources)	
Average growth rate of the park's tenants' firms (%)	Pearson Correlation	.185	1	.359**	
	Sig. (2-tailed)	.153		.005	
	N	61	61	61	
	Bootstrap <sup>c</sup>	Bias	-.001	0	.005
		Std. Error	.112	0	.120
	90% Confidence Interval	Lower	-.001	1	.162
		Upper	.362	1	.565
		Upper	.373	.565	1

Table 14 below demonstrates the percentage and count of average growth rate of tenants' firms that are already operational.

**Table 13: Correlation between RTP’s Governance model and Average growth rate of Tenants’ Firms Cross Tabulation**

			Average growth rate of the park's tenants' firms (%)					Total	
			1-20%	21-40%	41-60%	61-80%	More than 80%		Not applicable
Governance Model of RTP	Triple-helix	Count	8	8	3	1	2	1	23
		% within Governance Model of RTP	34.8%	34.8%	13.0%	4.3%	8.7%	4.3%	100.0%
Non-profit research park	Non-profit research park	Count	4	2	3	0	3	0	12
		% within Governance Model of RTP	33.3%	16.7%	25.0%	0.0%	25.0%	0.0%	100.0%
Part of University organisation structure	Part of University organisation structure	Count	2	0	0	0	1	8	11
		% within Governance Model of RTP	18.2%	0.0%	0.0%	0.0%	9.1%	72.7%	100.0%
		Count	2	0	0	1	1	0	4

	Company with Share Capital	% within Governance Model of RTP	50.0%	0.0%	0.0%	25.0%	25.0%	0.0%	100.0%
	Company owned by the University	Count	0	1	1	0	0	1	3
		% within Governance Model of RTP	0.0%	33.3%	33.3%	0.0%	0.0%	33.3%	100.0%
	Under Government Governance-Free Zone	Count	2	2	1	2	0	1	8
		% within Governance Model of RTP	25.0%	25.0%	12.5%	25.0%	0.0%	12.5%	100.0%
Total		Count	18	13	8	4	7	11	61
		% within Governance Model of RTP	29.5%	21.3%	13.1%	6.6%	11.5%	18.0%	100.0%



### 8.5.5. Correlation between RTP Governance Model and Average Growth Rate of Start-Ups

Table 15 below demonstrates bivariate correlation between the governance model and the average growth rate of start-ups on-park since P-value= 0.005 is less than 0.05, which proves a significance correlation between the two variables at a significance level ( $\alpha$ ) =10%.

**Table 14: Bivariate Correlation between RTP’s Governance model and Average growth rate of start-ups using Chi-Square Tests**

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	46.586 <sup>a</sup>	25	.005
Likelihood Ratio	46.959	25	.005
Linear-by-Linear Association	2.203	1	.138
Number of Valid Cases	61		

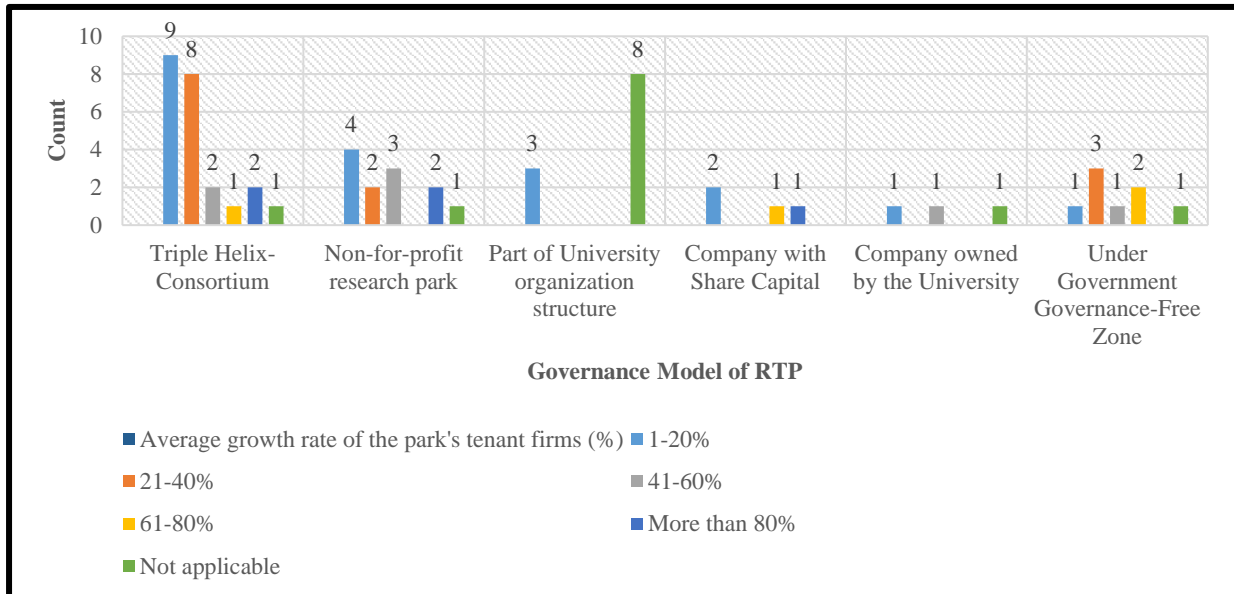
Table 16 below demonstrates the percentage and count of average growth rate of start-ups on-park according to the governance model.

**Table 15: Percentage and counts of Average Growth Rate of Start-ups on-Park Cross Tabulation**

			Average growth rate of the park's tenants' firms (%)						
			1-20%	21-40%	41-60%	61-80%	More than 80%	Not applicable	Total
Governance Model of RTP	Triple-helix	Count	9	8	2	1	2	1	23
		% within Governance Model of RTP	39.1%	34.8%	8.7%	4.3%	8.7%	4.3%	100.0%
Non-profit research park		Count	4	2	3	0	2	1	12
		% within Governance Model of RTP	33.3%	16.7%	25.0%	0.0%	16.7%	8.3%	100.0%
Part of University organisation structure		Count	3	0	0	0	0	8	11
		% within Governance Model of RTP	27.3%	0.0%	0.0%	0.0%	0.0%	72.7%	100.0%
		Count	2	0	0	1	1	0	4

	Company with Share Capital	% within Governance Model of RTP	50.0%	0.0%	0.0%	25.0%	25.0%	0.0%	100.0%
	Company owned by the University	Count	1	0	1	0	0	1	3
		% within Governance Model of RTP	33.3%	0.0%	33.3%	0.0%	0.0%	33.3%	100.0%
Under Government Governance-Free Zone	Count	1	3	1	2	0	1	8	
	% within Governance Model of RTP	12.5%	37.5%	12.5%	25.0%	0.0%	12.5%	100.0%	
Total	Count	20	13	7	4	5	12	61	
	% within Governance Model of RTP	32.8%	21.3%	11.5%	6.6%	8.2%	19.7%	100.0%	

Figure 8.4 below demonstrates the cross-tabulation comparisons made to explore the correlation between the RTP's governance model and the percentage average growth rate of start-ups on-park.



**Figure 8. 4: Average Growth Rate of on-Park's Tenants' Firms**

### 8.5.6. Correlation between RTP Governance Model and Number of IPs Licensed

Table 17 below demonstrates Spearman correlation between the governance model and the number of IP Licenses. Since P-value= 0.025 is less than 0.05 it proves a significance correlation between the two variables.

**Table 16: Spearman correlation between the governance model and the number of IP Licenses**  
Symmetric Measures

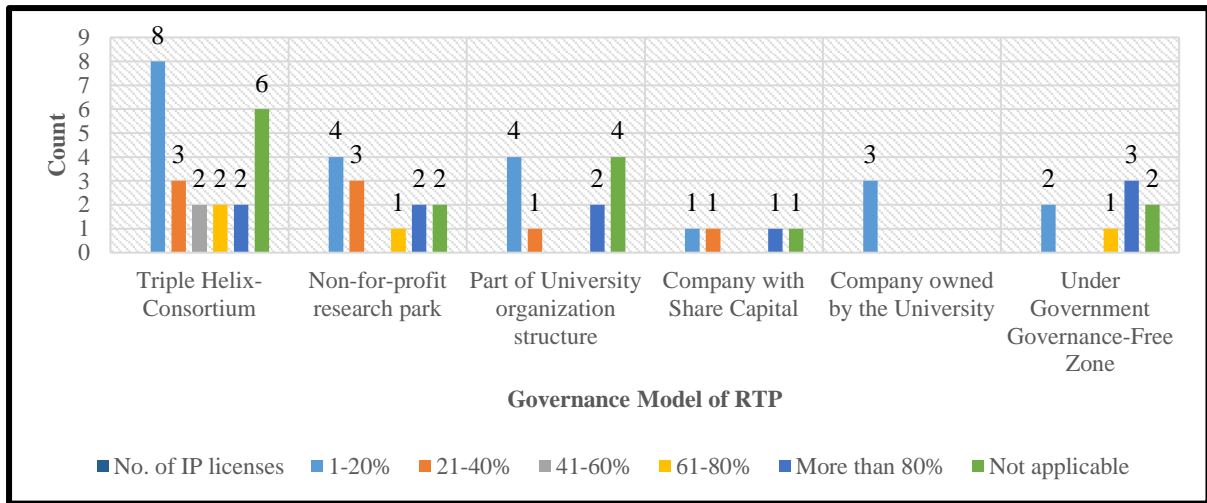
		Value	Asymptotic Standard Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Ordinal by	Kendall's tau-b	.017	.105	.161	.872
Ordinal	Spearman Correlation	.025	.129	.190	.850 <sup>c</sup>
Number of Valid Cases		61			

Table 18 below demonstrates the percentage and count of average growth rate of IPs licences according to the governance model.

**Table 17: Percentage and Count of Average Growth Rate of IPs Licences According to RTP’s Governance Model Cross Tabulation**

			Number of IP licenses					Total	
			1-20%	21-40%	41-60%	61-80%	More than 80%		Not applicable
Governance Model of RTP	Triple-helix	Count	8	3	2	2	2	6	23
		% within Governance Model of RTP	34.8%	13.0%	8.7%	8.7%	8.7%	26.1%	100.0%
Non-profit research park		Count	4	3	0	1	2	2	12
		% within Governance Model of RTP	33.3%	25.0%	0.0%	8.3%	16.7%	16.7%	100.0%
Part of University organisation structure		Count	4	1	0	0	2	4	11
		% within Governance Model of RTP	36.4%	9.1%	0.0%	0.0%	18.2%	36.4%	100.0%
		Count	1	1	0	0	1	1	4

	Company with Share Capital	% within Governance Model of RTP	25.0%	25.0%	0.0%	0.0%	25.0%	25.0%	100.0%
	Company owned by the University	Count	3	0	0	0	0	0	3
		% within Governance Model of RTP	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	Under Government Governance-Free Zone	Count	2	0	0	1	3	2	8
		% within Governance Model of RTP	25.0%	0.0%	0.0%	12.5%	37.5%	25.0%	100.0%
Total	Count		22	8	2	4	10	15	61
	% within Governance Model of RTP		36.1%	13.1%	3.3%	6.6%	16.4%	24.6%	100.0%



**Figure 8.5.7-1: Correlation between RTP Governance Model and RTP's Collaborations on Strategic or Operational Levels**

Table 19 below demonstrates Spearman correlation between the governance model and the number of IP Licenses since P-value= 0.032 is less than 0.05 which proves a significant correlation between the two variables.

The correlation in Table 19 does not relate to testing RTP's governance model and number of IPs Licenses. As this one related to Table 17 (Spearman vale=0.025). It is related to the Spearman correlation between RTP's governance and RTP Collaboration with other entities on strategic/operational.

**Table 18: Spearman Correlation between RTP's Governance model and the Number of IP Licenses**  
Symmetric Measures

		Value	Asymptotic Standard Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Ordinal by Ordinal	Kendall's tau-b	.029	.095	.301	.764
Ordinal	Spearman Correlation	.032	.105	.243	.809 <sup>c</sup>
Interval by Interval	Pearson's R	-.001	.103	-.009	.993 <sup>c</sup>
Number of Valid Cases		61			

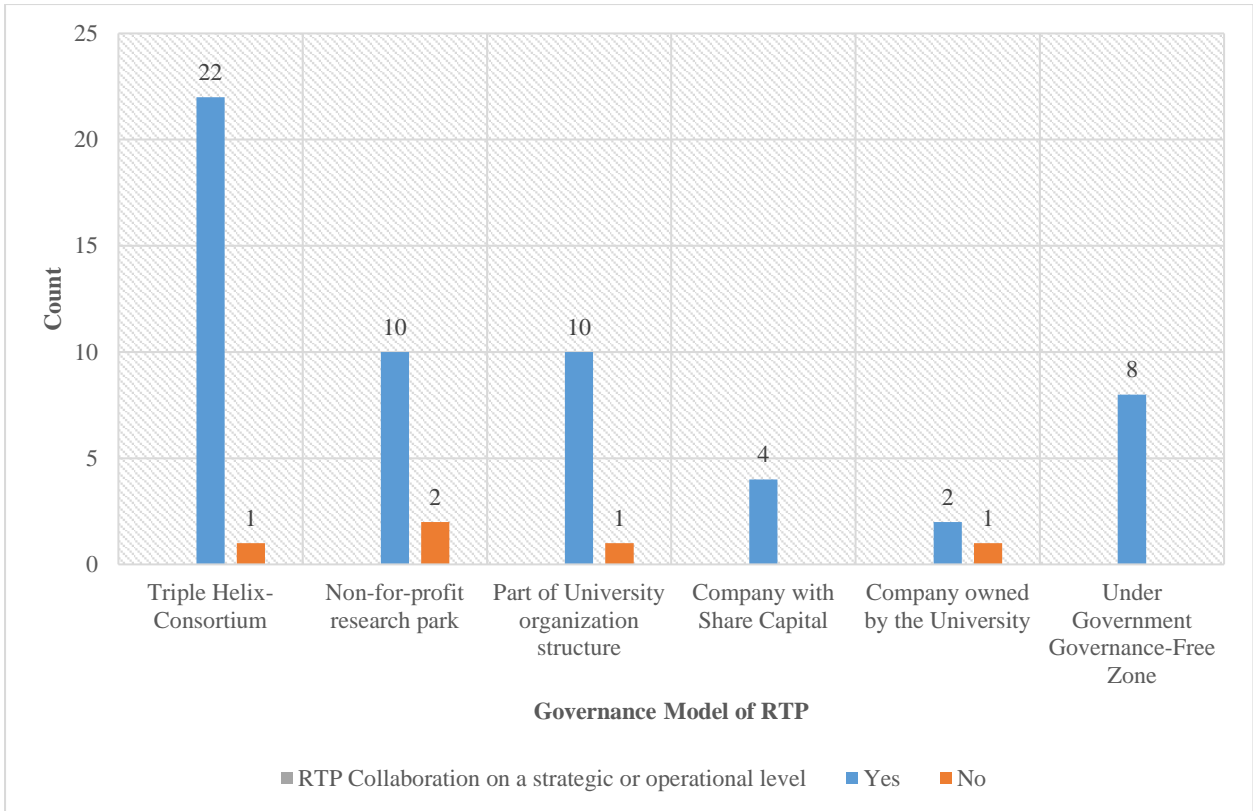


Table 20 below demonstrates the percentage and count of average growth rate of start-ups on-park according to the governance model.

**Table 19: Governance Model of RTP against RTP’s Collaborations on Strategic or Operational Levels Cross Tabulation**

			RTP Collaboration on a strategic or operational level		Total
			Yes	No	
Governance Model of RTP	Triple-helix	Count	22	1	23
		% within Governance Model of RTP	95.7%	4.3%	100.0%
	Non-profit research park	Count	10	2	12
		% within Governance Model of RTP	83.3%	16.7%	100.0%
	Part of University organisation structure	Count	10	1	11
		% within Governance Model of RTP	90.9%	9.1%	100.0%
	Company with Share Capital	Count	4	0	4
		% within Governance Model of RTP	100.0%	0.0%	100.0%
		Count	2	1	3

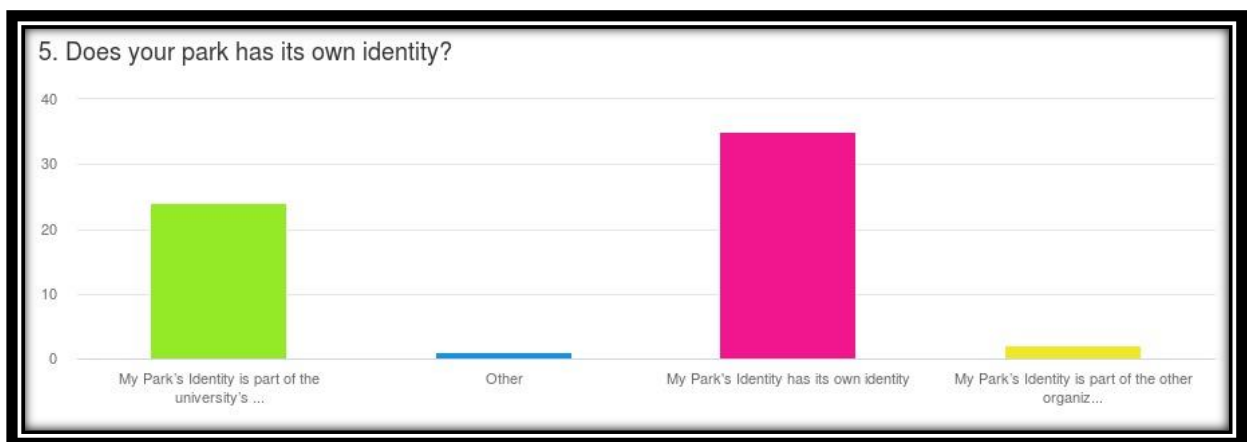
	Company owned by the University	% within Governance Model of RTP	66.7%	33.3%	100.0%
	Under Government Governance-Free Zone	Count	8	0	8
Total		% within Governance Model of RTP	100.0%	0.0%	100.0%
		Count	56	5	61
		% within Governance Model of RTP	91.8%	8.2%	100.0%



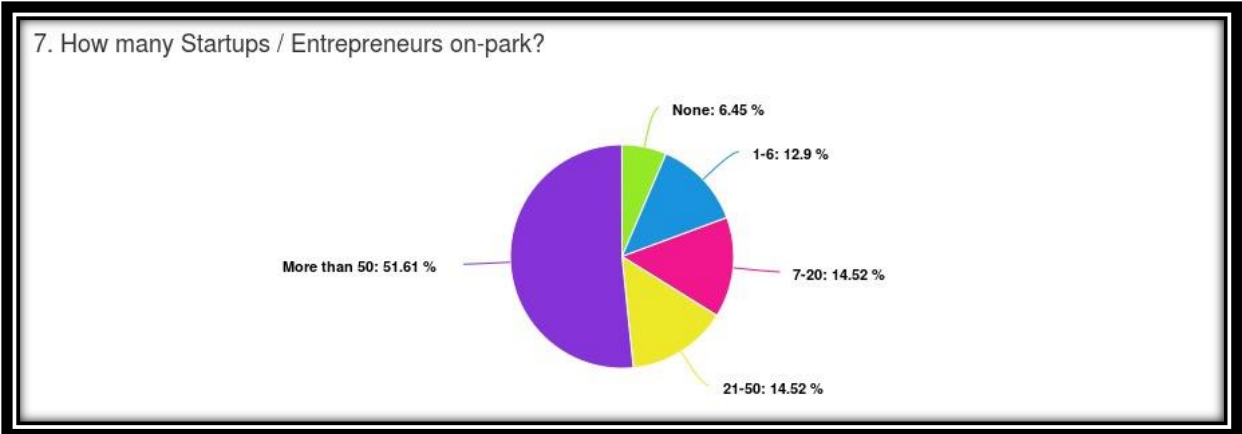
**Figure 8. 5: RTP Collaboration with other Entities on Strategic/Operational Level According to RTP’s Governance Model**

**8.6. Descriptive Statistics Generated from the Questionnaire**

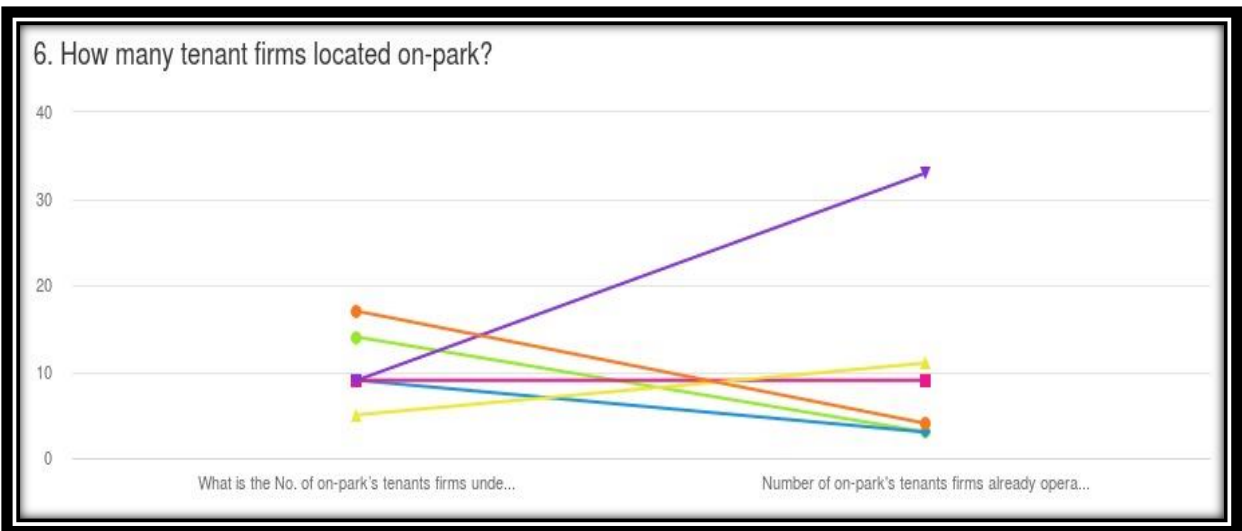
The below figures from 8.6 to 8.21 illustrate the results of descriptive statistics generated from the participants’ response of the questionnaire using the Form Stake online platform.



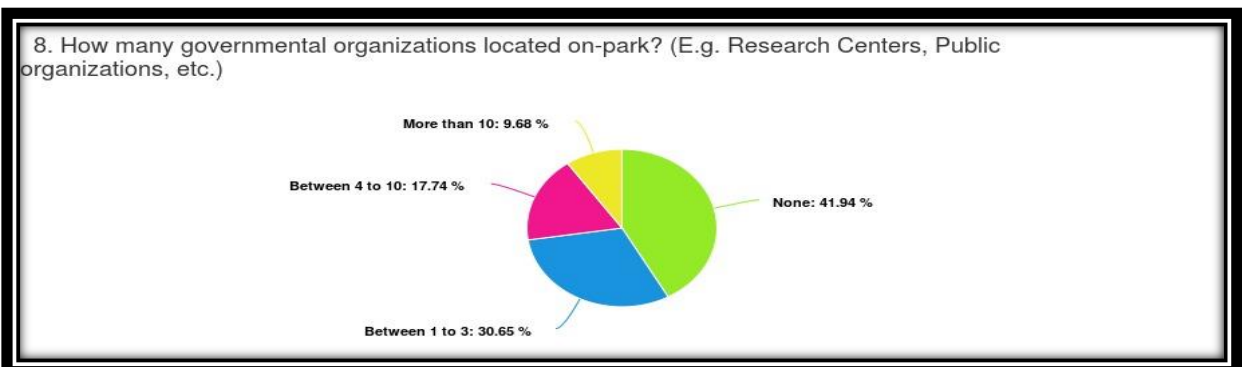
**Figure 8. 6: RTP’s Identity Ownership**



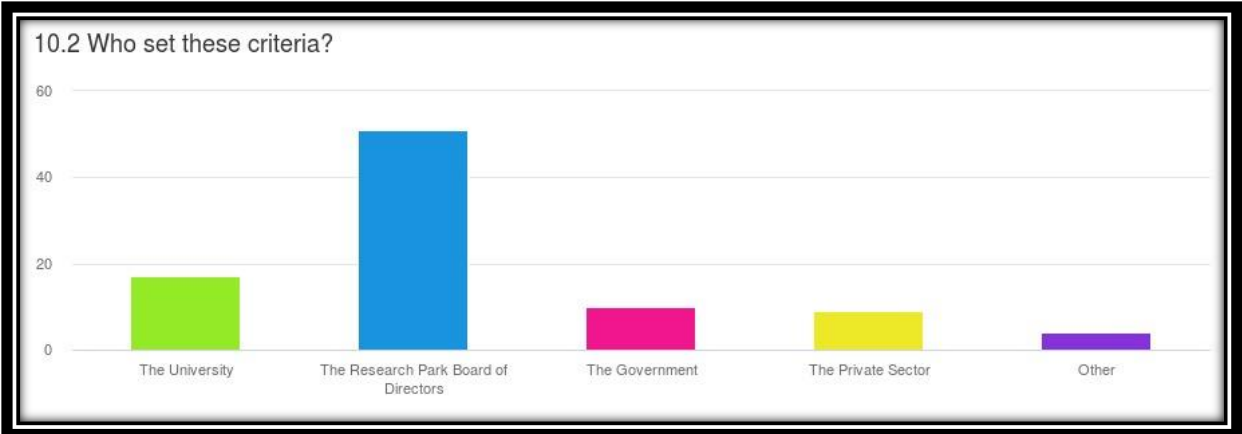
**Figure 8. 7: No. of Start-ups on-Park**



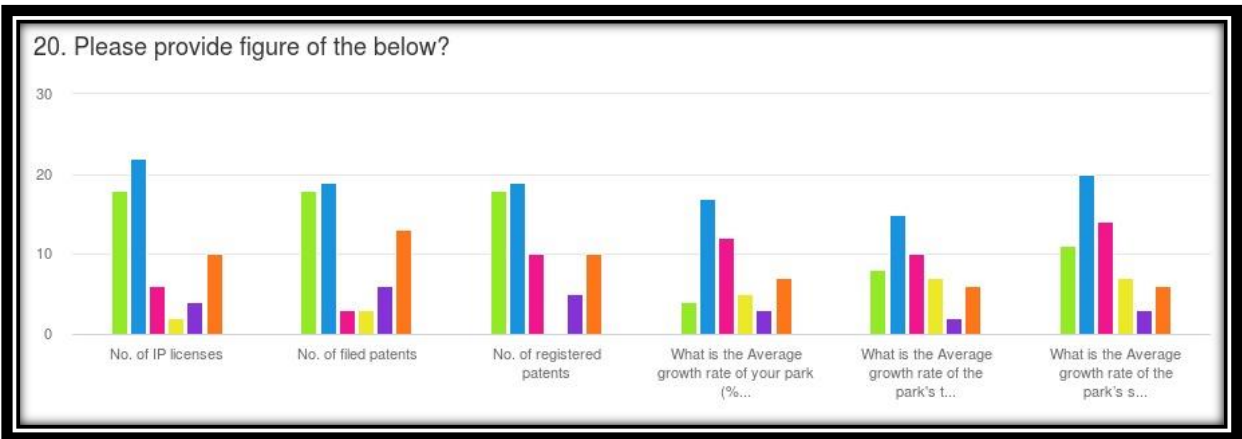
**Figure 8. 8: No. of Tenants' Firms on-Park under Construction vs. No of Tenants' Firms already Operational**



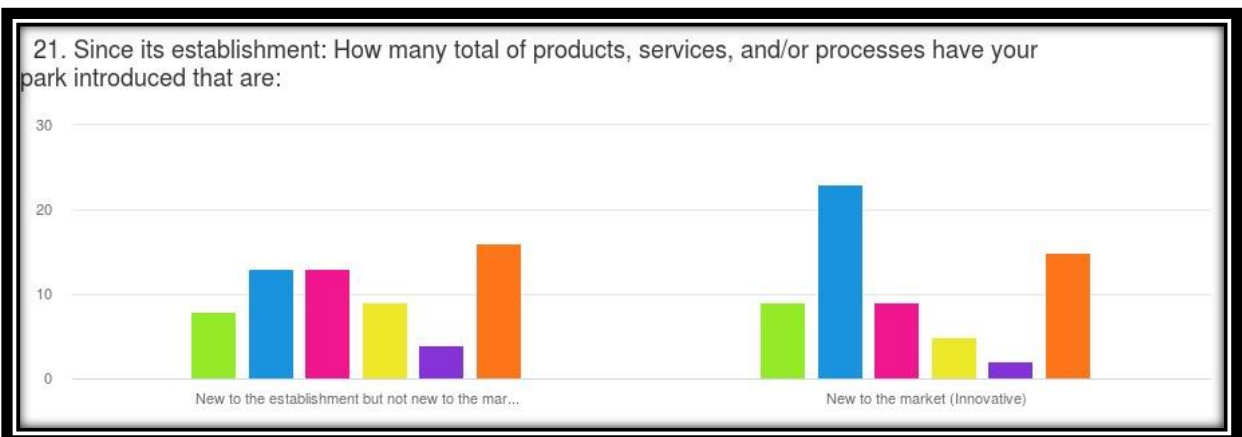
**Figure 8. 9: Governmental Organisations located on-Park**



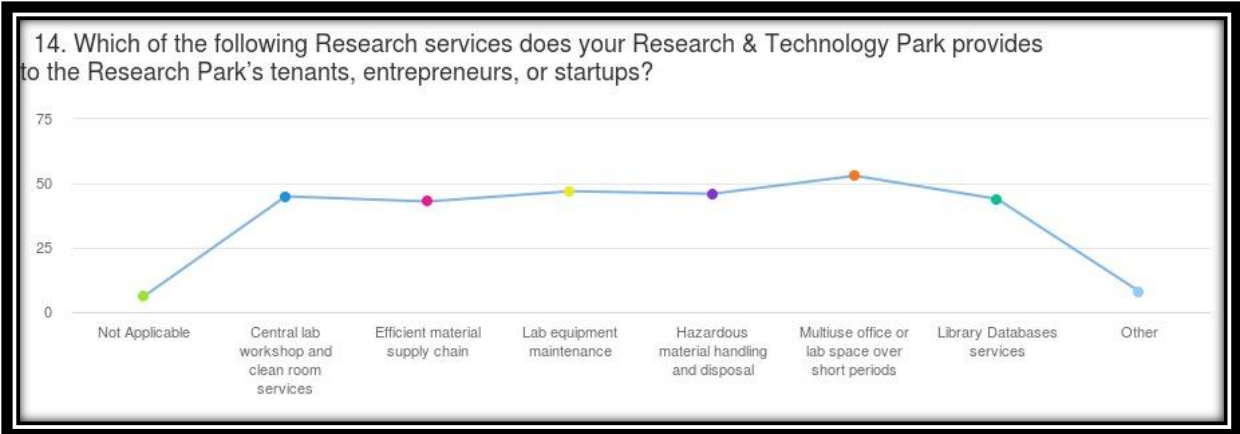
**Figure 8. 10: Governance of Selection Criteria for RTPs' Locating Tenants' Firms on-Park**



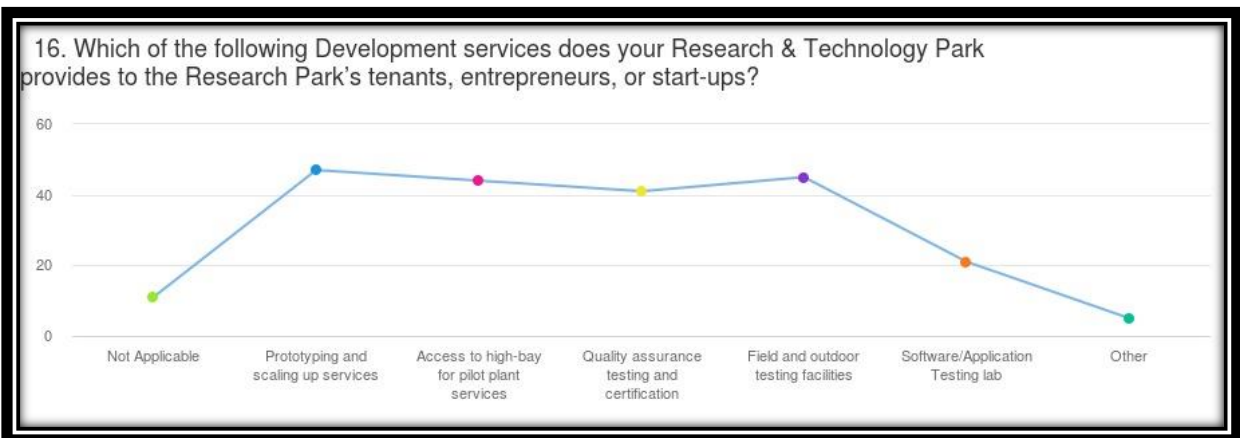
**Figure 8. 11: RTPs' Performance Measurement**



**Figure 8. 12: RTPs' Outcomes**



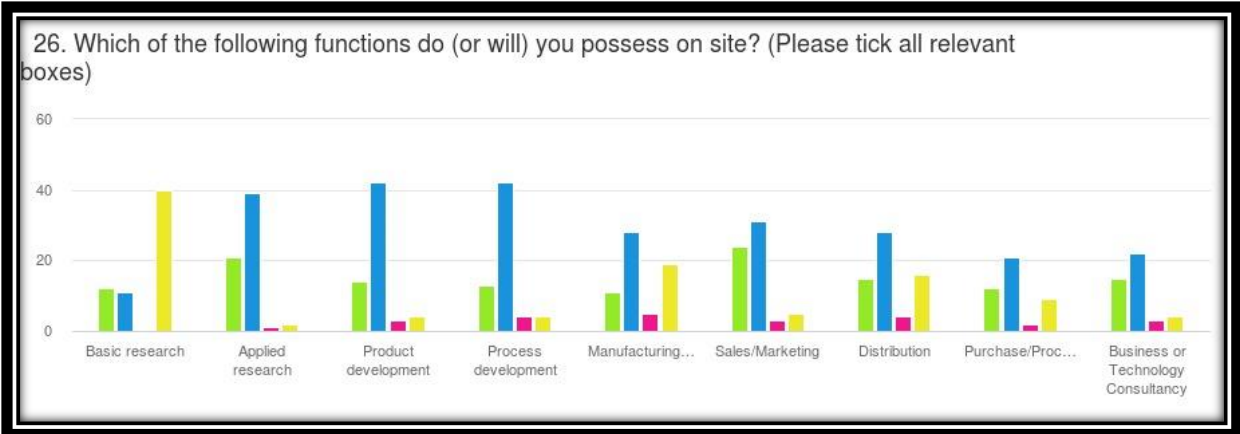
**Figure 8. 13: Research Services Provided on-Park**



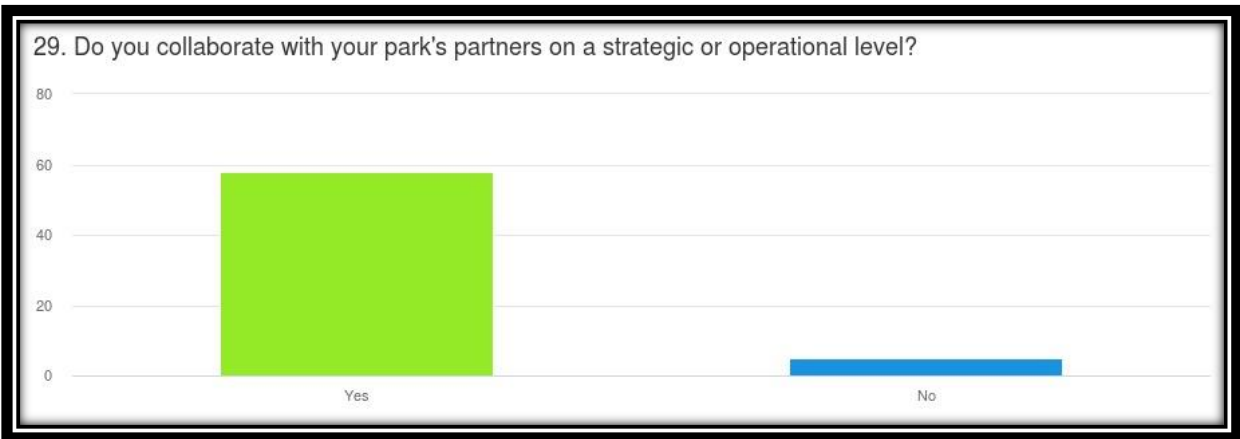
**Figure 8. 14: Development Services Provided on-Park**



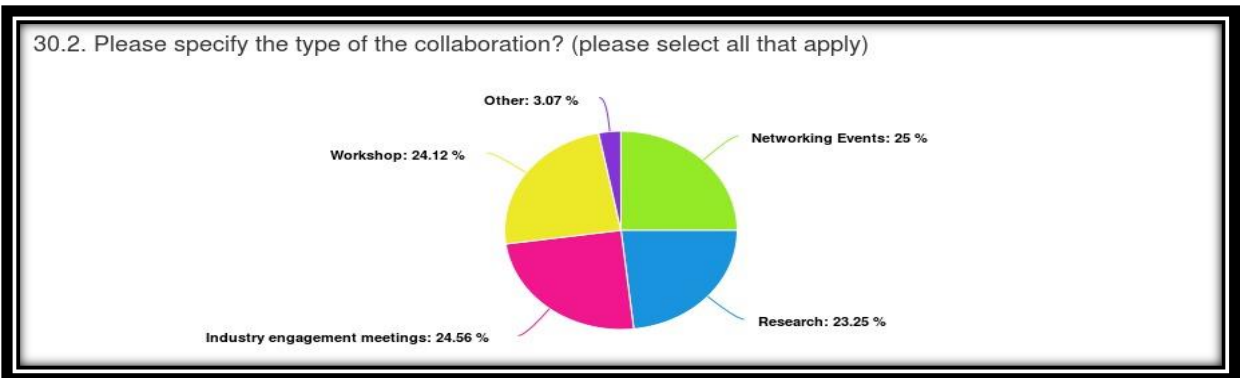
**Figure 8. 15: Governance of RTPs' Services**



**Figure 8. 16: RTPs' Functions and Activities**



**Figure 8. 17: Number of RTPs' Collaborations**



**Figure 8. 18: Number of RTPs' Collaborations**



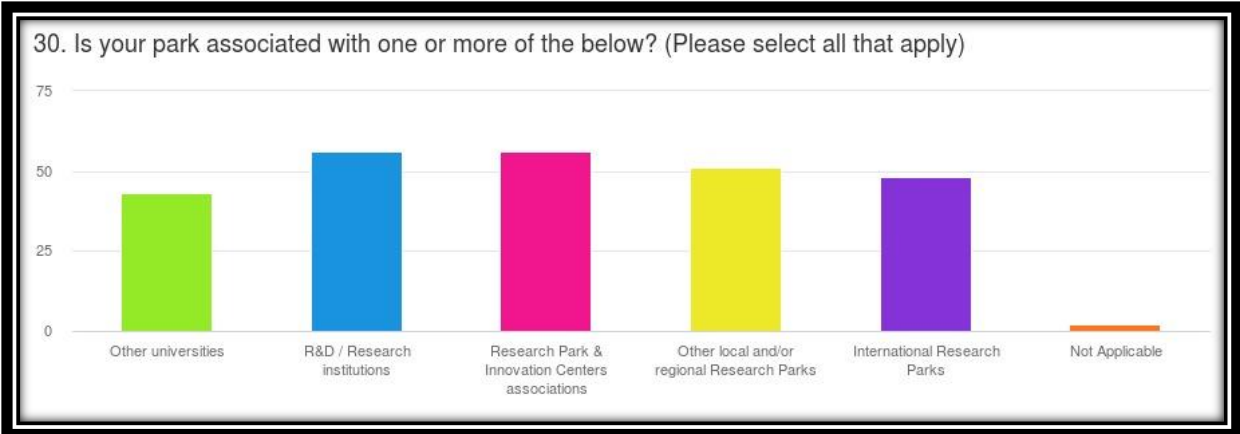


Figure 8. 19: RTPs’ Collaborations with External and Internal Organisations

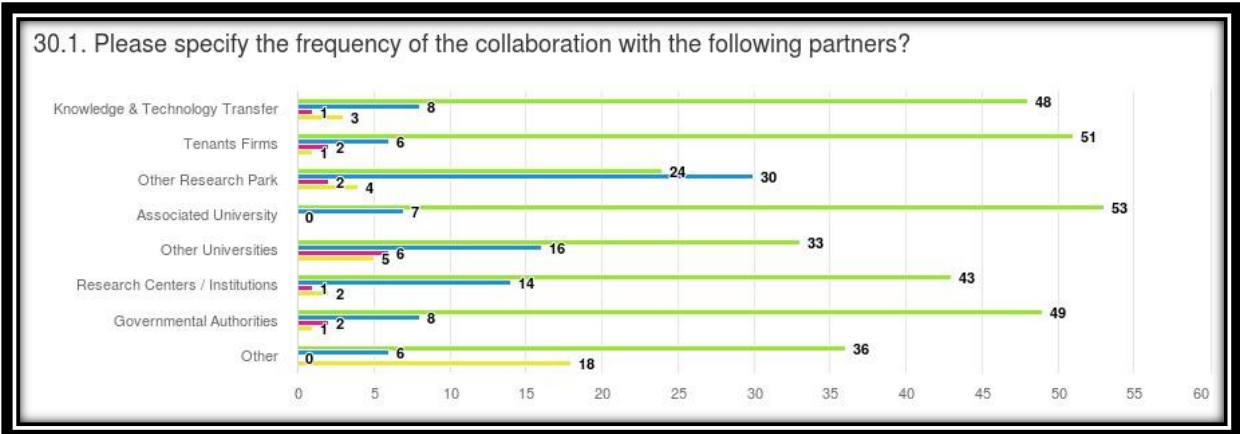


Figure 8. 20: Frequency of RTPs’ Collaborations

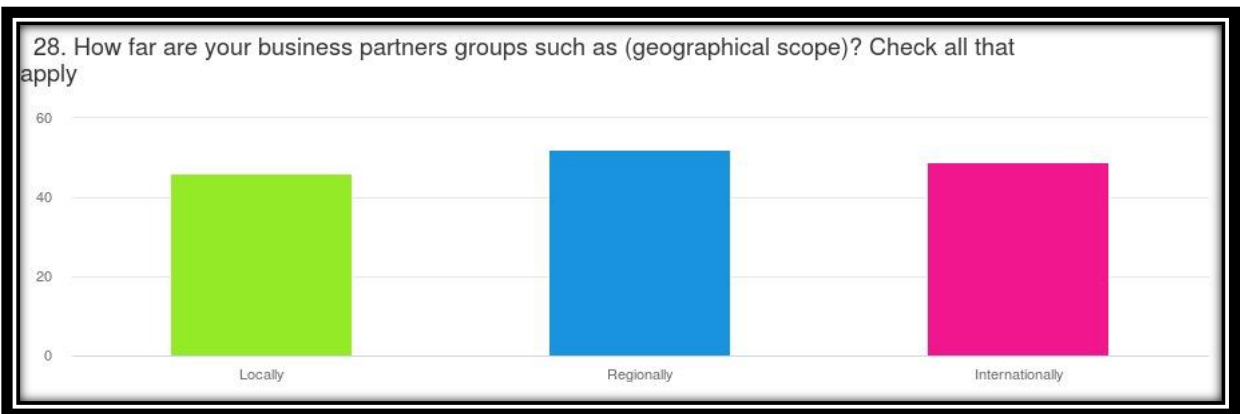


Figure 8. 21: Frequency of RTPs’ Collaborations

### 8.7. Correlation Analysis Using NVivo

According to the initial conceptualisation generated from NVivo, it produced a direct link between governance model and the “Triple-helix” type. This has been demonstrated when the researcher selected all nodes, including RTPs’ Directors’ interviews, Tenants’ firms’ interviews and start-ups, and the observations as demonstrated in the below diagrams from NVivo software.

The below figures represent the relationship between the different codes drawn from the collected data after clustering the data, using the clustering analysis from nodes clustered by the word similarity and using the similarity metric of “Pearson Correlation Coefficient”. Additionally, narrative analysis was carried out to demonstrate what participants said about both governance model and growth rate, according to the different aspects of the interview. The researcher used the correlation between governance model and RTP growth in NVivo to support the quantitative data analysis carried out in SPSS.

According to NVivo, on the circle graph all the items from the data sources and coding categories are represented as points on the perimeter. Similarity between items is indicated by connecting lines of varying thickness and colour. Similarity is indicated by blue lines—thicker lines indicate stronger similarity. All lists of codes available in **Appendix T**.

As per Figure 8.22 below, the clustering analysis shows there is a relationship between the following codes:

- The governance model and “Triple-helix” type.
- Types of RTPs’ measurement, the measurement of RTP, the charged services, the funded sources, and the RTP technology field.

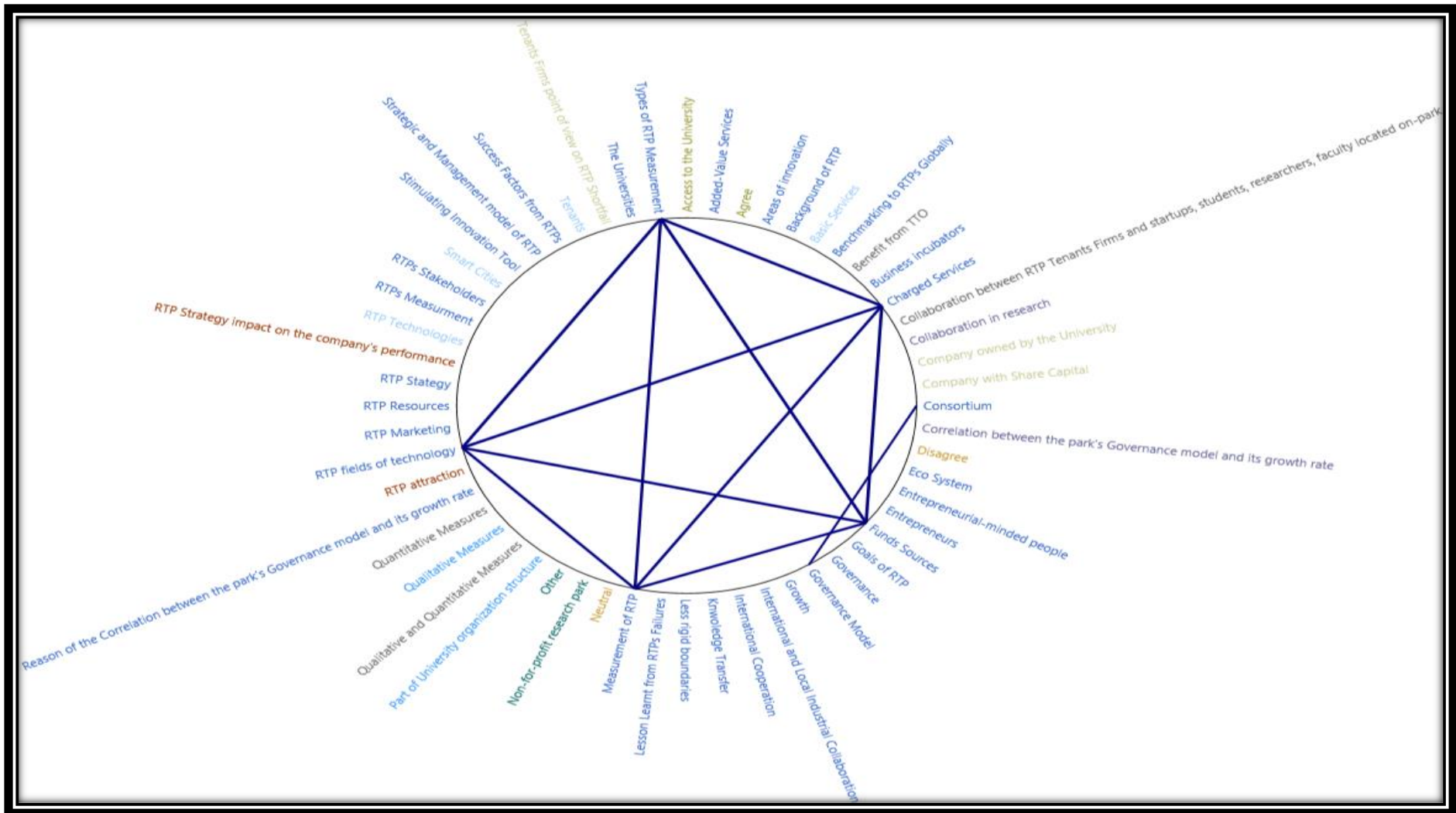


Figure 8. 22: Relationship between the Governance Model and “Triple-helix” Type after First Coding Cycle

On the other hand, the same links were demonstrated by Figure 8.23 when the researcher selected all other nodes, including RTPs' directors' interviews, tenants' firms' interviews and start-ups, and the observations. Even after the second cycle of coding, the relationship between the governance model and the Triple-helix "Consortium" type remained.

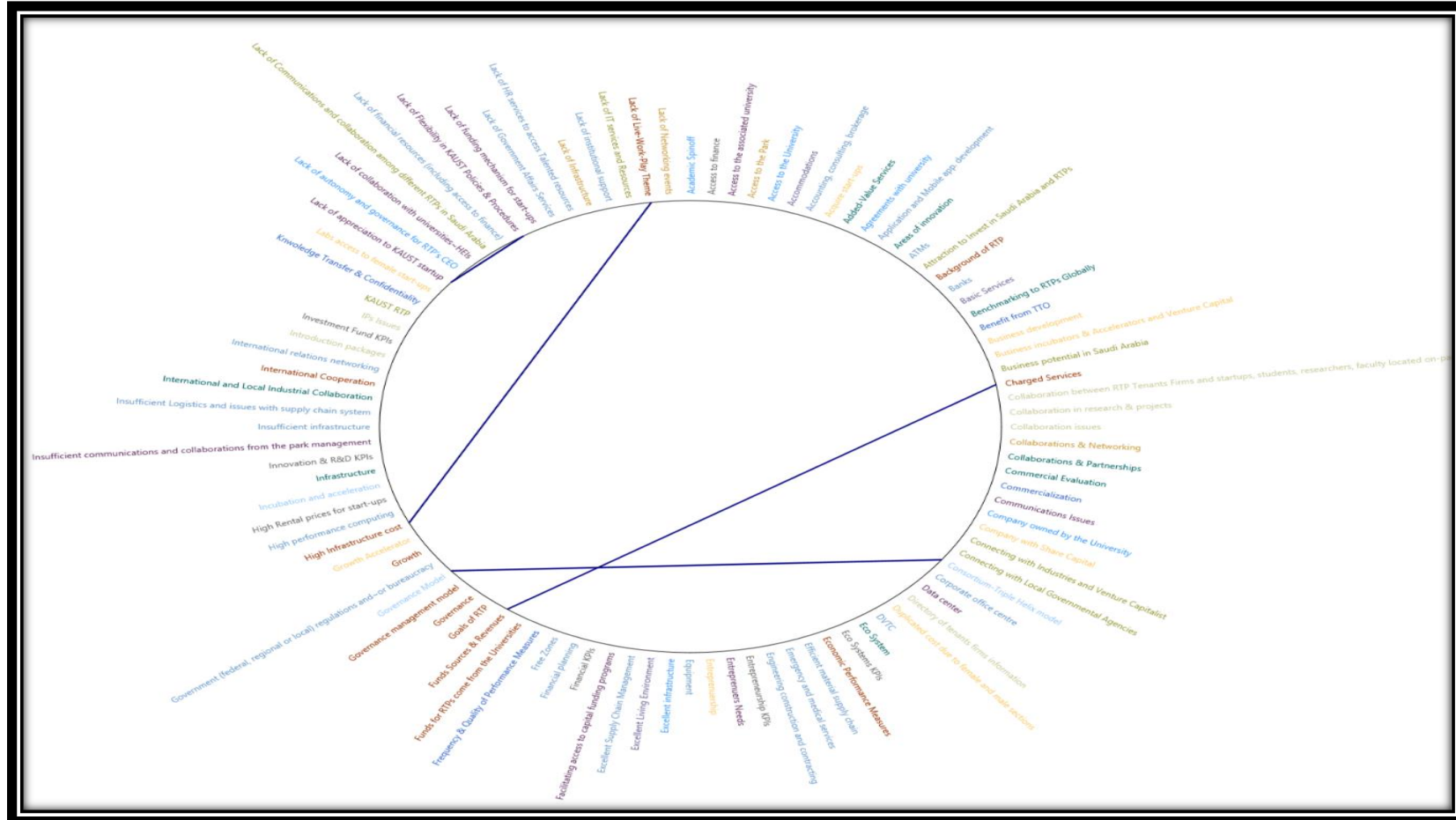


Figure 8. 23: Relationship between the Governance Model and “Triple-helix” Type after Second Coding Cycle

After the third cycle of coding according to Figures 8.24 and 8.25, the relationship between the governance model and “Triple-helix” type still created an academic spinoff result drawn from the data, as shown in the below figure using the clustering analysis from Nodes clustered by the word similarity and using the similarity metric of “Pearson Correlation Coefficient”.

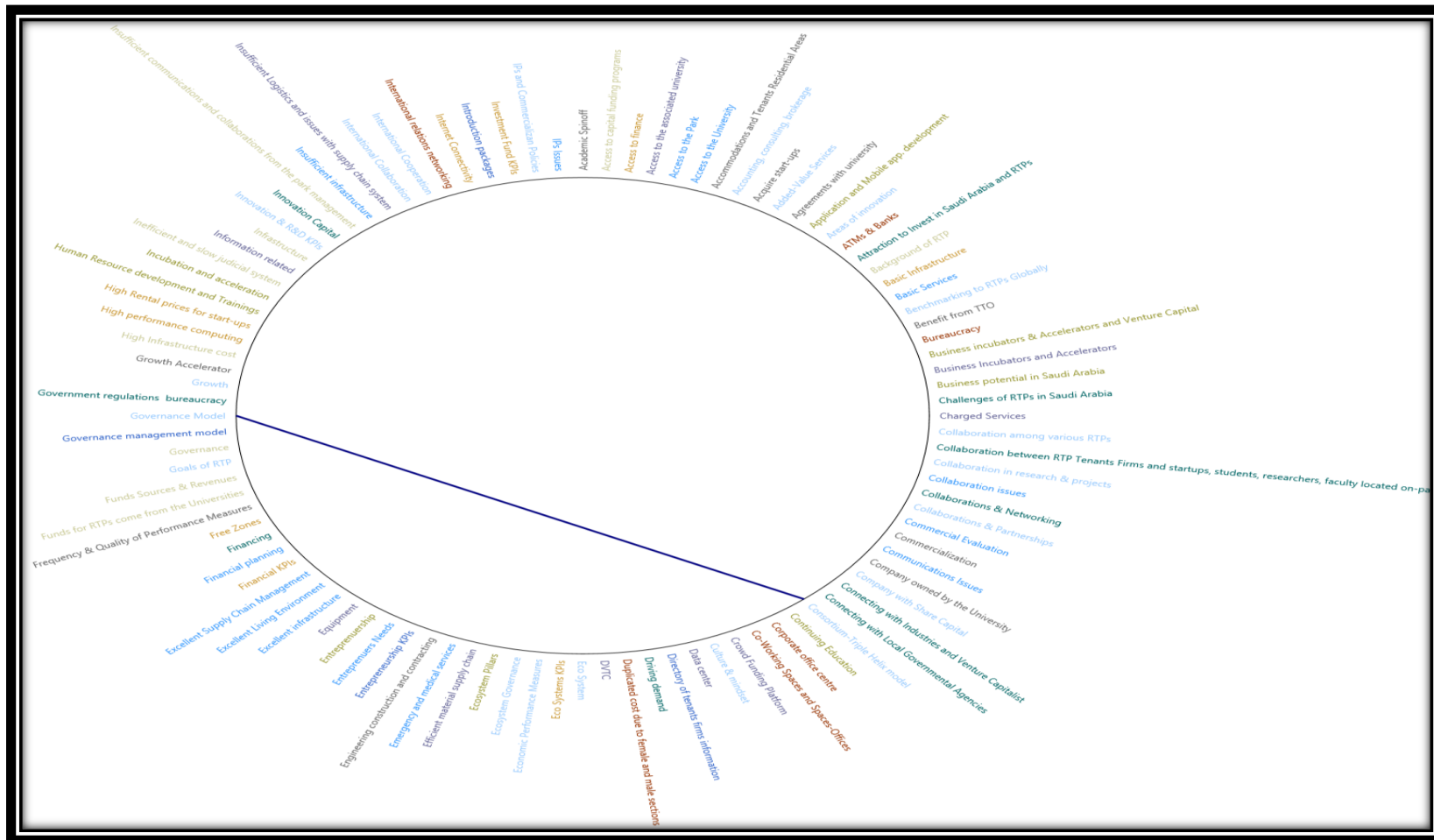


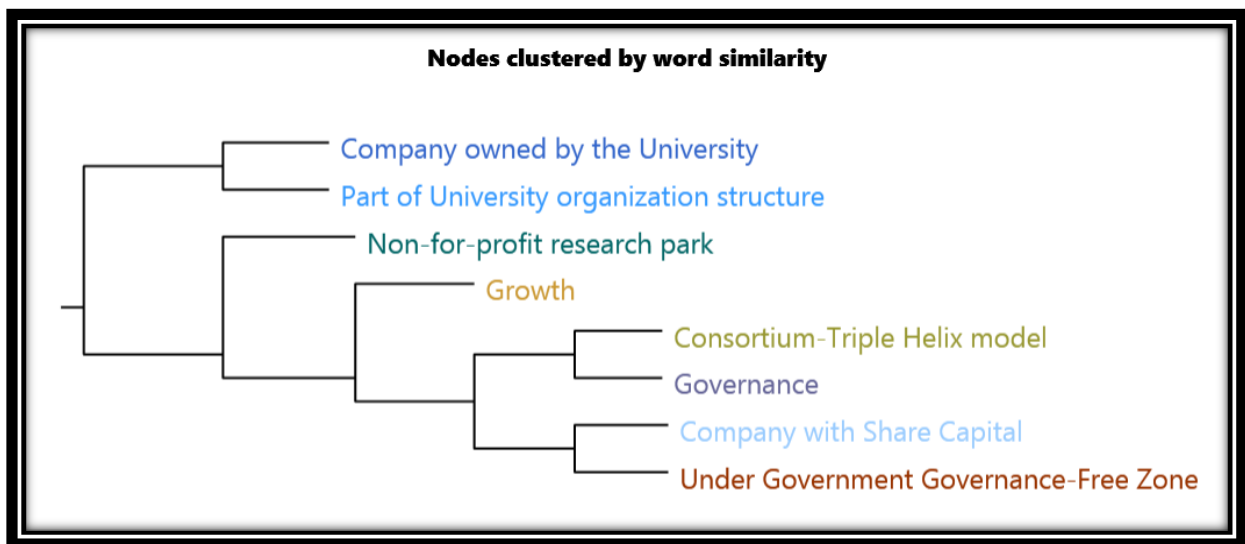
Figure 8. 24: Relationship between the Governance Model and “Triple-helix” Type after Third Coding Cycle





To analyse the word similarity in the major nodes to test the correlation between the governance model and the growth rate, the researcher selected the nodes “Governance model”, and “Relationship between RTP’s governance model and growth rate”. The relationship depicted in Figure 8.26 below demonstrates that the two types of governance model, “part of university organisation” and “company owned by the university”, are grouped in one cluster, whereas the “Triple-helix, “company with Share capital”, “free zone-under government”, “non-profit”, growth, and governance models are grouped in another cluster.

According to NVivo, the Horizontal Dendrogram branching indicates the similarity between items, where similar items are clustered together on the same branch and different items apart from each other.



**Figure 8. 26: Using codes to draw conclusions from the data of RTP interviews about the governance: “what are people saying?”**

### 8.8. Conclusion

The results of the study statistically verified the initial hypothesis of the research by verifying the relationship (using the SPSS program) between the governance model of RTP and its growth rate and performance by testing a) Correlations between the RTPs’ governance models and the below variables, b) Bivariate/Spearman correlations between the RTPs’ governance models and the below variables, and c) Relationship between the RTP’s governance model and the below variables using cross tabulation:

1. Number of tenants' firms (large-scale corporations) located on-park
2. Number of start-ups/entrepreneurs located on-park
3. Percentage average growth rate of RTP
4. Percentage average growth rate of RTP's tenants' firms
5. Percentage average growth rate of RTP's start-ups
6. Number of IPs licenses
7. RTP's collaborations with the stakeholders

Although to different degrees, the RTP's governance model has six main elements influencing the RTP's growth rate and performance; these are 1) Benchmarking to RTPs Globally, 2) Collaborations and partnerships, 3) Ecosystem, 4) RTP's performance measurements, 5) RTP's attractions and value propositions, 6) RTP Strategic-Governance-Management Model. Therefore, further research studies are recommended to explore the influential factors of RTP's strategic visionary management framework which lead to RTP's strategy implementation and how those factors impact the growth rate in each RTP's governance model.

Conversely, the researcher utilised the NVivo program to verify the correlation between governance model and RTP growth from the qualitative data to support the quantitative data analysis carried out in SPSS.



## **CHAPTER 9: QUALITATIVE DATA ANALYSIS DISPLAY**

### **9.1. Introduction**

Following the quantitative analysis in Chapter 8, the researcher utilised the analysed quantitative data to guide her throughout the qualitative data analysis.

The goal is to explore the different strategic and business management models adopted by successful RTPs, and how these models satisfied the strategic visionary management of the RTPs and increased the performance growth rate of the parks. (Ndonzuau et al., 2002; Borgh, 2007). The major deliverable is to analyse the qualitative data to discover the combination of the different successful business and strategic models that will best fit RTPKEID using the exploratory research methodology mentioned in Chapter 4. That addresses the second and third research questions.

This chapter starts with analysing the RTPs' directors' data according to the interviews' transcripts by providing generic overviews of each category of RTP's stakeholder's perspectives on the below elements of RTPs: 1) the goals of RTPs, 2) the backgrounds of RTPs including the main fields of technologies and sub-field of technologies, 3) the RTPs' governance model and how the participants interpreted it, 4) the different fund sources provided to RTP throughout the different stages of its life cycle according to its governance model, 5) the type of services provided by the RTPs to their tenants' firms by categorising the service to 'value-added' and 'basic' and whether to should be chargeable or provided for free, 6) the RTPs' performance management according to the governance model categorised to qualitative and quantitative KPIs, 7) the RTPs' governance models, and 8) The relationship between the Park's governance model and the park's growth rate from qualitative perspective

### **9.2. Analysis of RTPs' Directors' Data**

The analysis of the RTPs' Directors' interviews was the most significant part of the qualitative data analysis. This is due to the significance of the perspectives of RTPs' directors about the relationship between the RTP governance model and how it impacts the park's performance and growth rate which directly answers the first

research question in-depth considering other factors that can impact the management and governance models of the RTP. The RTPs' Directors' perspectives on the governance model of the RTP helped to answer the successive research questions and provide valuable inputs to the development of the strategic visionary management roadmap of the RTPKEID. The researcher was introduced to the major RTPs' Directors from the USA and other countries during the 2015 AURP International Conference while she was accompanying the RTPKEID group. This brief introduction eliminated the resistance and ethical issues which might have been raised by the participants as they trusted the RTPKEID; and particularly because the RTPKEID was the diamond sponsor of the conference.

Before the interview, the researcher explained the goal of her research, the sponsor of the study and how the participants can benefit from the research. She also provided the information sheet, and a brief of her research project to the participants, got the consent forms signed by the participants, and offered to send the final reports to the participants. During the interviews, participants were first asked general information about their RTP for ice-breaking purposes, such as the goals of their RTP, the background of the RTP, and the main field of technologies that the RTPs focus on. Then the researcher asked the participants about the type of governance model of their RTPs and whether they have any perspective on the correlation between the governance model of the park and the park's growth rate. Some of the participants found it sensitive to provide their *real* perspective on this question and even after the reconfirmation from the researcher on the confidentiality of the responses, they kept emphasising that their RTPs will not change their governance model, although they expressed the real perspectives and preferences on the governance model "Triple-Helix/Consortium of different bodies". Almost all the directors who's RTPs have the governance models "Triple-Helix/Consortium of different bodies" and "Private Companies" engaged in highly confident non-verbal communication and body language during the interviews, such as confidence and openness, non-verbal communication, maintaining eye contact and being open for new unplanned questions and discussion. They looked forward to receiving the final findings of the research study to gain some insights about the cons and pros of the different governance

models and, specifically, to benchmark their RTPs against other RTPs around the world.

On the other hand, the majority of the directors whose RTPs have the governance model “under university structure” were very cautious about expressing their real perspectives on the correlation between the governance model and the performance of the park. It was noticeable from the non-verbal communications, such as avoiding eye contact with the interviewer, long pauses before answering the questions, and lack of real benefits from the current governance model. This called for the creations of an academic spinoff of the strategic roadmap to convert the governance model without changing the legal form of the park by providing more autonomy for the RTP’s director.

Conversely, the RTPs’ CEOs from the KSA were very openly expressing their dissatisfaction with the lack of RTP’s CEO autonomy and the micro-management style that was happening inside the park. Particularly, they mentioned that the university’s president was appointed as the chairman of the board of directors, and therefore he is imitating the exact management style of the university. This was one of the major challenges leading to operational issues in the RTP. According to the RTP CEO in one of the parks in the KSA,

“the legal and logistics bureaucracies in obtaining constructions permits from ministry of commerce considered to be the major issue in the day-to-day real-estate investment operation for the RTPs in the KSA. Therefore, the park approached MODON to expedite the process of permits as MODON has a regulation in the standardization of buildings and infrastructure therefore the foreign investors will be confidence in the ease of the process.” [RTPMWC-RTPD-FA]

Another common challenge among the RTPs in the KSA is that the funding for the RTPs goes from the government to KASTC, which in turn distributes the funds to the universities, and finally the funds go to the associated RTPs. This is because the universities own the RTP or the RTP is part of the university’s organisation structure.

### **9.2.1. The Goal of the RTP**

Regarding the goals of the RTPs, the analysis of the RTPs’ Directors’ interview transcripts revealed that, regardless of the governance model and the size of the park,

the majority of the RTPs' Directors' responses ranged around the following goals as shown in Figure 9.1:

1. Implement and contribute to the diversification of the local and regional economy and its transformation to a knowledge-based economy
2. Drive the impact and creating culture of entrepreneurship in the society
3. Leverage the resources of the affiliated universities, and accelerate the collaboration to stimulate the innovation and research among the ecosystem's stakeholders, partners and actors
4. Create collaborative innovation strategies to accelerate commercialisation of knowledge-based and technology transfer
5. Attraction, acquisition, and development of talents, New-Technology-Based-Firms, spin-offs, start-ups, and entrepreneurs
6. Attraction of knowledge and technology-based large companies, research institutes to locate on-park
7. Orchestrate and facilitate the collaboration between the entrepreneurs, the start-ups and spin-off companies, and the industry, government, and the universities to create high-tech and high-value jobs to boost the economic development
8. Performance measurement of the tenants' firms and start-ups
9. Promote sustainability and growth of the companies, start-ups, spin-offs located on-park and minimise the risk of any potential failure
10. Create an ecosystem by bridging the gap between the university, the industry, and the government to promote internationalisation



Figure 9. 1: The Word Count of the RTPs' Goals

### 9.2.2. The Background of the RTPs

This section describes the various background histories of the RTPs. The analysis of the RTPs' Directors' interview transcripts showed diversity in the background of the RTPs. Moreover, a summary of the participants' views regarding the development stages of the RTPs and their implications on RTPs' governance models and the RTPs' growth rates is presented. The background of RTP analysis is essential for looking at the full picture of the RTPs, how they developed, what the economic, political, environmental, and cultural factors impacting the RTP were, and the linkage to the RTP's goals and objectives. All these factors give insights to the researcher to make sense of the big picture of the RTPs and how it impacted the RTPs' governance model decision or the growth rate (Miles and Huberman, 1994).



In summary, there are well-developed RTPs. Most are located in the USA, which is not surprising as the emergence of the RTPs started during the 1950s in the USA. Most of the interviews' transcripts show that the RTPs initiated the infrastructure construction. This took around two to six years before the parks were fully operational and started to locate tenant's on-park. The funds for the RTPs' construction and infrastructure were provided by the regional and local governmental bodies, the universities, grants, and donations. Moreover, regardless of the governance model of the park and whether the park is affiliated with a university or not, almost all the RTPs are in close proximity to the main universities in the cities where the park is located. Some of the RTPs are located in the heart of the city and/or adjacent to the local governmental university.

“In 1956, the 320-acre Jones farm was acquired with funds from the ASFC .... The actual formation of the Research Park took several years and required collaboration by several governmental agencies .... The infrastructure improvements included streets, utilities, landscaping and lake system that users of the Park enjoy Government provides the funds for infrastructure”.  
[RTPD-ASU-CS]

In the case of RTPs in the USA most of the RTPs' lands were provided by the universities, local states, and/or governmental agencies in collaboration with non-profit foundations, and the RTPs are mostly governed by the universities. On the other hand, some RTPs utilise land from the university and either pay rent or use it free, where they build and own the RTPs' buildings. “The lands are the university's properties, but the Park owns the buildings.”[RTPD-SC-CD]

Some of the land used in the development of RTPs was provided by the governmental agencies in the form of long-term lease of the park's land. Moreover, the university shares a percentage of the project's revenue from the RTPs' collaborations with the tenants and private or public sectors and in other cases can obtain minimal revenue from the RTPs' revenue in the form of income from leasing the spaces to the tenants. “The university gets minimal rents from the Park and gets 5% of the project's revenue”.  
[RTPD-SC-CD]

The background of the RTPs significantly impacted the RTP's governance model; for example: in the case of the RTPSV which was developed by Stanford University in 1951. The start of RTPSV's idea was initiated by RTPSU which is a research-oriented park focused on engineering and electronics, decided to establish its own RTP in the location called Palo Alto close to Stanford University. Because the park became the most revolutionary park in the world, the governance model changed to have adopted a consortium of different private companies, public and governmental agencies, and universities. The question about the background of RTP prompted some of the participants to describe the governance model in detail. For example:

“The staff of the park are paid by the university, but they report to the Park's board of directors...The board members have non-voting advisors (Research and operation, head of corporate relations, head of patents and licensing) .... The university control's over the park is limited to 10%”. [RTPD- UWMU-GH]

The question about the RTP's background triggered other participants to explain the funding sources, mechanism, and RTP's revenue generation, and the economic impact of the park on the country, and of the park and how the park is achieving its goals. “The park has more than \$825 million in annual economic impact, nearly 9,300 Wisconsin jobs supported, \$43 million in local and state taxes generated each year”. [RTPD- UWMU-GH].

According to the interview's transcripts, the oldest RTP was established in 1953 and the newest RTP was established in 2015. Some of the key RTPs started as an entity under the university's organisational structure for transferring the knowledge and technology only, such as RTPTH which was a department under Tsinghua University that specialised in engineering and technology. Therefore, the background of the RTP has a major impact on the development of the park; as a result it was crucial to understand the background of the park and how the park developed over time to assess the patterns of the park's governance model and the correlation to its growth. The RTPTH now is one of the largest RTPs around the world, and since 2002, the

Tsinghua University has held an ownership share of 45% in the RTPTH. [RTPD-RTPTH-TZ].

### 9.2.3. The Technology Fields of the RTPs

Table 21 below describes the fields of technologies of various RTPs categorised by the researcher by the main technology area, and the sub-areas of specific technologies' fields that differ from one RTP to another depending on the RTP's goals and background. In summary, the main fields of technologies of RTPs are listed as follow:

- **Pharmaceuticals and Medical technology:**
  - Medical technology
  - Pharmaceuticals
  - Health Sciences
- **Civil Engineering Industries:**
  - Civic and Professional Organisations
  - Civil Engineering Industries
  - Advanced Building and Green
  - Construction Materials
- **Biological and Environmental Science and Engineering:**
  - Biotechnology, Bioscience and Biomedical
  - Environmental science
  - Marine science
  - Plant science
  - Agricultural and Environmental Industries, and Food Safety
  - Genetic Engineering
  - Artificial Rain Making Technologies
- **ICT, Computations and Mathematics:**
  - Mobile and Software Development
  - Advanced Computing and Emerging Technologies
  - e-Government
  - Cybersecurity
  - Applied mathematics and computational science

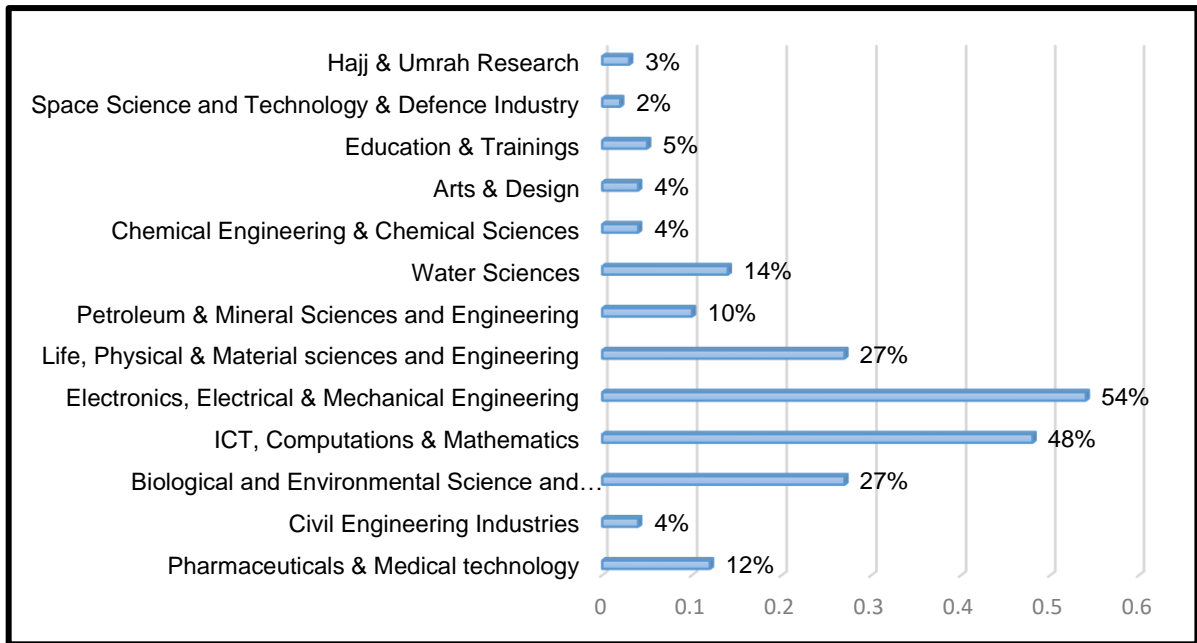
- Computer science
- Statistics
- ICT
- GIS Research
- **Electronics, Electrical and Mechanical Engineering:**
  - Solar Power
  - Rapid Prototyping and Digital Fabrication
  - Clean and Renewable energy
  - Transport systems and Smart Vehicles
  - Electronics and Electrical Engineering
  - Mechanical Engineering
  - Logistics Digitisation Production Technologies
  - Mechatronics
  - Electro-medical Manufacturing
  - Sensors
  - Smart grid
  - Winter sports
- **Life, Physical and Material sciences, and Engineering:**
  - Physics
  - Advanced materials
  - Nanotechnology
  - Material Science and Engineering
  - Production Industries
  - Material and Metallurgy
  - Steel Industries
  - Advanced Manufacturing
  - Life Science
  - Membranes applications
- **Petroleum and Mineral Sciences, and Engineering:**
  - Oil and Gas
  - Refining and Petroleum Engineering
  - Petrochemical Processes and Engineering

- Geosciences
- Advanced reservoirs modelling
- Minerals technology
- **Water, Waste Water Sciences and Management:**
  - Water management and treatment
  - Water production
  - Waste water treatment
- **Education and Trainings:**
  - Professional and Technical Services
  - Private Educational Services
  - Happiness Research
  - Public Policy and Leadership
  - Educational Research
- **Hajj and Umrah (Pilgrims) Research:**
  - Services and facilities development
  - Crowd Management
  - Logistics

If we look at the fields of technologies of RTPs, a pattern can be noticed between the location of the RTP and the field of technology in which the park is specialised.

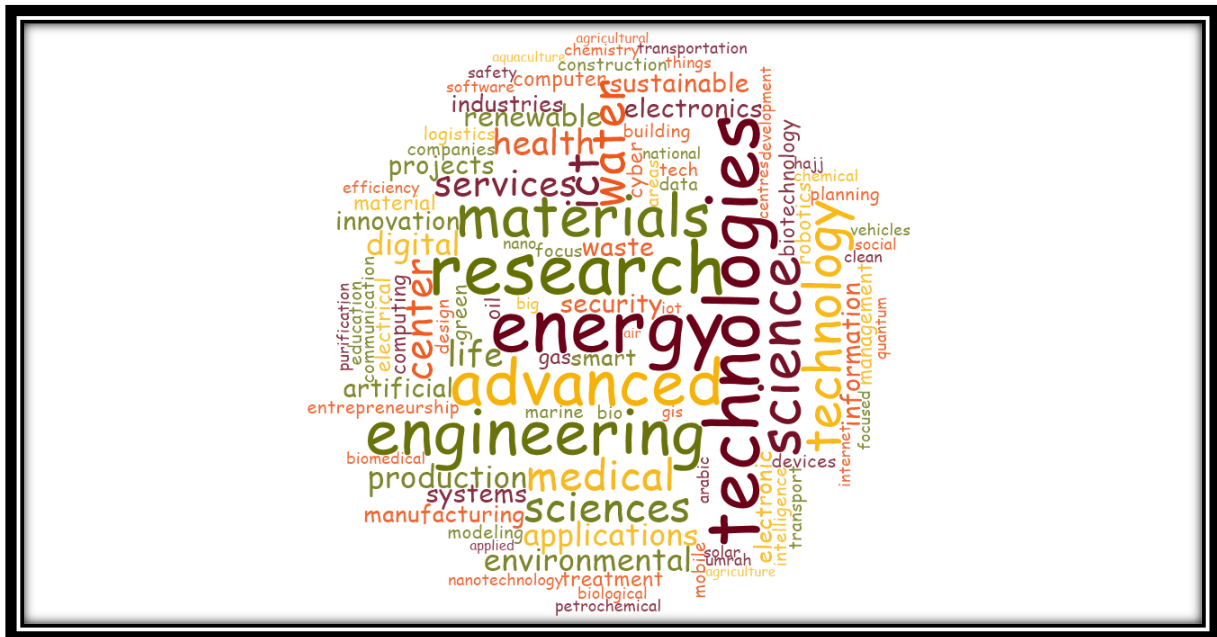
For example: there are unique areas of technologies in the RTPMWC due to its nature of annual religious pilgrims visiting the holy mosques in Makkah during specific dates for the Hajj and Umrah and during the month of Ramadan. Therefore, the area of technology is specialised in Hajj research, and crowd management utilising the technology to provide advanced services to the pilgrims, such as crowd detections, sensors that monitor the crowded areas, and GPS tracking, among others.

Figure 9.2 below illustrates the percentage of each technology area among the RTPs and demonstrates the highest percentages in the fields of electronics and ICT. In addition, the fields of biosciences and material engineering are showing higher potential.



**Figure 9. 2: RTPs' Fields of Technology**

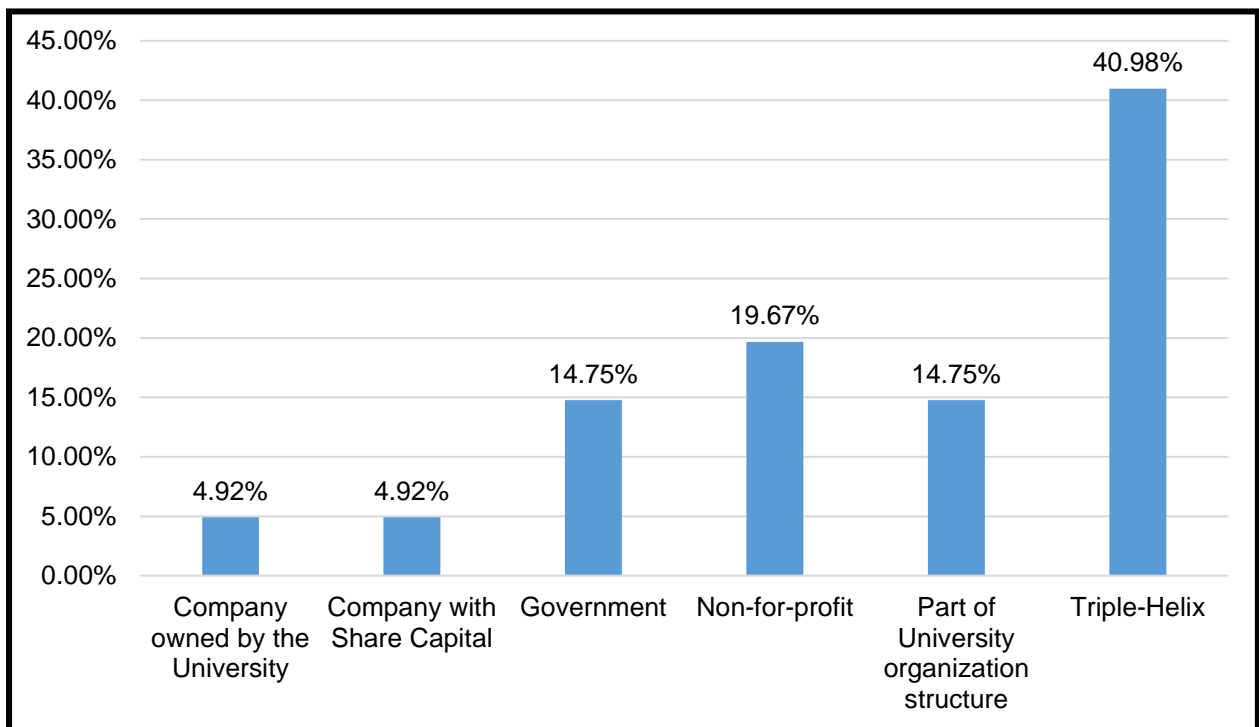
The Word Cloud in Figure 9.3 below illustrates the above areas of different technologies of RTPs:



**Figure 9. 3: RTPs' Fields of Technology Word counts**

#### 9.2.4. The Governance Models of the RTPs

This section relates to one of the main questions in the interview to clarify more information on the type of governance management model of the park, so it was extremely important to differentiate the governance management model of the park from the RTP's ownership type. The governance model was not clear during the pilot test as most of the participants associated the question to the ownership of the park, which is very different from the governance management model of the park (Connelly et. al., 2010). Such differentiation enabled the researcher to evaluate the patterns of the governance management model of the parks in order to draw an accurate picture on the relationship between the RTP's governance model and the growth. According to Figure 9.4 below, the majority of RTPs have the Triple-helix governance model.



**Figure 9. 4: Governance Model of RTPs' Percentage**

The CEO of the IASP Association explained that he differentiated between the ownership and the governance management models by summarising the governance model by the board of directors governing and directing the strategic visionary management of the RTPs, such as creating, or updating the RTP's policies, procedures and guidelines that directly reflect on the strategic direction of the RTPs. He stressed that the RTP's governance can be viewed as the decisions taken by the

board members managing the RTP, along with the RTP's director, who was usually appointed as one of the members of the RTP's board of directors, in addition to the RTP's resources and staff. Therefore, the members of the RTP board of directors should have economic, industrial and entrepreneurial expertise and experience to establish effective collaborations with the corporates and the entrepreneurs' communities. He emphasised that he referred to the governance management model regardless of the ownership, which clearly stated that the governance model can have diverse ownership models: "Please note that I am referring to the management and government structure regardless of whether the ownership of the park is private, public or mixed." [RTPAC-SL]

Moreover, the CEO of the AURP Association also emphasised the differentiation between the governance management model and the ownership of the RTPs. She stated that some non-profit RTPs are considered a Triple-helix model as they are being governed by private and public sectors, community, and the university or multiple universities, but their legal ownership model falls under a 501(c) (3) non-profit organisation in the USA. On the other hand, some of the RTPs' are under the "Free zone" governance model; they have legal ownership of the governmental authorities, but their governance management model is considered a Triple-helix model, due to the strong partnerships with the universities, industry, private and public sectors, and the community.

According to Patton (2002), the 'sensitising concepts' approach is used when the researcher became aware of the themes which were not labelled and took the initiative to explain these themes inductively to generate additional categories. The analytical method used by the researcher to analyse the type of governance model started with deductive analysis with a set of existing frameworks according to the different types of the governance model in the literature reviews. After that, the researcher used inductive analysis to discover the patterns and themes and categorised the data accordingly. Therefore, eight inductively-driven codes were grouped under the category of "Governance".



Table 22 below demonstrates the clustered codes and expressive quotes derived from the interview transcripts based on the participant's point of view. Each code demonstrates what the participant's definition of RTP's Governance is. Below is the list of the clustered codes of RTPs' governance ranges from Ownership, Decision-making, RTP's Director Autonomy, Authority, Governance of RTP's Functions, Collaborations Model, Business Model, Management and Operation, and Organisation Structure.

**Table 20: Governance Definitions as Interpreted from the Interview Transcripts**

<ul style="list-style-type: none"> <li>• <b>Ownership</b></li> </ul>	<p>“Some departments not under the governance of the park.”</p> <p>“I believe the research and development, patents and all technology transfer activities should be conducted by the affiliated university as the park should only focus on commercialisation and business.”</p> <p>“MWC can be a legally holding company, i.e. it can own and establish subsidiary companies and invest in start-up companies.”</p> <p>“The park has its own labs.”</p>
<ul style="list-style-type: none"> <li>• <b>Decision-making</b></li> </ul>	<p>“The park has a CEO and Vice President at the same, so it was a bit confusing about how the management decisions are taken and by whom?”</p> <p>“There is lack of quick decision, so RTPKEID investment fund office doesn’t have the authority to make decisions.”</p>
<ul style="list-style-type: none"> <li>• <b>RTP’s Director Autonomy</b></li> </ul>	<p>“The president of the affiliated university is the chairman of the board of directors and the CEO has minimal autonomy on managing the park and even on the operational level such as working hours, etc.”</p> <p>“Don’t have the flexibility and governance structure as the other investors.”</p>
<ul style="list-style-type: none"> <li>• <b>Authority</b></li> </ul>	<p>“The park’s CEO has full authority in the governance and management of the park.”</p>

<ul style="list-style-type: none"> <li>• <b><i>Governance of RTP's Functions</i></b></li> </ul>	<p>“I believe that the RTPs are built for investment in human capital and resources, generating revenues and not conducting research.”</p> <p>“The other lands can be leased to commercial organisations and then use the fund to construct the park”</p>
<ul style="list-style-type: none"> <li>• <b><i>Collaborations Model</i></b></li> </ul>	<p>“One comprehensive model and three individual governance models were developed according to the structure and relations of industry-science/research park-supporting organisation interactions.”</p>
<ul style="list-style-type: none"> <li>• <b><i>Business Model</i></b></li> </ul>	<p>“The debate is whether there is a standard business model suitable for all research parks and there is no way to have a standard business model for RTPs.”</p>
<ul style="list-style-type: none"> <li>• <b><i>Management and Operation</i></b></li> </ul>	<p>“...but not to structure the events and run the park.”</p>
<ul style="list-style-type: none"> <li>• <b><i>Organisation Structure</i></b></li> </ul>	<p>“There was re-organisational structure”</p> <p>“as part of university structure”</p>

### 9.2.5. The Funding Sources of the RTPs

This section identifies the funding sources in which the RTPs are raising or generating revenue. According to the directors of several RTPs, almost all RTPs obtained the funding for the infrastructure and the establishment at early development stages usually from the government, the local states, or the universities as part of the allocated budget from the government, and a minority received funding from the private sectors.



“The park gets the funds at the establishment.” [RTPD-ASU-CS]


“The park gets the funds at early stages 70% from public sector, and 30% from private sector.” [RTPD-BPSF-FC].

Table 23 below demonstrates how the participants think of different sources of funds for the RTPs and how they explained the initial funds provided to establish the park and the challenges they are facing in funding the activities of the park’s operations, particularly in terms of creating the ecosystem of entrepreneurship culture in the society. The analysis showed that RTP’s funding sources are highly dependent on the type of the governance model, for example: the RTPs with governance model “Part of the university’s structure” are funded by the university, in which the university allocates a budget to the ‘economic development department’ of the ‘Park’ as a business unit under the university. Therefore, the establishment of the park’s infrastructure and constructions of spaces and buildings are run as projects funded and managed by the university and contracting them to a real estate company as a service provider.

Table 9.2.5-1 below shows the different funds sources for RTPs at different stages of the RTP’s life cycle according to the “Composite Sequence Analysis” diagram (Patton 2002):

**Table 21: The Different Fund Sources Provided to RTPs in Different Stages of their Life Cycle**

<b>RTP Governance Model (Stage)</b>	<b>Triple-Helix (n=23)</b>	<b>Government - Free Zone (n=8)</b>	<b>No-for-Profit (n=12)</b>	<b>Part of University (n=11)</b>	<b>Company Owned by University (n=3)</b>	<b>Company with share capital (n=4)</b>
 Establishment Stage	Government-Use of Lands - Constructions- Establishment- Infrastructure-Utilities- Facilities	Government-Use of Lands - Constructions- Establishment- Infrastructure- Utilities- Facilities- Consortium	Government- Constructions Use of Lands	University- Government	Government	Government- Regional Union- private sector
 Operational Stage	Endorsement-Grants- Donations-Pre-Seed Fund-Seed Fund-On Park tenants' firms Charges Fees-Rental of spaces- The park self-funded- venture Capitalist- Regional	The park self-funded- venture Capitalist- Private Sectors	Endorsement- Government fund- Donations- Rental of spaces- On-Park tenants' firms Charges fees- Catering services- The park	Internal Funds- Innovation Fund- venture Capitalist- On-Park tenants' firms Charges- Services to tenants- Private	Donations- Rental of spaces- On Park tenants' firms-Private Sectors-Public sectors-	Grants- On-Park tenants firms Charges fees- Selling services to the building- Consulting services- Private Sectors

	<p>Union-Live, Work and, Play Services-Private Sectors- tax incentives- Commercialising Technologies- International Investors- Projects' Collaborations</p>		<p>self-funded- Private Sectors- lease spaces to accelerators and incubators-Banks- NGOs-Local and Regional Funds- Investment fund</p>	<p>Sectors- International Investors- University- Real Estate Development Company</p>	<p>Government fund</p>	
 <p>Globalisation and Maturity Stage</p>	<p>Commercialising technologies-Private investments-Projects' Collaborations- International Collaborations- Governmental Financing Programmes- Donations-Investors- The University</p>	<p>The park self-funded</p>			<p>Commercialising technologies- Private's sector investments- Public Sectors</p>	<p>Building and Commercializing technologies- Projects' Collaborations- International Collaborations- % of share capital in start-up</p>

### 9.2.6. The Services Provided by the RTPs

This section summarises the RTP services provided to the tenants' firms and entrepreneurs located on-park. The researcher categorised the RTP's services into four types, according to the interview's transcripts:

- RTP's Core Functions: These are the core functions of any RTP regardless of its governance model.
- RTP's Basic Services: These are considered to be the bare minimal and basic services expected to be provided by any RTP regardless of its governance model.
- RTP's Value-added Services: These are the services that significantly differentiate one RTP from the others and are considered as attractive and competitive advantages of the RTP.
- RTP's Charged Services: These are the services that the RTP charges to the tenants' firms either directly or through service providers or outsourced companies via the park.

RTPD-ASUP stated that the revenue of the RTP from the services charged to the tenants' firms come from the rental of spaces. Conversely, the RTP's companies with capital shares provide several services to the tenants' firms for a charge. The other services that the RTPs provide to tenants' firms range from the core functions of the RTP's services such as RTP's tenants' firms' affiliations office and the university's liaison office. The RTP's services should at least provide the tenants' firms with the basics services such as rental of spaces and landscape, security, and others.

Table 24 expresses the different classifications of RTPs' services as created in an academic spinoff. The researcher classified the services to value-added services as charged and non-charged, as the interviewees expressed the value of the RTP's services as high, even if they were charged for these services, as is explained later in detail in Section 9.2 from the tenants' firms' interview transcripts.

The RTPs with the 'Government-Free zone' governance model are designing the services according to the surveys and feedback received from the tenants' firms and start-ups, and the results of the performance measurement's analysis.

**Table 22: Classifications of RTPs' Services as Interpreted from the Interview Transcripts**

<b>Classifications of RTPs Services</b>	<b>RTP's Services as Interpreted from the Interview Transcripts</b>
<i>Value-Added Services</i>	Access to capital funding programmes.
	Access to libraries and databases.
	Talents and technical human capital expertise recruitments. "Recruiting service was the basic attribute to the RTPLP as there is no HR department to recruit the talents professionals."
	Mobility of the park: car sharing, transportation, electrical gas stations, and how the park will be accessed by tenants are major value-added services and attractiveness of the park from the participants' points of view. Almost all the participants emphasised the park accessibility on their web presences as well.
	Community building services and activities are mainly an indirect way for networking the tenants' firms with the RTP's actors and stakeholders and will enable the initiation and discussion of projects' collaboration among them.
<i>Value-Added Services (Charged)</i>	Sports and leisure services, such as social and networking events, sports activities, and tournaments "As the tenants will be attracted to accommodate on the park."
	Childcare and kindergarten, educations institutions and schools: were among the services that the RTPs' participants viewed as value-added for their tenants' firms and considered as competitive advantage one the other RTPs.
	Emergency and medical services.
	Hotels and suitable accommodation for tenants' firms' according to their type (large corporates vs. start-ups).
<i>Basic Services</i>	Security



	Facilities maintenance, utilities of water, electricity, and waste management
	ATMs and banks
	Technology transfer office services
	Catering services and facilities
	Research Centres and Labs, and technical and specialised equipment
	Conference rooms, co-working spaces/offices, and lounges
	Parking facilities
	Basic technology infrastructure, such as internet and Wi-Fi connectivity, printing, and telephones
<i>Basic Services (Charged)</i>	Catering services and facilities, restaurants, cafes, food courts, and food trucks
	Accommodations and tenants' residential areas
	Emergency and medical services
	Engineering construction and contracting, especially for large corporates.
	Post office
	Schools and childcare
	Supermarket
<i>RTP's Core Functions</i>	Tenants' firms' affiliations office
	University's liaison office
	Entrepreneurs' services
	Strategic, financial, and business planning and development
	Training and continuous professional education
	Marketing, promotions, and networking

Figure 9.5 below illustrates the frequency of words cloud for the node “RTP Services”:



- 1) RTP's KPIs divided into:
  - a) Qualitative Measures
  - b) Quantitative Measures
  - c) Frequency and Quality of KPIs, and
  - d) Frequency and Quality of Collaborations and Networking
  
- 2) Tenants' Firms' KPIs:
  - a) Research and Development Outcomes and Progress
  - b) Commercialisation
  - c) Academic Collaboration with Associated University
  - d) Access to Finance
  - e) Technical Products
  - f) Number of Start-ups' Customers
  - g) Turnover and Revenue
  - h) The companies' employees and Job Growth

The below paragraph provides a brief definition of each cluster and samples from the interview and relates each participant's response to the RTP's governance model of his/her RTP. It exemplifies and benchmarks the importance of each performance measure for the various RTPs' governance models. A full list of the RTPs' KPIs can be found in Table 25 in Appendix H. There are two types of RTP's performance measurements – Quantitative and Qualitative. Most of the RTPs concentrate on quantitative measurements.

RTPs with the '**Triple-helix**' governance model have a broad range of performance measurements. Due to the mixed nature of the RTPs' actors and stakeholders, this type of RTP evaluates and measures the performance and growth rate of their parks using multiple sets of quantitative KPIs ranging from technology and knowledge transfer, innovation and R&D, to occupancy, and others.

Each stakeholder and actor of the park can introduce and embed the relevant performance measurements according to the goal he/she interested in achieving from the park. Since the performance measurement process of the Triple-helix RTPs is of

high importance to the RTPs' board of directors and stakeholder, the process is carried out by independent third-party organisations to maintain the level of accuracy and transparency.

The qualitative measures are of high importance to the Triple-helix RTP as it consists of several stakeholders and actors. These measures are frequently requested from the RTP's management to be presented to the various stakeholders such as local and regional governments, private sectors, the universities, and society.

On the other hand, RTPs with the '**Non-profit**' governance model employ quantitative KPIs. Some of these KPIs highly depend on the performance of the tenants' firms; thus the parks usually evaluate and measure the performance of their tenants' firms, either on an annual or semi-annual basis. Conversely, some of the 'Non-profit' RTPs employ the qualitative measures to focus on the quality of the collaborations among the park and tenants' firms, start-ups and entrepreneurs. In addition, the most important from their perspectives is the quality of R&D collaborative projects, proof-of-concepts, and engagement between the tenants' firms among themselves and between the tenants' firms and the associated university's faculty members, researchers, postdocs, and students.

The second performance measure which is highly important in the long term is the economic impact on how the park and the tenants' firms' located on-park contribute at the local, regional, and national economic development levels.

The third performance measure of importance to RTPs of the 'non-profit' governance model is the social and environmental impact on the economic development of the community on a local scale, and the influence that the parks have over the society. That can be interpreted by policy changes or policy creation by the policymakers as influenced by the RTP's outcomes to improve the living conditions of those in society. Examples can be 'social entrepreneurship', 'increase the level of innovation among the society', and many other qualitative measures that directly or indirectly impact the society: *"Qualitative measures such as the contribution of the park to the community, the reputation of the park, business consultancy services done by the community not the park, etc. anything that doesn't cost money to the park will be measured by qualitative measures."* [RTPD- URTWDU]. Furthermore,

*“The main difficulty here lies in the fact that because of their nature, STPs deal a lot with qualitative aspects, but these are very difficult to measure. Qualitative aspects are very important, but we are now trying to understand better what the right methodologies are to be able to assess them in a credible way.” [RTPAC-SL]*

Nevertheless, since the RTPs with the governance model **‘Part of the university structure’** are obtaining the funds of the park’s operations from the university, they are limited in the funding sources and they differ from one country to another. Some of the participants indicated that it is not compulsory to report the performance and growth of the park to the university management. Conversely, some of the participants claimed that they measure the performance of their entrepreneurship centre and incubator by an independent body such as the UBI Index which is a European research initiative specialised in incubators’ benchmarking. In addition, some of the performance measurements’ reports of RTPs located in the USA are prepared by independent organisations such as Economy League of Philadelphia. However, most of them use the below quantitative KPIs to evaluate and measure the performance and growth rate.

One of the participants stated that they are using automated software for technology transfer to manage online invention disclosures, marketing and customer relations management, intellectual property management, contracts, financial tracking and compliance and a suite of graphical reporting. Moreover, the software is used to evaluate the performance of TTO and geared for commercialisation.

Participants agreed that RTPs’ performance measurement highly depends on the performance of the tenants’ firms; thus, the parks usually evaluate and measure the performance of their tenants’ firms, on an annual basis, to evaluate their eligibility to continue occupying the spaces on-park, especially for the start-ups and entrepreneurs.

In general, from what the researcher observed from the qualitative data analysis, RTPs with the governance model ‘Part of university’s structure’ extensively use qualitative measures due to their attachment to the university non-tangible impact resulting from the university’s research.

Mainly there is a consensus among participants of this RTP's governance model that it is seldom to concretely measure the impact of RTP with governance model 'under the university' on the local economic development due to several reasons, such as the unforeseen, multiple factors involved. The RTP's actors and stakeholder and variables are involved in the measurement of the impact and the outcomes are unpredictable. *"Nobody can predict if the impact is going to be good or bad, because there are too many factors, too many variables, too many actors that you just do not know."* [RTPD-KRED-KC]. One of the RTP's managers construed that, *"due to the fact that the nature of the business is not instant in early stage it is difficult to have a quantitative number so intangible indicator such as start up spending (too fast, which means spending on unimportant spending)"* [RTPM-IF-SS].

Moreover, the RTPs with governance model '**Company owned by university**' diverge in the degree and depth of their RTPs' performance measurements. For example, the exercise of measuring the performance evolves over time depending on the park's maturity level, the quality of the tenants' firms' located on-park, and the park's strategic visionary management.

The measurement of Park reports is aligned with international and standard performance measurements of RTPs such as IASP measurement. *"Measurement criteria and growth rate of the park are highly mature at our RTP and we are using a web-based tool developed in-house"* [RTPD-DTVCHR].

Regarding the funds and budgets allocated for the strategic initiatives of the parks, one of the participants stated that *"Budgets KPI should be invested in the development of the Park by signing contracts and kick-off projects and not leave the budget on-hold"* [RTPD-MWTC-FA].

The selection criteria set by one of the parks is that it measures the tenants' firms on the maintenance and the development of the technology-facilities and labs, whereas, among all the others RTPs, the maintenance and the development of the technology-facilities and research labs are the core responsibility of the park. Mainly, the parks are promoting their facilities' research labs to attract tenants' firms to locate on-park.

The main goals of the RTPs with governance model type **‘Company with share capital’** is the financial sustainability, therefore, the RTPs performance management and measurements processes are extremely crucial in accomplishing the RTP’s vision and goals. Like the RTPs with governance model ‘Company owned by university’, the measurement of RTP’s reports must adhere to the industrial international and standard performance measurements of RTPs such as balanced scorecards. These RTPs’ companies collect the data from the different parties and departments, tenants’ firms, and start-ups to conduct extensive analysis, construct a performance measurements framework, and finally present the results to the RTP’s board of directors and management’s digital boardroom using dashboards of both qualitative and quantitative KPIs. One of the giant RTPs stated that: *“Our RTP’s Revenue’s growth rate has increased tremendously by 990% during the last 16 years”* [RTPD-TP-TZ]. *“91% of the park is derived from commercialising and commercial activities related to S&T”* [RTPD-BPSF-FC].

The qualitative measures are of high importance to the RTPs governed as ‘company with share capital’ as these include indicators to the management that directly alert them to the tenants’ firms’ satisfaction levels. These measures are periodically requested by the private and public sectors investing on-park, in addition to the local and regional governments to measure the impact of the RTPs on the local and regional economic, social, and environmental development.

On the other hand, RTPs with the **‘Government – Free zones’** governance model evaluate and measure the performance and growth rate of their parks and tenants’ firms located on-park using multiple set of quantitative KPIs range from technology and knowledge transfer, innovation and R&D, occupancy. Most important is the economic development impact of the technological exports and industry’s domiciliation. Since the performance measurement process of this type of RTP is of high importance to the RTPs’ board of directors as the fund of the RTP considered governmental funds, it needs to be monitored and reported at the national level. Therefore, the process of measuring the performance consists of several numbers of auditors to validate the parks’ performance, companies, and start-ups located on-park.

After the reports of performance issued by the parks, an immediate action plan for each park should be provided to the government to plan for the next funding cycle.



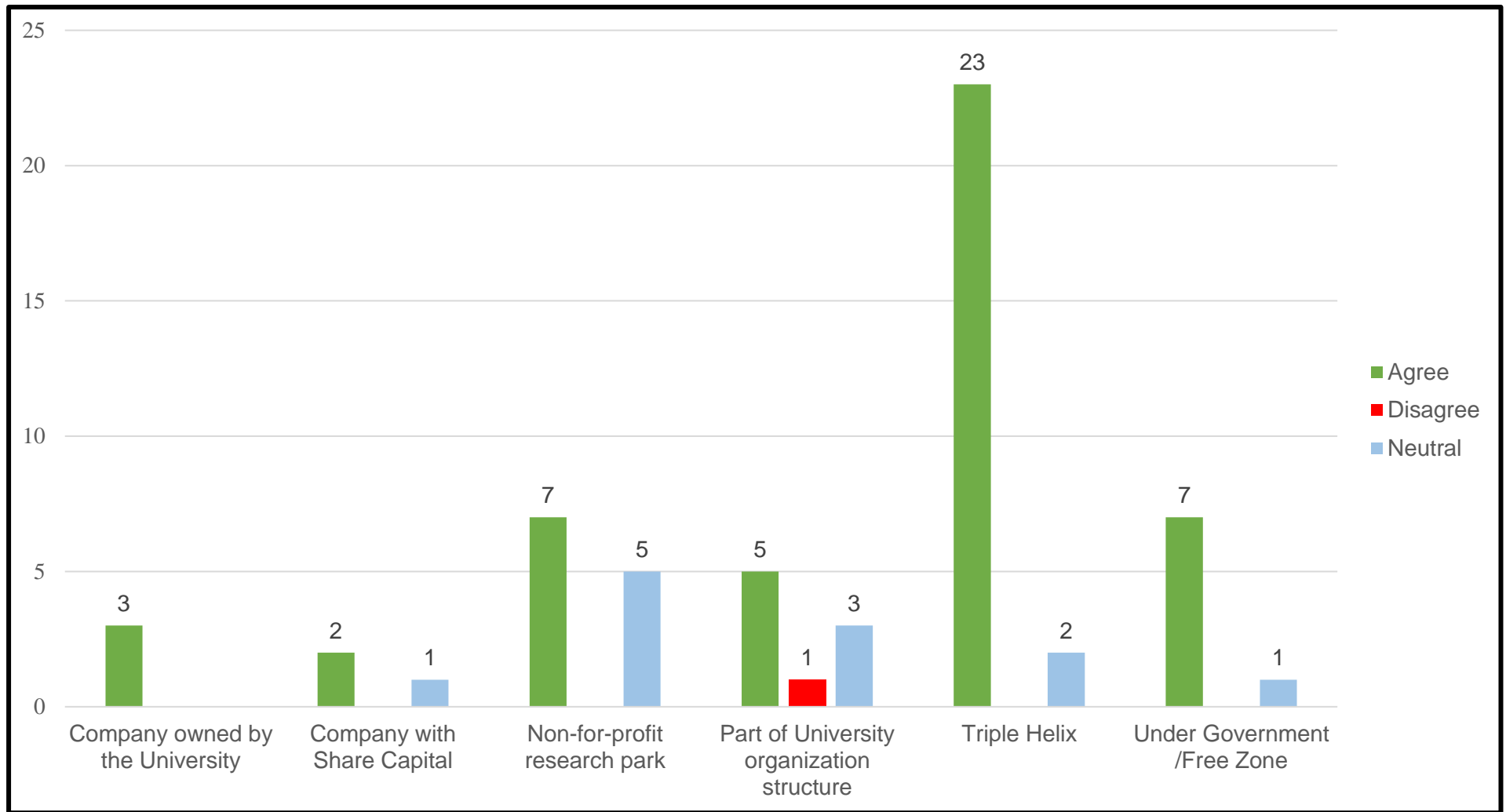
### **9.2.8. The Relationship between the Park's Governance Model and the Park's Growth Rate from Qualitative Perspective**

In this section, general findings from the interview and the survey are merged to map the answers of the participants from the questionnaire and the interviews related to the main question investigating the perspective of the RTPs' directors about the correlation between the RTP's governance and its growth and performance. In addition to Chapter 8, this section contributes to the key research question: *"Is there a correlation between RTP's governance and the growth rate and performance of the park?"*

Figure 9.6 below shows the responses of RTPs' Directors and the RTPs' different governance model types. According to Figure 9.6., the majority of the participants agree that there is a positive or negative relationship among the two variables – i.e. that the governance model contributes to the RTP's growth.

That means that the RTP's governance model can impact the RTP's growth rate positively or negatively and the degree of growth's impact can be determined by the nature of the RTP's governance's bureaucracy – i.e. the more flexible the RTP's governance, the more positive the RTP's growth rate is.

Conversely, the more bureaucratic the RTP's governance is, the more negative is the RTP's growth rate.



**Figure 9. 6: Opinion of RTPs' CEOs Categorised by RTP Governance Model**

The qualitative data are mainly convenient in understanding how the relationships between the data have emerged and in demonstrating the dynamics causing such relationships. Such approach is essential for developing the internal validity, like the hypothesis-testing demonstrating a significant correlation among the others. Thus, it is crucial to explore the underlying theoretical explanations and why there is a relationship among the data (Eisenhardt, 1989).

Generally, 78% of the participants **Agree** that there is a relationship between the governance model of the RTP and its growth rate and performance, whereas 20% of participants' responses were **Neutral** or not sure about the relationship between the governance model of the RTP and its growth rate and performance. Conversely, only 2% of the participants **Disagree** with the relationship between the governance model of the RTP and its growth rate and performance. Therefore, the researcher detailed the analysis of the participants' responses according to their RTPs' governance model for further investigation between the participants' points of view and other factors that might impact the participants' points of view, such as lack of autonomy of the RTP's director and lack of understanding of the form of governance. In particular, there were multiple beliefs and understanding over the concept of the RTP's governance which was interpreted with different meanings according to Section 9.1 – The Governance Models of the RTPs. Table 26 below demonstrates the different types of governance model of RTPs and the opinions of the RTPs' Directors.

**Table 23: Number of RTPs' CEOs' Opinions on the Relationship between the RTP' Governance and RTP's Growth Categorised by RTP Governance Model**

RTP Governance Model	Agree	Disagree	Neutral	Grand Total
Company owned by the University	3			3
Company with Share Capital	2		1	3
Non-profit research park	7		5	12
Part of University organisation structure	5	1	3	9
Triple-helix	23		2	25

Under Government /Free Zone	7		1	8
Grand Total	47	1	12	60
	78%	2%	20%	

According to the above table, 100% of RTPs' directors with the governance model type "Company owned by the University", which is a special governance model in the KSA stated that they sense the relationship between the RTP's governance model and its growth, and that the reasons they mentioned have significant similarities such as 'autonomy' and 'lack of authority of the RTP's director'. One of the RTP's directors mentioned that lack of RTP's director's autonomy minimises the efforts of the RTP's as the affiliated university management team is interfering and controlling the governance and management of the park.

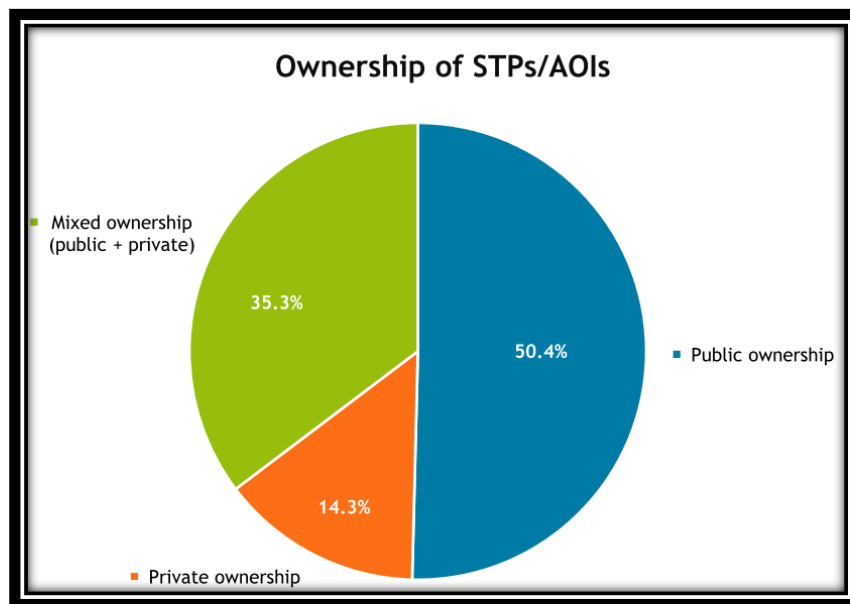
*"When the university management has control over the board of directors, lots of efforts get stifled by them". [RTPD-MWTC-FA]*

Another RTP's director stated that the RTP should be governed and managed by the RTP's board of directors with a governance system that is independent from the affiliated university. Therefore, selection and evaluation criteria of the park's gatekeeping should be controlled by the RTP's director. He added that the affiliated university should concentrate on R&D.

*"The affiliated university should not have any governance or power over the park's operational model that leads to flexibility in management style of the park and will also give the university the chance to focus on the research activities and registering the patents and IPs...All the governance and management of the park are totally independent from the university." [RTPD-MWTC-FA]*

On the other hand, 95% of RTPs' director with the "Triple-helix" governance model type stated there is a relationship between the RTP's governance model and the growth rate and performance, representing the highest proportion of participants' responses' scores. It is important to mention that the "Triple-helix" model/"consortium" accounts for the second highest proportion of the overall governance models in the

world, according to the IASP General Survey published in 2015 as shown in Figure 9.7 below (Eghbal, 2017).



**Figure 9. 7: Percentage of The Governance and Ownership of RTPs according to the IASP 2015 General Survey**

This makes intuitive sense as Table 9.2.8-2 below shows. It analyses the transcripts data ‘case-level display for partially-ordered meta matrix’ demonstrates the value added for the triple-helix model as the most a, such as enabling better collaborations among the different actors and RTP’s stakeholders, financial sustainability, most importantly, leading the RTP to internationalisation, and on-park attraction factors for talented entrepreneurs, R&D institutes, and large corporations.

The point of views of the RTPs’ directors relating to the “Triple-helix” model were supported from different interview transcripts conducted with policymakers, RTPs’ international associations (IAPS and AURP), and most significantly, the RTPs’ tenants’ firms’ located on-park, which are discussed in detail in Sections 9.2, 9.3, and 9.4, respectively.

Table 27 below demonstrates the perspectives of the participants in regards to the definition of “governance” and their opinions on the relationship between the RTP’s governance model and its growth rate, categorised by the governance model of the participant’s RTP.

### **9.2.8.1. Summary of RTPs' CEOs' Perspectives regarding the Relationship between the Park's Governance Model and the Park's Growth Rate According to the RTP's Governance Model**

The section presents the perspective of RTPs' CEOs regarding the relationship between the park's governance model and the park's growth rate categorised by corresponding governance model:

#### **Triple-helix:**

##### **1. RTP-BTCD:**

The reason between the relationship between the RTP's governance model and RTP's growth rate and performance. That relationship is due to the collaboration model that creates an exceptional consortium of different entities united towards one shared goal. In addition, the governance model facilitated the access to high-level knowledge and trained professionals which is one of the main reasons behind the high-performance RTPs. That perfect combination of government, technology and academic achievement drives the RTP to minimise the cost and risks of funding the RTP's infrastructure due to the support of the RTP's stakeholders and actors' network.

##### **2. RTP-BCC:**

The reason why there is a relationship between the RTP's governance model and RTP's growth rate and performance, inasmuch as the growth of the park is driven by the governance model that swiftly cultivates the open innovation ecosystem between the RTP's actors 'government-industry-university, supported by the fundamental and applied research offered to scientists, entrepreneurs, students and investors. The consortium forms new chances and solutions in sustainability and health that are environmentally sound, business-savvy, and socially positive, and boost the economic impact locally and regionally. The RTP is governed cooperatively by leadership teams by the consortium board of directors. The governance model enabled the RTP to obtain significant support from the local government, the associated

universities, the national government, private sector, and several local, regional, and national public funds and bodies.

**3. RTP-CRP:**

The flexibility of the Triple-helix governance model enabled the park to obtain the excellent government support for growth and development of businesses, and the collaborations among the consortium facilitated the park to become the leading RTP regionally.

**4. RTP-GSTP:**

The key driver of the relationship between the RTP's governance model and RTP's growth rate and performance is that the governance model determines how flexible the collaboration model between the RTP's various actors will be operated and managed. The smooth and effective collaboration between the RTP's consortium is the catalyst for innovation and collaboration between government, industry and research can trigger innovation and act as an actuate vigour for the innovation and economic development governance, policies, and processes. That, in turn, enables the collaboration model to be executed successfully, the networking and collaboration in projects, knowledge and technology transfer, and academic spin-off creation to happen, and the growth of the park to rise among all the RTP's actors in an open innovation system. The role of the local government is vital in driving the governance model of the parks and flourishing the growth of the RTP.

**5. RTP-JSCP:**

Mainly, the governance model is the basis for setting the policies and procedures on how the park operated and managed, that mean setting the rules of the RTP's board of directors, the RTP's management roles, the eligibility of the tenants' firms, and what should and should not be conducted on-park. These factors can make or break the collaboration model. Thus, autonomy of the park and the authority enabled the park to provide the tenants' firms with the services and support to focus on the growth of their companies and boost the growth opportunities via the innovation and collaboration projects with other bodies and park's actors and stakeholders. Moreover, the flexibility of the governance model enabled the park to work as a broker to enable the

collaborations among all park's actors, provide trainings, coaching, and mentoring to foster the innovation and lead to the growth and drive the performance of the tenants' firms, and the park's stakeholders' consortium.

**6. RTP-LBSPHF:**

If the governance model enables the collaboration between the RTP's actors, then the growth rate and performance of the park and other stakeholders will be increased. The harmony between the different stakeholders and their clarity on each's one roles and responsibilities in the governance makes the collaboration among innovation and research projects thrive. The different bodies associate and communicate on the management and operations of the park.

**7. RTP-SC:**

The reason for the relationship between RTP's governance model and its growth rate and performance, because the governance model boosts the collaboration model of the park and enables numerous entities and stakeholders to attract tenants' firms and start-ups. Moreover, due to the flexible management style of the Triple-helix governance model, the governance model contributed to the growth of the park's revenue, and increased the park's expansion, as the Triple-helix governance model perfectly aligned to the park's innovation strategy.

**8. RTP-SV:**

The relationship between RTP's governance model and its growth rate and performance can vary from negatively or positively impact from that relationship. The vision of the park should determine the governance model because the research centres and academic institutes will never be operated and governed as businesses or corporates. The park's leadership team should focus the efforts to make the park's vision come true. Therefore, the leadership team should start growing the park internationally to attract, inspire, and fund the technical entrepreneurs.

**9. RTP-NTCP:**

Basically, the governance model is the foundation of the successful RTP and one of its indications is the growth rate and performance of the park. Therefore,



the focus of building the business on innovation is a collaborative and continuous effort. The governance model sets the base for the collaboration model. Therefore, the governance model is the enabler and facilitator for the enterprises, entrepreneurs, the external bodies, and the universities to partner and collaborate on innovation projects to create the dynamics in the ecosystem, secure funds for from the networks of RTP's stakeholder to finance the innovation projects, increase the growth of the RTP's different actors and flourish the RTP's growth. With all that said, RTP promotes the local and regional economic development through its collaboration which is mainly based on the governance model.

**10. RTP-PP:**

The governance model relates to the growth in several points: it aligns the partners, stakeholder, and actors of the RTP on the policies, processes, and rules on how they interact among them. All the partners have intensive and broad experience matching the RTP's goal and field of technology. The governance model enabled the RTP to collaborate with several academic institutions, private and public sectors tenants' firms in transfer knowledge and technologies, commercialisation, along with innovation projects collaboration to transform the discovers into commercial products, processes, and services. The advantage of the governance model that increases the growth is the flexibility in associating and collaborating with several universities to provide the tenants' firms with value-added services and a pool of talented human capital to serve the needs and expectations in specific fields of technologies related to the park's goal and vision.

**11. RTP-PDTP:**

The park is governed by 15 individuals representing the RTP's board of director, and they are responsible for managing and operating the park, monitoring the services provided to the tenants, and most importantly authorising the governance model framework, policies, and the park's processes. The governance model was built with the voice of the customer in the first place. The governance model relates to the park's performance and growth as the model enables the corporates, entrepreneurs and other RTP's actors' located

on-park to perform their daily work toward achieving their goals and raising their growth rate. It also enabled the park to become a key influencer in commercialisation and economic development among the local and regional players, and it helped the park in reaching its goal in internationalisation.

**12. RTP-PRFRP:**

The park ownership is non-profit, although the governance model is based on the Triple-helix governance model. That enabled the park to have a strong collaboration model with all the RTP's stakeholders such as the university, the government and the private corporates, and to gain access to the market. The governance model enabled our park to eliminate the dependency on the RTP's actors and provided the RTP management with the autonomy and decision-making powers to set the relevant policies and rules to work in harmony with all our partners.

**13. RTP-RTP:**

There is a relationship between the RTP's governance model and RTP's growth rate and performance, as the governance model initiates the collaboration between the companies, universities, and society to come together in cross-sectoral projects, and that in turn lead to tremendous achievements and growth in the performances among all actors.

**14. RTP-SRTIP:**

The relationship between the RTP's governance model and RTP's growth rate and performance is obvious for a major reason: the governance is the policy management of any RTP, therefore it must be equipped with the power to impact the local economic development, and in turn facilitate the RTP with the autonomy and authority to assist the entrepreneurs and the tenants' firms in their daily operations. Therefore, it is transformed into the knowledge-based economy, to take the local economy to the next level in the field of specialised technologies and innovation-based start-ups. That will never happen if the governance model lacks the sufficient support for the infrastructure and services required to succeed.

**15. RTP-SRP:**

The relationship between the RTP's governance model and RTP's growth rate and performance is made possible as the governance model is contingent on the policies and obligations to provide the autonomy to the RTP's management.

**16. RTP-TSPT:**

There is a relationship between the RTP's governance model and RTP's growth rate and performance, because the governance model orchestrates the park's operations to serve the tenants' firms with the main goal of driving the growth of the start-ups, and developing new ideas to continuously add value to the services of the park to tackle the needs and expectations of the tenants' firms. The proof is that the current governance model impacted the growth rate of the park, as we have more than 200 tenants' firms from start-ups to large corporate and large global-players companies, who started as entrepreneurs. The key role that the governance model plays is to raise the growth of the technology-based firms by fostering the collaboration model and networking opportunities with several universities, private and public sectors, and local government, in addition to providing the excellent living environment to achieve our globalisation goal.

**17. RTP-TPL:**

The reason behind the relation between RTP's governance model and RTP's performance is that the solution for the park's growth is basically the governance model, particularly the Triple-helix governance model.

**18. RTP-TLKPC:**

There are many reasons behind the strong relationship between the RTP's governance model and the growth of the park; for example, the governance model is an enabler for an effective interaction between the academic institutions, the private sectors, and government to cultivate the commercialisation of the innovation, research, and entrepreneurship. Moreover, the governance model allows the networking and partnership opportunities between commerce and trade associations, supports the growth of tenants' firms internationally, engages in collaboration and streamlines the incubators' efforts, and attracts investors and academic spin-offs and memberships. Nevertheless, the governance model facilitates the park to work

with their actors to develop the required local talented human resources capital, select from the top-notch, local entrepreneurs' pool. The governance model facilitates the creation of the ecosystem from combining the efforts from government, private companies, and the academia. In addition, the governance model enables the tenants' firms to be attracted on-park to enjoy the exclusive taxes exemptions and special incentives, acquisition of IPs, and enjoy the special economic zone services and excellent supply chain management system and import duty exemptions. The governance model of Triple-helix is the basis on how the park is combining the best of all sectors and the management of the daily operations of the park smoothly and the autonomy given to the RTP's management team to grow the park and drive the performance to create the best ecosystem with the "Live-Work-Play" theme to the tenants' firms and stimulate the innovation and transfer the knowledge. Nevertheless, the governance model enables the park to engage the community to participate actively in achieving the park's vision.

**19. RTP-TSTPA:**

The governance model has a strong relationship to growth of the park. The governance model contributed to the RTP's growth and expansion dramatically. The reason behind the relationship is that the governance model contributed to the RTP's flexibility of management style, in addition, facilitated the proximity and collaboration between the RTP to ten research institutes and more than six institutes in the Humboldt University. Because of the governance model, the RTP's growth rate reached out to more than 1000 tenants' firms and the park expanded to 4.2 square kilometres. Nevertheless, the RTP has expanded globally by collaborating and partnering with more than 15 biggest science parks across the world.

**20. RTP-TSTPC:**

The governance model has a strong relationship to RTP's growth and performance boost. That's because governance model empowers the park's growth to efficiently adjust upfront to the emerging requirements of the local and regional entrepreneurial, research, innovation, and technology development, research institutions, universities, and research communities. Moreover, the

governance model simplifies the process of collaborations among RTP's actors and stakeholders, allows the park to provide specialised professional and technical services and facilities to several tenants' firms from all ranges to enable them to focus on their technology transfer, commercialisation activities, and prototyping. The governance model enabled the park to smoothly run the daily operational activities for the benefits of the tenant's firms and fostered the growth rate of the park.

**21. RTP-TCP:**

The main concept behind this is that the governance model simply identifies how the park executes its collaboration model among the various stakeholders and partners. The most important part is that the park cannot reach its strategic vision as a solo operator and governor of the daily processes and policies, and that is exactly the success story of the "collaboration and consortium of different entities". Because of the best-fit design of the governance model, the park created an entrepreneurship-friendly ecosystem providing the best in class-products and services that foster and enabled the growth of the tenants' firms and the park thereafter.

**22. RTP-USP:**

There is a relationship between the RTP's governance model and RTP's growth rate and performance because the governance model strengthens the execution of the park's vision in attracting regional and international corporates to locate on-park by simplifying the policies, and roles of entering the RTP and selection criteria. Additionally, the collaboration model attracted the top talented skilled resources in the region to collaborate in R&D projects with the tenants' firms.

**Non-profit:**

• **RTP-ASUP:**

The reason between RTPs' governance model and RTPs' performance and growth is the complex policies and the management style of the academic institutions are not best suited to the dynamic of dealing with the industrial sector and businesses. The academic institutions cannot handle the rapid

demands and requirements of the private companies and tenants' firms located on-park. Thus, it will be too complex for academic management to swiftly eliminate the challenges of the RTP's actors and stakeholder such as entrepreneurs, and private companies located on-park. The more flexible the RTP's governance model is, the more flexible the process will be, and the more opportunities for RTP in collaborating with external stakeholders and bodies.

- **RTP-BPUM:**

The relationship between the RTP's governance model and RTP's growth rate and performance is understandable because the governance model authorises flexible processes of knowledge transfer and commercialisation, therefore, positively and highly impacting the RTP to facilitate the growth rate of the tenants' firms' located on-park.

- **RTP-ISURTP:**

The reason for the relationship between the RTP's governance model and RTP's growth rate and performance is the governance model enabled the policies and flexible processes for the effective collaboration model to be executed. The park owns, manages, and operates 83% of the buildings on-park and the 17% remaining buildings are owned, managed, and operated by the private sectors. The park does not fall under the management and operation of the university. It has its own governance model, and the RTP's board of directors have the autonomy and decision-making over the RTP's management and operation. Such autonomy and collaboration enabled the growth to rise and the park to attract more tenants' firms; therefore, there is an ongoing expansion of the park to accommodate more tenants' firms to locate on-park. The park has more than 1700 tenants' firms' employees and the number expected to double 2025. That enabled the park to have a tangible economic impact on the city because of the governance model.

- **RTP-RTP:**

There is a relationship between the RTP's governance model and RTP's growth rate and performance, as the governance model initiates the collaboration between the companies, universities, and society to come together in cross-

sectoral projects, and that in turn lead to tremendous achievements and growth in the performances among all actors.

- **RTP-PRFRP:**

The park is governed by 15 individuals representing the RTP's board of director, and they are responsible for managing and operating the park, monitoring the services provided to the tenants, and most importantly authorising the governance model framework, policies, and the park's processes. The governance model was built with the voice of the customer in the first place. The governance model relates to the park's performance and growth as the model enables the corporates, entrepreneurs, and other RTP's actors' located on-park to perform their daily work toward achieving their goals and raising their growth rate. It also enabled the park to become a key influencer in commercialisation and economic development among the local and regional players, and it helped the park in reaching its goal in internationalisation.

## **Part of University Organisation Structure:**

1. **RTP-RTPKEID:**

A relationship exists between the RTP's governance model and its growth rate and performance because the governance model is the manner and practices of all the activities conducted on-park. Examples are if the RTPD decided to update a policy to reduce the charges deducted from the tenants' firms, released another policy on the entry gate for locating the tenants' firms' on-park, and selection criteria for the entrepreneurs and engage the tenants' firms on the strategic visionary roadmap of the park. Therefore, the growth rate and performance of the park will be increased dramatically. The governance model does not necessarily mean spin-off from the university's structure; it can be simply shifting the strategic vision of the park by focusing on the engagement between the university and the tenants' firms, which is the engine of the growth and competitive. The more the park concentrates its governance model on the companies with innovation imposition and enables the collaboration with them, the more growth for the park.

2. **RTP-UAEURT:**

There is a relationship between the RTP's governance model and RTP's growth rate and performance, because the governance model of the park influences the formation of the park's strategy, goals, objectives, the strategic initiatives, and how the park will measure these objectives.

**3. RTP-UTP:**

The relationship between the RTP's governance model and RTP's growth rate and performance depends on the governance model type; for instance, the park with the Triple-helix governance model significantly drives the park's growth and performance. Conversely, the park with the company share capital governance model has a substantial influential power on the market's share and the services provided to the tenants' firms. On the other hand, the park that is under the university structure has an inflexible and complex process in operations and management of the park, particularly in the procurement and lease of spaces.

**4. RTP-TP:**

There is a relationship between the RTP's governance model and RTP's growth rate and performance as the governance directly influences the degree of policies bureaucracy and promptness of the park. The tenants' firms located on-park look for RTP that enables them to effectively collaborate with other tenants' firms, local and regional governments, researchers, universities, and international corporates in fulfilling the technology transfer, commercialisations, and research and innovative projects cooperation and partnership opportunities in an agile and flexible environment that contributes to the growth of their businesses.

**Company Owned by the University:**

• **RTP-DV:**

The relationship between the governance model and the growth rate and performance exists due to multiple reasons. For example: the governance model is the tool that dictates the authority level, the decision-making process, and the degree of bureaucracy in the park. The correlation of the park and its governance model demonstrates the dilemma of many RTPD who lack



autonomy due to restricted policies and, therefore, lack proper decision-making in the management and operation of the park. This in turn can lead to conflict of interests and confusion of governance among the RTP board of directors due to multiple roles and responsibilities. Conversely, there are different management styles between the academic institutions and the park as an enterprise which in turn makes the chair of the board of directors of the park pay less attention towards the talent in the park as they play dual roles in managing the university as a president and governing the park as the chair of the board of directors. Thus, there is less focus on the park's staff and management.

- **RTP-JTV-AM:**

The main reason for the relationship between the RTP's governance model and RTP's growth rate and performance is because when the governance of the park is solo controlled, the RTP's board of directors will lack the autonomy to manage and operate the park. Therefore, the daily collaboration, operations and services will be micromanaged by the university which will lead to wasted efforts by the park's management

- **RTP-WM:**

The relationship between the RTP's governance model and RTP's growth rate and performance exists for several reasons. One of the reasons is that the RTP's governance model should totally focuses on commercialisation, creation of ecosystem, and facilitating the innovation on-park among the stakeholders and actors. The RTP governance and operational model should avoid engagement in any R&D activities. One of the most common R&D activities most of the parks are engaging in is technology transfer and IP registrations, which is a function that should be governed outside of the RTP's scope. The RTP operations and R&D operations are totally different and cannot be governed by the same organisation. The other major reason is that the economic development function is a major a complex and needs complete attention and governance from the RTP. Therefore, the RTP should cautiously evaluate its governance model to fit the high demands of the RTP's tenants' firms and ensure attraction of international companies and talented start-ups to

locate on-park and leave the R&D operations to the university, to boost its growth rate and performance.

### **Government-Free Zone:**

- **RTP-ATG:**

There is a relationship between the RTP's governance model and RTP's growth rate and performance, as it provides the investors and RTP's actors the autonomy in projects' selections and use of the projects' funds to financially support the projects each phase.

- **RTP-CHTP:**

The empowerment of the governance model supported the RTP to achieve high growth of the park and enabled the globalisation of the park due to the high level of services provided to the tenants' firms due to the effective decision-making and authority that made the park achieve its goal of the open innovation ecosystem. In addition flexible investment policies have helped it achieve its goal.

- **RTP-ETP:**

The main reason for the relationship between the RTP's governance model and RTP's growth rate and performance is the collaboration opportunities that the governance model facilitated, which is the driver for the growth of RTPs. Other than that, the flexible management style to access talented and qualified resources and provide them with incentives to work with tenants' firms on research and innovative collaboration projects has contributed to the success of the park. In addition, the tax exemption of income corporate taxes and value-added tax, and the insurance premium support as part of the governance model enabled the tenants' firms to grow tremendously; therefore the RTP's growth rate increased and the park's performance flourished.

- **RTP-IH:**

The tenants' firms related the governance model to the collaboration model, claiming that the 85% of the park's tenants see the dynamics of the governance and collaboration to their growth and, therefore, the park's growth. There is a

direct relationship between RTP's governance model and its growth rate and performance.

- **RTP-ISC:**

There are several reasons behind the relationship between RTP's governance model and its growth rate and performance. For example: the governance of the park controls how the park collaborates in a Triple-helix setting and the policies govern and control the relationships with the park's stakeholders and different actors. Therefore, the governance model should be interpreted against different aspects. For example: if you have a Triple-helix governance model but your park lacks the authority and decision-making capacity, and the board of the park reports to the government, the RTP director is appointed by the Minister, and the government governs the universities and large companies, then the collaboration will be diminished and even the industry will not be active. The other reason is that the governance model controls the policies and the basics settings of the park; therefore, the more flexibility of the governance model and the more the park is governed as an enterprise, the more growth the park changes to success. Since the development of parks in developing countries is the role of the governmental authority, then RTP board should differentiate between the ownership and the governance by managing the park – where the park's director has significant autonomy – by collaborating with the private sectors by investing and developing the park's services, and appointing stakeholders from the private sectors to become members on the park's board of directors.

- **RTP-OTP:**

The RTP's management should thoughtfully consider many factors when evaluating whether the governance model will serve the long-term strategic visionary roadmap of the park, as this influences the relationship between RTPs' governance model and the RTPs' performance and growth. So, if the park's vision is "Globalisation" or "Regional", then the RTP governance model should be more dynamic to support and boost the growth of the local companies, entrepreneurs, and investors by providing global competitiveness and excellent technology infrastructure, facilities, technology exports, and

value-added services, technology development free zones. Therefore, it will create an excellent ecosystem, raise the quality of the innovation among the entrepreneurs' products, promote commercialisation, smoothly govern the investment opportunities in technology interest fields of the RTP, and provide the sufficient authority, autonomy and decision-making to the RTP's director to effectively manage the park's operations. The relationship of the governance model is proven in the case of our park, with evidence of technologies exports' capacity of on-park tenants' firms worth around 2.4 billion USD.

- **RTP-SRTIP:**

The relationship between the RTP's governance model and RTP's growth rate and performance is obvious due to major reason: the governance is the policy management of any RTP so it must be equipped with the power to impact the local economic development, and in turn facilitate the RTP with the autonomy and authority to assist the entrepreneurs and the tenants' firms in their daily operations. Therefore, it will transform the park into the knowledge-based economy, to take the local economy to the next level in the field of specialised technologies and innovation-based start-ups. That will never happen if the governance model lacks the sufficient support to the infrastructure and services required to succeed.

- **RTP-TPIAS:**

The strategic model of the park is based on partnership and collaboration with various stakeholders from the government, the private and public sectors, local, regional and international universities, and RTPs' Associations. The model depends on the collaboration between the local government, the defence industrial, technological and engineering authorities, the chamber of commerce and the associated university and it is divided into five clusters: 1) aviation sector innovation cooperation, 2) R&D Centres Communication and Collaboration, 3) Aviation Sector Innovative Cooperation, 4) Defence, Aeronautics and Space Cluster, and 5) design and engineering services of ships.

- **RTP-TSLTP:**

The governance of RTP forms the backbone of the policies that manage the daily work of the park. Therefore, the governance model facilitates streamlined communications between the universities, the private sectors, and the government. In addition, the collaboration model is the driver for the growth. Hence, there is a high possibility of park's growth improvement.

The responsibilities shared between the RTP's actors must focus on a shared goal and vision in boosting the innovation, entrepreneurship, and research and technology transfer.

### **Company with Share Capital:**

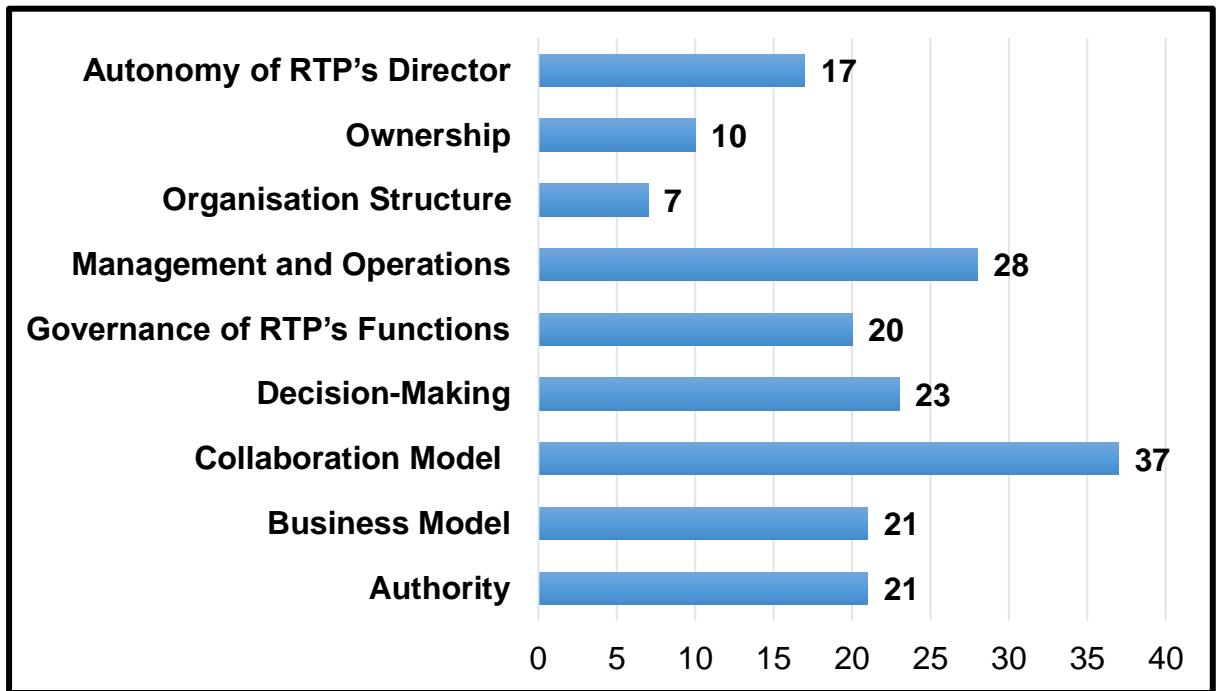
- **RTP-BSF:**

The relationship between the governance model and its growth rate and performance exists because the governance model creates dependencies on the regulation and authority controlling your park. These obligations can be limited funding sources, less autonomy of the park management, and less decision-making in acquiring the talented resources. The governance model can also limit or increase the park's capabilities to sustain the best services provided to the tenants' firms' located on-park.

- **RTP-TH:**

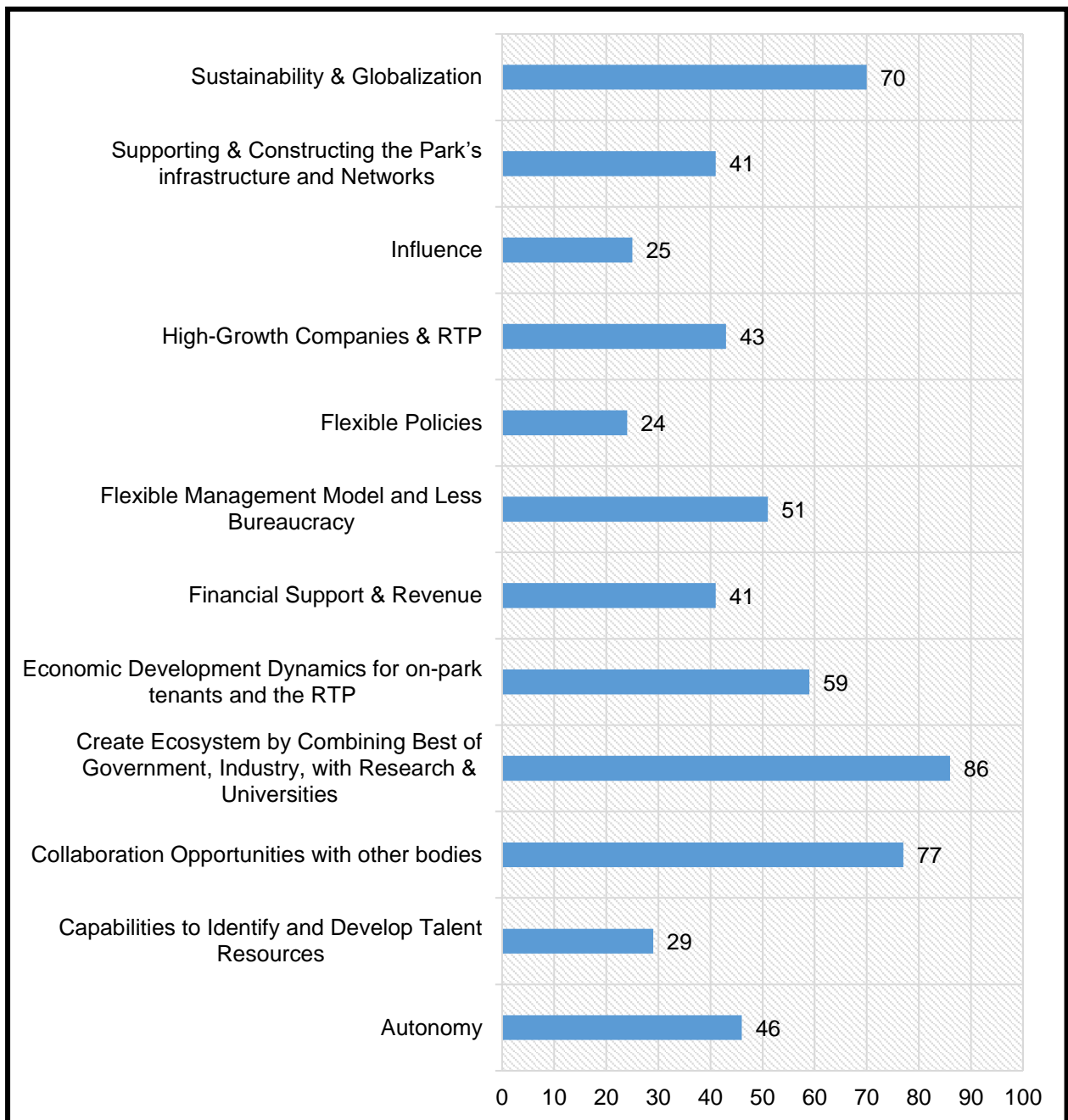
The governance model is an enabler for the collaboration if it is of sufficient flexibility because it associates the rewards for both public and private sectors. The relationship between the RTP's governance and RTP's growth lies in facilitating the collaborations and partnerships between the different actors of the parks. Therefore, the governance model can enable the public sectors such as local, regional and international governments to fulfil their needs in collaborating and partnering with the park's actors and stakeholders in R&D, technological, and entrepreneurial projects. On the other side, the private sectors will invest in the park to collaborate with the park's stakeholders and invest in the park's entrepreneurs and spin-offs and generate revenue, hence, boosting the growth rate of the park and driving the performance.

Figure 9.8 below illustrates the various perspectives of RTPs' CEOs regarding the meaning of 'governance'.



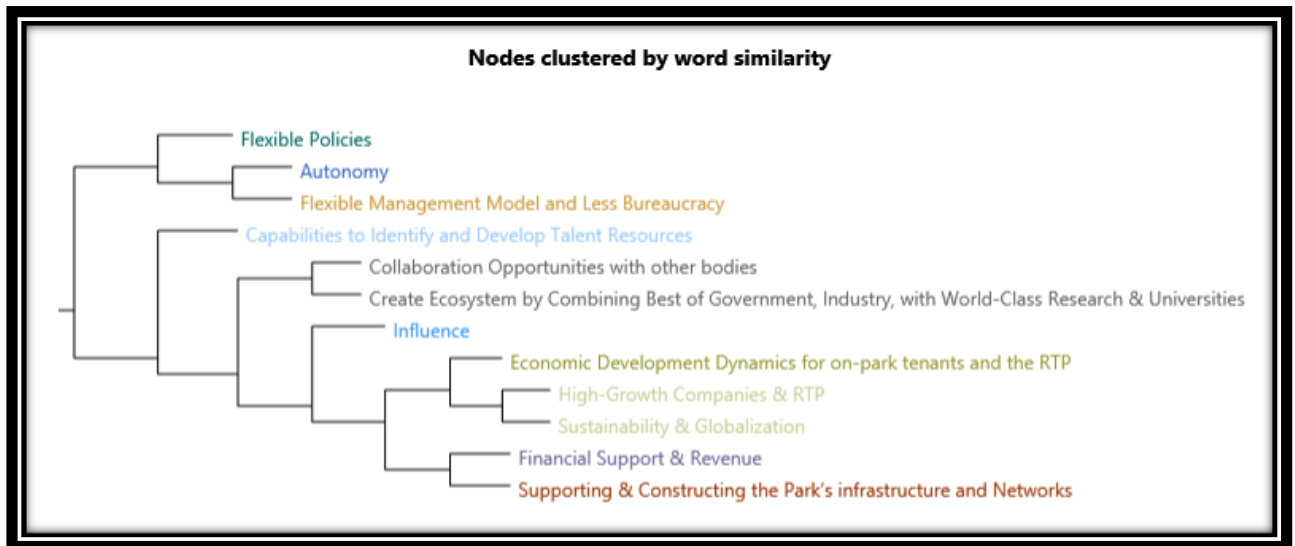
**Figure 9. 8: The Various Perspectives of RTPs' CEOs Regarding the Meaning of 'Governance'**

Figure 9.9 below illustrates the coded sources on the reasons for the correlation between the park's governance model and its growth rate.



**Figure 9. 9: Reasons for the Correlation between the Park's Governance Model and its Growth Rate**

Figure 9.10 below clusters the reasons for the correlations between the RTP’s governance and growth rate into three main categories: 1) flexible policies, 2) adaptabilities to identify and develop talents, and 3) influence of RTP.

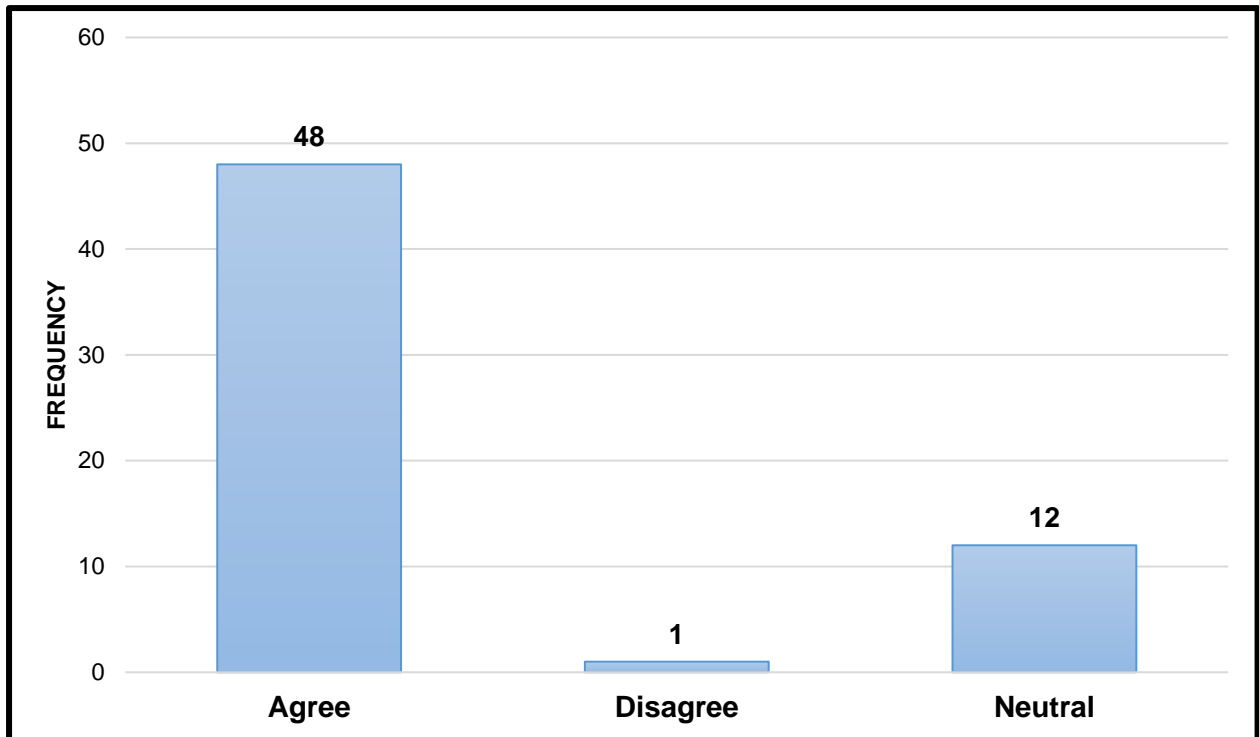


**Figure 9. 10: Reason for the Correlation between the Park's Governance Model and its Growth Rate Clustered by Word Similarity**

Based on the survey’s responses, Figure 9.11 shows the responses from the RTPs’ directors regarding the correlation between the RTP’s governance model and the park’s growth rate. The exploratory interviews and the surveys demonstrated the point of view of each RTP director on why there is a correlation between these variables, “RTP Governance model” and “RTP Growth rate”. ***The word governance occurred more than 4159 times in data sources.***

On the other hand, Figure 9.11 below illustrates the percentage of the RTP directors who agreed that there is a relationship between the governance model of the RTP and its growth rate.





**Figure 9. 11: Opinions of RTPs’ CEOs on the Relationship between RTP Governance Model and its Growth Rate**

**9.2.9. The Benefits that can be gained from changing the RTP’s Governance Model in the case of “Part of the university’s structure”**

By modifying the governance model that best fits the park, the park will be able to create more collaboration opportunities with other bodies. The benefits of changing the governance model from ‘part of university structure’ can reduce the complexity of the policies and decrease bureaucracy when collaborating with the private sectors. This is particularly the case in enhancing the closure of investment deals and eliminating the obstacles facing the tenants’ firms. Therefore, this provides more flexibility in management style, processes, and high response rate to the needs and expectations of the tenants’ firms located on-park. Additional benefits such as collaboration opportunities with other bodies such as multiple universities and R&D institutes among others are a key attraction strategy to attract talented entrepreneurs and large companies to locate on-park. Such collaboration among individuals and organisations that have common interests facilitates the efficiency in the collaboration

process and generates new ideas by discussing any issues that emerge, thus making it easier to resolve these before they become problems. Hence, the RTP can achieve higher growth rate and drive better performance.

Additional benefits of changing the governance model from 'part of university structure' are a direct impact and influence on the RTP's autonomy, efficiency of the RTP's infrastructure, and attraction of potential private local and international companies. This will boost the RTP's growth and expansion, and increase its revenue, therefore fostering economic development. Moreover, it will improve the capabilities to identify and attract talented resources by merging the academic resources from the universities and talented entrepreneurs to collaborate in projects, funded by private and public sectors to enable the creation of the ecosystem and flexibility in financing RTPs to expand internationally. The key to the success and development of the RTP is governing and managing it as a company rather than as a university department. Moreover, changing the RTP's governance model from 'Part of university structure' has the potential to increase the deals of commercialisations and licensing activities in the RTP. *"As the park is meant to be focused only for the businesses and economic development, the university should only focus on the research and development and leave the economic development to the park. The only decisions depending on the university decision are the ownerships of the IPs and lands usages for the first time."*  
[RTPD-MWTC-FA]

#### **9.2.10. The Problems of the Solo-governance Model of RTP**

This section summarises the interviewees' points of view on the problems associated with the solo-governance model of the RTP. These can vary from the lack of flexible governance, such as difficulties in securing funds, and delaying the negotiating of the investment deals with, among others, private companies. The solo-governance model can cause significant delays in daily operations, which in turn affects the tenants' firms' services management. Moreover, Almeida et al. (2008, p. 13) stated that "the narrow and closed approach underlying science parks implementation restrains its potential in contributing to the upgrading of the regions economy's technological specialization pattern."

Moreover, the university's services are designed to serve the academic institutes; therefore, the park needs to have flexible relationships and eliminate bureaucracy that will otherwise create bottle necks between the park and the university, as this will impact the level of services provided to the tenants' firms, and result in a slow response rate to the companies, and limited services. Moreover, the inflexible management style affects the RTP's ability to identify talented resources. Nevertheless, the interviewees stated that the solo-governance model type – and particularly when the university is managing and operating the park – concentrates on the academic management and pays less attention to the documented policies and procedures of the RTP's governance model, resulting in unsatisfactory levels of collaboration and no collaboration model in place. This leads to low level of collaboration on projects and R&D among the tenants' firms and between the university and the tenants' firms, in addition to the lack of a satisfactory collaboration model. Therefore, the private sectors are reluctant to invest in the park due to the restrictions of the controls and governance model. One interviewee stated: *“Therefore, areas of innovation must be involving the business, ventral capital, the environment, the economic factors, and the city itself”* [RTPD-MWTC-FA].

From another perspective, the interviewees perceive a lack of funding sources to build robust RTPs in the developing countries due to lack of the RTP's director's decision-making autonomy over the management and operations of the park. As stated below:

*“We don't have the power in developing countries to develop the STPs, so we need to differentiate the ownership and the governance and the management of the parks...About 80% of the economy is run by the country, if RTP is run solo by the government, then the private sector cannot own the land that has huge space”.* [RTPD-ISTT-ME]

The governance model type 'part of university structure' lacks flexibility, which significantly impacts the collaborations model of the park, such as collaborating with other universities' RTPs and R&D institutions, due to conflict of interest in the research projects. The governance model of the universities is built based on a non-profit basis; therefore, the revenue generation is not among the universities' strategies. As a result,

the park's strategy will be impacted and the park cannot grow financially. Conversely, the governance model of the RTP running under the university lacks the economic expertise to manage the park as an enterprise in negotiating and securing the needed funds and financing mega collaboration projects. Therefore, they will fail to integrate the different actors (academic, scientists, industry, private, public sectors, community, etc.) in the research and collaborative projects, and thus fail to attain the RTP's globalisation expansion. The RTP under the university structure is considered as just another unit under the university organisation structure so all the strategies, policies and regulations of the university will apply to it. Therefore, the RTP's director's autonomy is minimal; he or she lacks flexibility which impacts on the collaboration between the RTP and other universities to create ecosystems. That in turn affects the financial indicators of the park. The inflexible management style of the university hinders the growth of the park; on the other hand, however, the RTP that follows the 'part of university structure' model can face difficulties in collaborating with multiple actors. The collaboration model is crucial for any RTP's governance model to attract the tenants' firms and entrepreneurs, and therefore increase the financial growth of the RTP.

One of the major reasons for the difficulties in the 'part of university structure' governance model is the rigidity in governance of the management and the operations. This leads to difficulties in executing the park's innovation strategy, delays the development of the park's real estate and minimises the commercialisations and licensing operations, due to lack of collaboration with external bodies. Therefore, the university governance should concentrate on the R&D.

On the other hand, the governance of the economic development should be the solo focus of the RTP, to avoid the lack of flexibility in governance of project's funding, and the difficult and complex processes and policies related to on-park investment.

#### **9.2.11. The Various Strategic and Management Models of RTPs**

The descriptions of key current strategic and business management models adopted by the RTPs' directors summarised from the interview transcripts are presented as follows, categorised by the governance model:

**Triple-helix:**

The strategic model of this model boosts the ecosystem by encouraging both large firms and start-ups. Thus, it became the core of emerging and innovative technologies trusted worldwide. Additionally, it concentrates on the “Live-Work-Play” environment, magnifying the concept of interdisciplinary development, start-ups ecosystem education. The Triple-helix model concentrates on orchestrating the right marketing mix to achieve the goals of the park’s strategic model therefore, executing the strategy of the park by focusing on the park’s products.

Moreover, the power of the Triple-helix model facilitates the Public-Private-Partnership between the park’s actors – university, industry, and the government. Such a model provides significant autonomy for the RTP’s director and favours having successful technology entrepreneurs on the board of directors rather than the standard management team members as this boosts the RTP’s strategic goal by spreading the entrepreneurial culture in the park. The strategic model is set and runs the park’s management team; therefore, the park’s management team must have research experience, knowledge in technology transfer and commercialisations, and outstanding personality and soft skills as these skills and knowledge play a tremendous role in the success of the park.

The liaison between the associated university and the park regarding the collection of data of the innovations and research is the responsibility of the vice president of research at the associated university. Then the RTP mixes and matches the collaboration projects with the tenants’ firms. Nevertheless, the Triple-helix strategic model allows the faculty member, researchers and staff of the associated university to work as ‘part-time’ or partners for the tenants’ firms after signing NDA and confidentiality agreements with the tenants’ firms facilitated by the RTP.

**Non-Profit:**

The non-profit strategic model enables the park to purchase the landscapes from the associated university at very low-rates, less than the lands worth. Such model allowed the park to build and own the research centres, labs, and tenancy buildings, and leases the buildings to the university and leases the lands to tenants. Regarding the services provided to the tenants’ firms, the park contracts with private service providers to

provide high-quality services to the tenants' firms' located on-park. In addition, the park utilising its talented resources to provide the tenants' firms with private consultancy services.

Conversely, some of the non-profit RTPs focused only on large tenants' firms located on-park; thus they only attract large companies to collaborate with the park's associated university on projects. Therefore, the park strategy is to focus on the demands of the current tenants' firms of large-scale companies, analyse these demands, mix and match between the tenants' firms and the faculty members of the associated university, and finally connect them via networking events. In addition, the park's strategic model enables it to coordinate the daily operations and connections between the park's actors – the associated university, the tenants' firms, and the government agencies – to collaborate on projects and invest in the R&D activities. It is worth mentioning that the park's strategic model allows the not-for-profit organisations to lease spaces on-park.

#### **Part of University Structure:**

Usually 'Part of university's structure' model means that the park owns the land and leases it to the tenants' firms to cover RTP's operational expenses. Moreover, the park is established and managed by the university.

Some of the strategic models of RTPs under the university structure focus on leasing the spaces to tenants by aggressive clusters. Mainly such a model targets the technology entrepreneurs and start-ups; therefore, the focus is on conducting multiple events for them to enable their growth and collaborations with other parties and actors on-park.

Nevertheless, such a model focuses on technology transfer and the incubation function to increase the reference to the external environment. The proposed and improved version of the strategic model is the direction of the flow of university activities such as research, publications, innovations, processes, skills, and IPs technologies, which are conducted by the RTPs' primary actors, such as researcher, faculty members, students and postdocs.

**Company owned by the University:**

This is a unique model that has been observed in the KSA. Its strategic model is based on a holding company with independent subsidiaries; these are 1) Development company, 2) Knowledge company, and 3) Investment company. The role of the holding company is to provide strategic leadership, govern, provide the capabilities to its subsidiaries, and have a distinctiveness that should integrate all the elements of the strategic model.

Moreover, the park strategy is to enable the collaboration between the park, public and private sectors, other international RTPs, RTPs associations, and the banks. For example, the park's collaboration with the major industry players to build scientific and research centres on-park to tackle various industrial problems of the industrial problems and simultaneously boost the park and local growth.

**Government/Free Zone:**

The strategic model of government/free zones is based on the Triple-helix model in collaboration between the government, the industry, and the university, although the dominant engine of the collaboration activities and the decision-maker is the government, as the university and industry both report to the government. The private sectors' involvement is not effective as they are not willing to participate in the collaboration due to the dominance of the government. Such issues occur in some government-dominant entities in the Middle East, but this is not the case of the government/free zones models found in the Arabian Gulf, Turkey or Europe, where the private sectors are attracted to locate to those parks because of the tax exemptions and frequent feedback and improvement done by the parks' management teams.

**Company with Share Capital:**

Typically the strategic model of RTPs with company with share capital model concentrated on the improving the park's capabilities to provide tenants' firms on-park with the competitive advantages to increase their growth. Moreover, its strategic model enables the networking events for the sake of collaborative opportunities at local level among the various actors of the park to achieve the commercialisations goal.

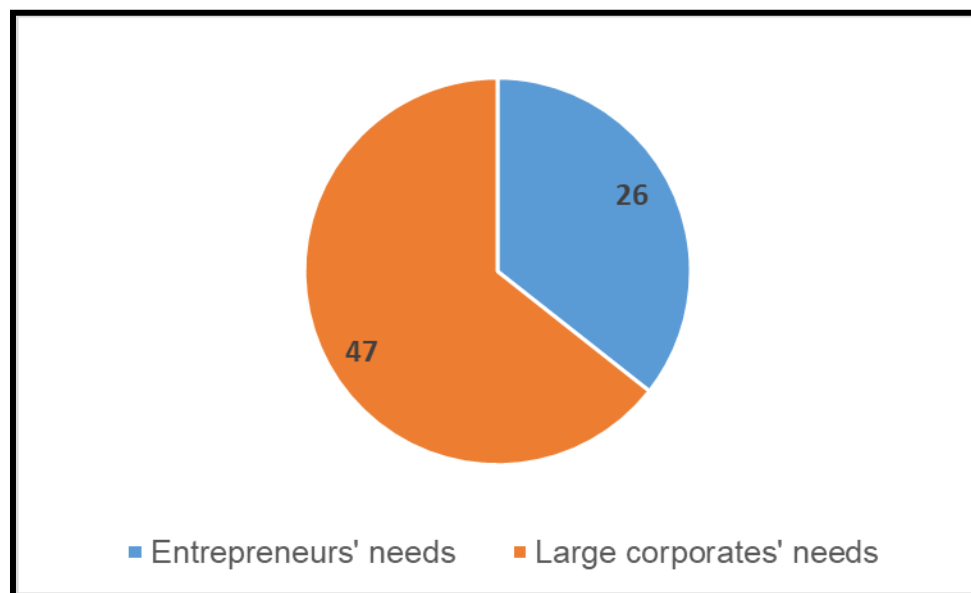
Furthermore, its main goals are 1) to govern, develop, operate and manage RTPs, 2) expand to reach globalisation level, and 3) acquisition of market leaders, and integrate talented resources to manage the park to reach to its ultimate goal of globalisation.



### 9.3. Qualitative Data Analysis of RTPs' Tenants' Firms' Directors

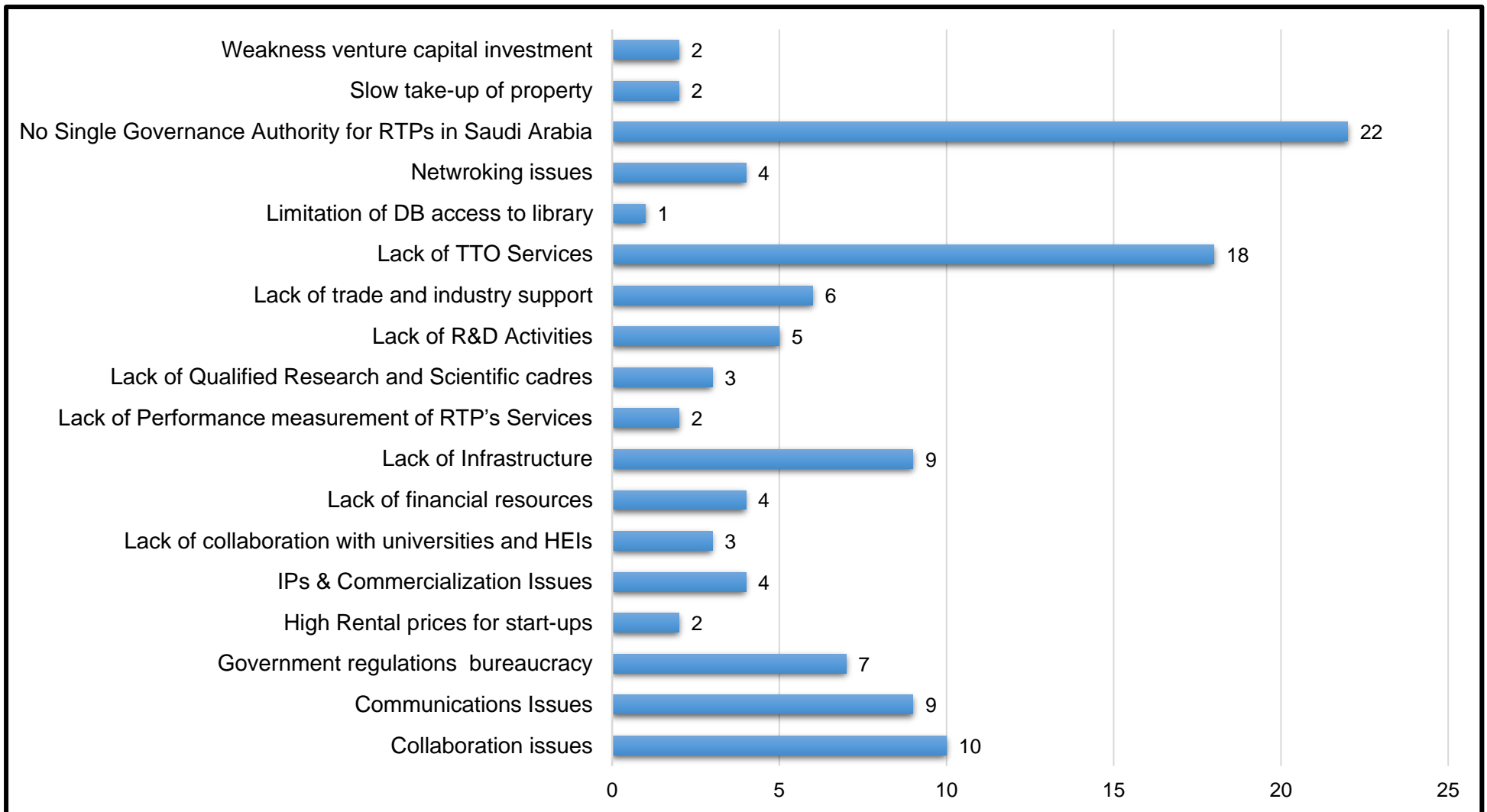
This section summarises the qualitative data analysis of all the tenants' firms located on-park that were interviewed during the study from different RTPs. Due to the different demands and expectations of the tenants' firms located on-park, the researcher categorised the tenants' firms into three groups: 1) the large Corporates, 2) the Start-ups and SMEs, 3) and the Entrepreneurs.

Figure 9. 12 below shows the needs of tenants' firms' located on-park from entrepreneurs and large-corporates from the RTPs in the KSA.



**Figure 9. 12: Tenants' Firms' Needs from RTPs in the KSA**

Figure 9.13 below illustrates the challenges of RTPs in the KSA from the view of tenants' firms by showing that the biggest challenge is that there is no single governance authority in the KSA.



**Figure 9. 13: Tenants' Firms' Needs from RTPs in the KSA**

### **9.3.1. The Attractions to locate on-Park**

This section summarises the factors that attracted the tenants' firms to locate on-park from the perspectives of the large-scale companies, SMEs, academic spin-offs, and entrepreneurs.

#### **9.3.1.1. The Attractions for Large-scale Tenants' Firms**

The first reason from the perspective of the large-scale companies is the interest to establish strong partnerships with the park and to invest and operate in the Middle East. Because the KSA represents the largest economy in this region, it is preferred among the others. One of the tenants was a strategic partner of the RTP's mission and vision since the establishment. *"The research parks only exist because of partnerships. At the end of the day it needs to be two ways dialogue."* [RTPKIEDT-DOWC-PG]

From the perspective of R&D facilities, they stated they want to leverage the talented human resources (students, researchers and academic members) and the facilities such as research centres and core labs provided by the park. From the 'live-work-play' perspective, the RTPs provide more attraction to the expatriates and the highly educated and talented local resources to relocate, live, and work in such an excellent living environment and community.

*"100% of tenants' firms' staff live on-park whether they are Saudi or non-Saudi, so the living environment is very attractive...Living environment for staff and amenities such as schools, accommodations, sport facilities, and the community."* [RTPKIEDT-DOWC-PG]

One of the giant chemical companies claimed that the most important factor to locate on RTP-KEIRTP is the networking, relationships and facilitation with the local customers that the park provides to the tenants' firms, particularly regarding equipment import and export. Surprisingly, the park management does not understand or recognise it as a value-added factor. *"The tenants are willing to pay higher rates to get the value-added for using the supply chain management system."* [RTPKIEDT-DOWC-PG]

The big-scale companies demand that the RTP invests in and develops the 'live-work-play' theme and has more amenities on-park for their employees.

### **9.3.1.2. The Attractions to Academic Spin-off and Entrepreneurs' Tenants**

Similarly, the medium companies are also attracted to invest and grow their technology businesses in the KSA, because it is the largest economy in the region. They want to leverage from the rapid growth of the RTPs in the kingdom and boost their companies' growth as well. Moreover, RTPKRTIED states that the park provides them with the flexibility to build their own labs and to leverage from the park's unique and rare facilities. The collaborations with the talented resources and technology entrepreneurs who work and interact with the park, which makes it easy to acquire start-up companies in the same technological field are also an attraction.

One of the medium tenant firms stated that the geographical environment of the Kingdom attracted the company to leverage the plethora of water desalination R&D activities happening on the shores of the Red Sea, which provides competitive advantage to the company to attract the local governmental bodies to commercialise the company's research which is developed inside the country. An additional reason was the technical and environmental safety regarding the handling of IPs by the RTPs, and the networking opportunities to meet potential customers and thus drive the growth of the SMEs.

## **9.3.2. The Collaboration with RTPs**

### **9.3.2.1. The Collaboration between the RTPs and the Large-Scale Tenants' Firms**

Most of the large-scale tenants' firms build specific technological labs on-park to facilitate the R&D activities for certain mega projects that meet the firms' strategic goals, and, in most of the cases they leverage the RTPs' facilities and labs. They work collaboratively with the RTPs on the innovation and technology projects that match both parties, and the mix and match of collaboration projects is done by the firms as they will search the RTPs'

faculty and researcher resources to identify those who are suitable to collaborate with and match their businesses.

Moreover, there are different methods to collaborate with RTPs: 1) Funding specific numbers of programmes and projects to collaborate with the RTPs. The payment here goes to the salaries of the post-doctoral fellowship team members and the firms demand that they manage the projects funded by them; yet the activities of the projects are conducted on RTPs' facilities. 2) Sponsoring Master and PhD students from the RTPs' associated university. 3) RTPs request to collaborate with the tenants' firms and leverage the know-how of their researchers by providing the RTPs' facilities and equipment without charging fees, so both parties benefit from the collaborations.

Conversely, frequently, the firms utilise the RTPs' equipment of the labs in projects-oriented for non-collaborative activities, so-called 'Transactions'. These happen more than the collaborative projects that require daily engagement between the firms' researchers and the RTPs' resources. The reason these 'Transactions' are happening more often than the collaborative projects is that they are easier to initiate and execute than the collaboration on projects and programmes. "The IP discussions for collaboration projects last from eight months to two years to reach to IP agreement." [RTPKIEDT-DOWC-PG]

The firms prefer the transactions as the collaboration projects with the RTPs take a long time due to legalities, technology transfer and IPs negotiations, as the RTPs refuse to adhere to the firms' IPs policy. This is also because some tenants' firms do not trust the NDAs; therefore, they avoid the collaborative projects. There is no need to sign NDAs unless the collaboration projects justify the involvement of patents' ownership.

*"The tenant's firm doesn't want RTP's researchers to work with other tenant's' firm's competitors on the same collaboration programme for a period of two years and to protect the firm's IP on this collaborative programme... So, trust should be there in the first place."* [RTPKIEDT-DOWC-PG]

Some of the firms believe trust should be raised between the tenants' firms and the RTPs to increase the number of collaborative projects in similar fields of technology; however, the reality is that the tenants' firms will avoid participating with the RTPs in collaboration

projects unless 1) the fields of technologies are different, which make the collaboration changes very low, or 2) the collaboration projects' fields of technologies of the project are comparable to the RTPs' technologies but the applications of the projects should be different from what the RTPs are working on.

The way that collaboration projects currently take place on-park exploits the capabilities of professors and the research centres, instead of matching the tenants' firms' businesses to the RTPs' resources and facilities.

#### **9.3.2.2. The Collaboration between the RTPs and Academic Spin-off and Entrepreneurs' Tenants**

From the SMEs' perspectives, the collaboration with the RTPs takes several forms, such as collaboration projects with water RTPs' research centre's resources to commercialise the technologies, and collaboration projects with RTPs' start-up companies and entrepreneurs who possess prominent prototypes to scale up or acquire them.

### **9.3.3. The Access to the RTPs' and Associated University's Services**

#### **9.3.3.1. The Access to the RTPs' and Associated University's Services from the Perspectives of the Large-Scale Tenants' Firms**

The master agreement between the tenants' firms and the RTPs makes access to the services provided by the RTPs and the associated university straightforward. The tenants' firms sometimes demand TTO services if the collaboration projects they are working on with the RTPs require patenting or IPs negotiations.

The park enhanced the access to the core labs services by introducing new technologies that enabled the staff of the tenants' firms to access core labs simply by using their badges.

### **9.3.3.2. The Access to the RTPs' and Associated University's Services from the Perspectives of Academic Spin-off and Entrepreneurs' Tenants**

The services are free of charge for the SMEs' tenants' firms for two years; after that they should either pay to rent the space or vacate the space for new tenants. The access to the core labs is very simple and smooth, since the RTP uses an online booking system, but the research centres need some improvement.

Regarding the RTPs with 'part of university's structure' governance model, the access to the business services such as human resources and government affairs are not allowed for the SMEs according to the policies as their companies do not fall under the university's structure. As the RTP's tenants' firms' affiliation manager said, they are responsible for this and the tenant said the tenant staff are doing the mix and match! This impedes the SMEs from focusing on the R&D activities and collaborative projects with the RTPs and overloads them with non-value-added administrative work, particularly in the RTPs in remote locations.

Nevertheless, the information technology department is not providing the SMEs' tenants' firms with simple services such as being able to connect to a printer, and others. During the analysis of the interviews, the researcher noticed that there is a conflict between them as the RTP's tenants' firms' affiliation manager answered that his team is responsible for matching and connecting the tenants with the faculty, students, and researchers from the university. However, the tenant said the tenant staff are doing the mix and match, which hinders the SMEs from focusing on the R&D activities and collaborative projects with the RTPs, and overloads them with non-value-added administrative work.

On the other side, the tenants' firms appreciated the electronic services provided by the local government. "The e-Governmental services provided by the Saudi government are very helpful". [RTPKIEDT-DOWC-PG]. Conversely, the SMEs' tenants' firms do not get the required quality services from the TTO, and even when the services are provided, they are of poor quality, particularly for the IP agreements service. Nevertheless, the TTO

services take a great deal of time; therefore, it is easier and less costly if the SMEs' tenants' firms can contract with the Technology Transfer Company from outside the park.

#### **9.3.4. The Impact of the RTPs' Strategic Model on the Performance of the Tenants' Firms**

##### **9.3.4.1. The Impact of the RTPs' Strategic Model on the Performance of the Large-Scale Tenants' Firms**

The large-scale tenants' firms strongly agreed that the RTPs' strategic model can have an impact on their performance. The reason can be related to the governance model of the RTPs; if the RTP is 'part of the university structure', for example, then it will not be able to predict the direction of the economy. Consequently, the tenants' firms might decide to relocate off-park and lose the access to the modern facilities and talented resources on-park. The governance model of RTPs strongly influences the tenants' firms and the economic development of the parks as well. Therefore, the tenants' firms are pursuing the RTPs to shift their strategic model to conduct more applied R&D activities. Currently, there are no local real economic development activities happening at RTP-KEIRTP because most leadership governing the RTPs comes with global experience, although that is needed as there must be alignment with Saudi Vision 2030, and across all the RTPs in the KSA, encouraging and promoting the local start-ups and entrepreneurial mentality first must be encouraged.

Overall, the RTPs should consider the large-scale tenants' firms when formulating their strategic model, as it will impact several aspects; for example, the RTPs' infrastructure expansion can dramatically impact the tenants' firms' daily operations and consequentially will impact the growth and performance. On the other hand, the strategic model adopted by RTPs should take into consideration the tenants' firms' policies and procedures and should involve representatives from the tenants' firms during critical decisions as these decisions impact the firms' existence on-park. They also facilitate the smooth operational and collaboration models of the tenants' firms located on-park, or at least consider exceptional case-by-case policy for these firms located on-park. Moreover,



the RTPs should create a dialogue and enhance the communications with the tenants' firms, and consider 'holistic' business processes to improve the overall tenants' firms' experience on-park. After these improvements, analysis of the different tenants' firms' operations models should be undertaken; the expectations and the demands of the tenants should be considered, prioritised and then aligned with and incorporated into the RTPs' strategic model. Additionally, the 'one-size-fit-all RTP' strategic model does not provide effective collaboration and operational models to the tenants' firms located on-park, as there are different groups of tenants' firms such as 1) Large corporates, 2) Academic spin-offs, 3) Start-up companies, and 4) Entrepreneurs. Therefore, adapting the RTPs' strategic model to match all the groups will increase the possibilities of the successful implementation of the park's strategy, and hence, improve the performance of the tenants' firms from all groups. As a result, that will ensure that the RTPs continue moving forward towards achieving the RTPs' vision.

*“For example: the large corporate services such as: TTO, Governmental affairs, and engineering services are not needed. On the other hand, the SMEs needed services are completely different from large multinational corporates.” [RTPT-DCRC-PG].*

### **9.3.5. The Collaboration between the RTPs' Associated University, Other Tenants' Firms located on-Park, and Entrepreneurs**

The large-scale tenants' firms collaborate among each other, but few large-scale tenants' firms collaborate with the start-ups and entrepreneurs located on-park in licensing and commercialisations projects. That is due to the lack of entrepreneurs in the same field of technology. Conversely, the SMEs' tenant's firms mentor the RTPs' internship students from different regions of the KSA, and internationally. On the other side, the tenants' firms collaborate with the associated university's faculty, researchers, and students by providing them with actual and real data to test the algorithms, and vice versa.

From the perspectives of the start-ups and entrepreneurs, they tried to approach the large-scale tenants' firms in a collaboration project in membrane technology, but was no interest from their side. Therefore, the start-ups and entrepreneurs took the initiative and established group-funded experience exchanges but there are no actual R&D

collaboration projects among the tenants' firms located on-park, and if there are, these take place on an ad-hoc basis. Even so, there is a lack of attention from the RTPs' management regarding communication which only happens quarterly, and the networking events, as these events happens twice a year only.

*“Currently the communications are happening on an ad-hoc basis when something happens; tenants need to be asked for services on a reactive basis.”* [RTPKIEDT- FVC-MS]

*“One of the founders had an idea on collaboration projects but due to the difficulties and bureaucracies of the collaboration process in specialised projects, the initiative has been discarded.”* [RTPKIEDT- SMDDC-FM]

### **9.3.6. The Shortcomings of the RTPs**

The RTP should align its strategic model and consider a greater mix of business and applied research-orientation directions instead of basic research. There is a crucial demand for a professional training centre to advance the competencies of the technicians and subject experts to build competency maps in specified fields of technologies, such as solar and energy, and in economic development areas. Currently, education and training in innovations are lacking, so commercialisation activities cannot be conducted. Nevertheless, RTPs cannot scale-up the technology start-ups programme as there is insufficient training available to address this.

From a different perspective, the tenant's firms are demanding to locate to RTPs with productive and accessible ecosystem environment so that transportation from one location to another is easy, particularly if they are handling sensitive chemical samples to collaborate with the RTP's associated university's researchers. Moreover, the amenities on-park should be scattered among the tenants' firms' buildings and not concentrated in one location, for ease of movement. In addition, more community services such as nanny services, housekeeping, supermarkets with low prices, and car maintenance centres are required, particularly in the RTPs located far away from the main city.

The communications with the RTPs' management are informal and very limited, and only happen following the request from the tenants' firms. During the establishment stage of the RTP, communication was happening more regularly and on a planned basis; however, it has reached a point where there is no single meeting conducted by the RTP management.

About the services shortfall, the tenants' firms cannot identify clearly what benefits they are gaining from the membership fees. Although the facilities services are charged to the tenants' firms, the RTP management reduced the services, as the management refused to recruit more technicians to operate the extra load requested by the tenants' firms. Conversely, the research papers' service and access to the library's database do not merit the membership fees that the tenants' firms have to pay.

The connection and networking with the local Saudi governmental authorities to collaborate on research projects are vital for the tenants' firms. Nevertheless, although the SMEs requested to collaborate with the large-scale tenants' firms, the RTPs' management has not taken any action, and even the mix and match service is not in place.

The non-Saudi SMEs owning the companies are facing difficulties in the service provided by the government, due to the restrictions in the Saudi regulations, such as dealing with the Ministry of Labour and the Ministry of Commerce. Therefore, all the SMEs' tenants' firms place high demand on the RTPs to help in governmental services.

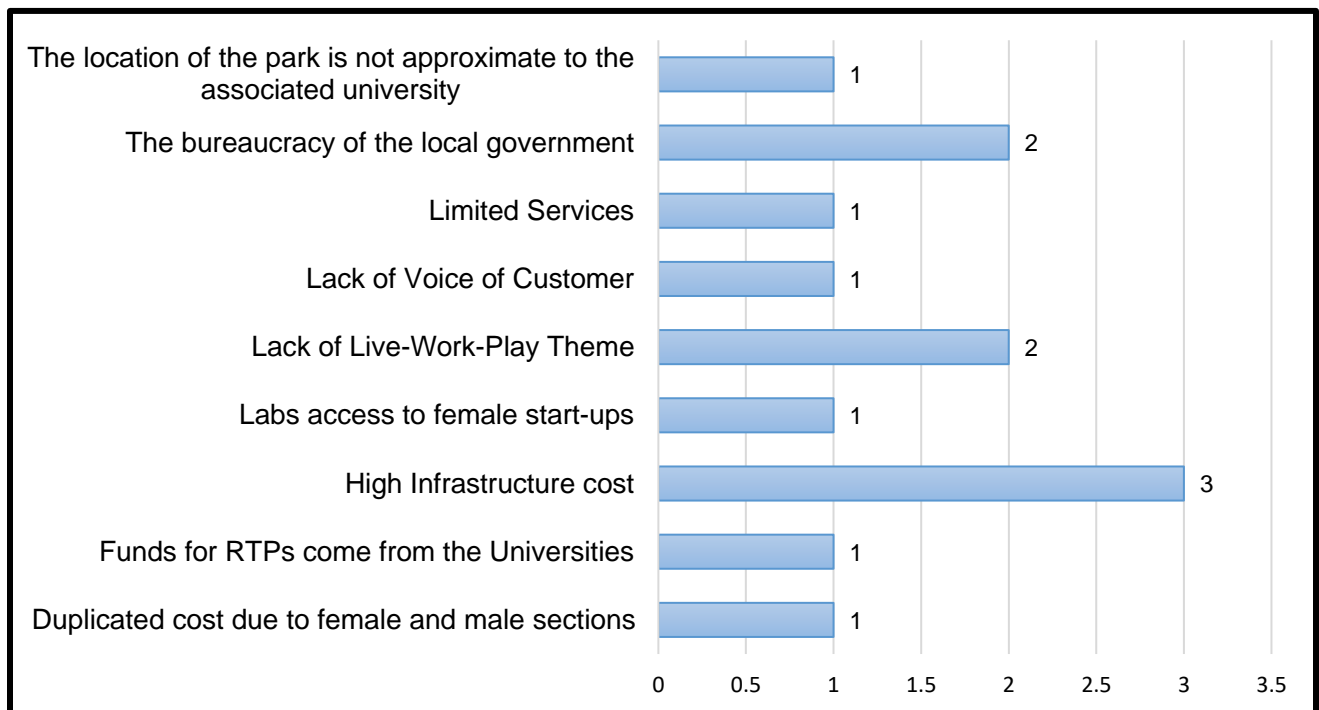
*“Liaison office for small enterprise (such as a government agency) to facilitate with the governmental authorities.” [RTPKIEDT- FVC-MS]*

The ecosystem of the RTP should be integrated with the community not only in the infrastructure, but in the policies and procedures as well. Also, the term 'tenants' should be changed to RTP's Start-ups. Conversely, the academic spin-offs should have special treatment as they are still teaching at the associated university. The housing services should accommodate the staff of the start-up's companies not just the founders. Additionally, the RTP should make the transportation available to the start-ups as well. Many services of the RTP are in high demand such as legal advisor, financial advisor, and marketing experts. There is a great need for the start-ups to access categorisations

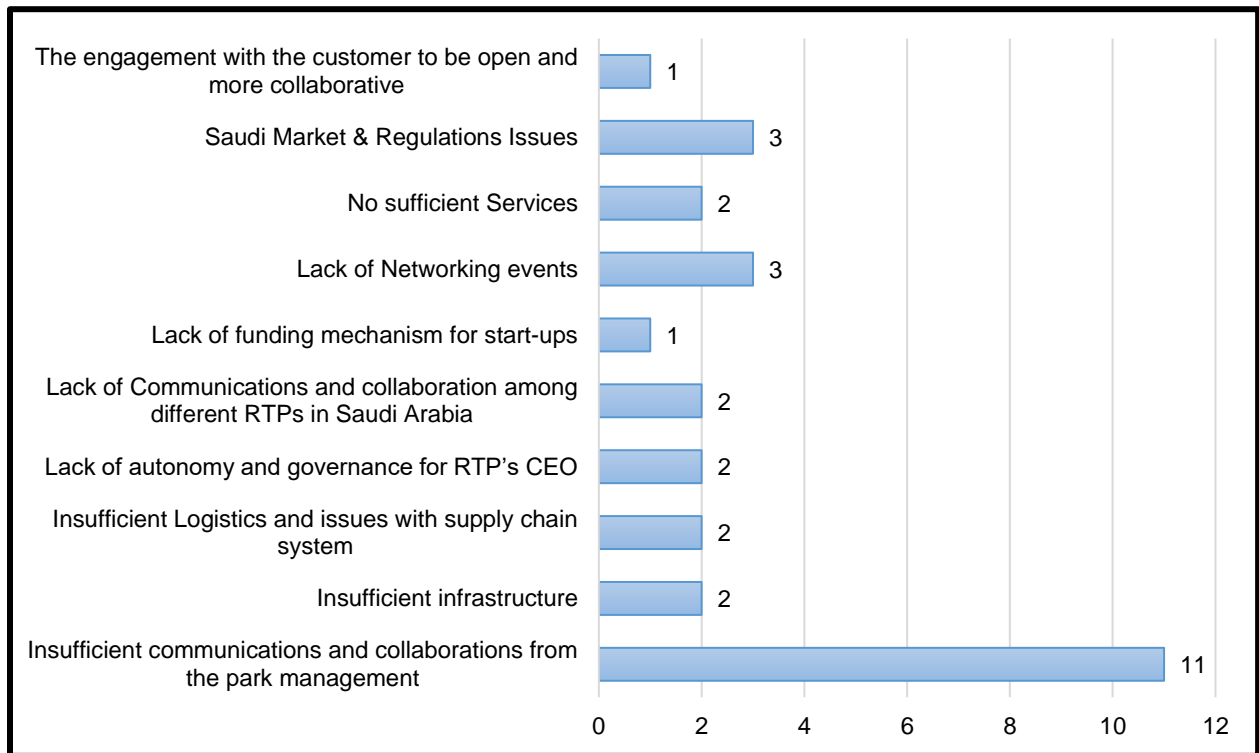
of the start-ups, such as large-scale, other, SMEs' companies, and entrepreneurs. This information on all the required materials in the research and where to find them in the KSA could be held in a database. The tenants' firms also requested to have more green walking areas to connect the park to the campus, and they commented that the rental prices of the spaces are very high for the start-up.

The lack of collaboration between the three groups of the tenants' firms among the RTP – large-scale corporates, start-ups, academic spin-offs and entrepreneurs – is one of the major shortfalls on-park, as all the tenants decided to re-locate on-park because of the potential for collaboration. Therefore, the RTP's management should swiftly facilitate and initiate collaboration among the different groups of the tenants' firms. There is a huge need to design and build standard labs and facilities to enable the RTPs to accommodate the tenants' firms and start-ups, aligned with the RTP's field of technological themes.

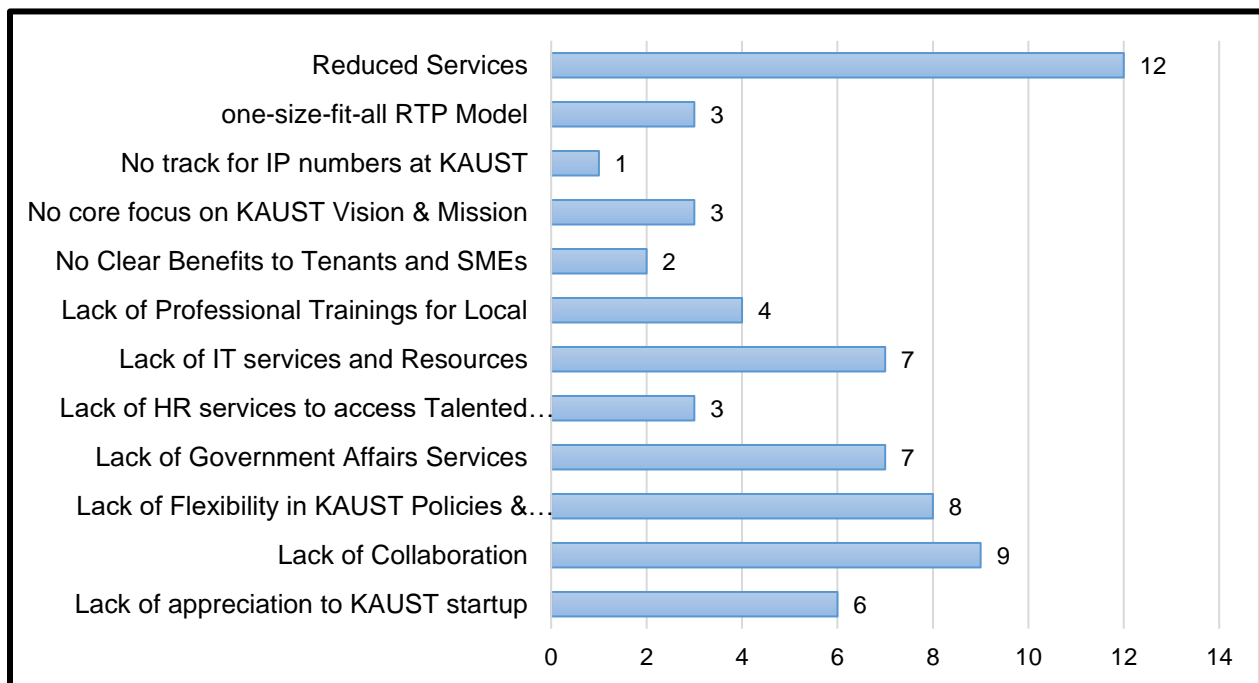
Figures 9.14 to 9.16 below summarise the challenges of the three RTPs' case studies from the points of view of the tenants' firms.



**Figure 9. 14: Challenges of RTPMVC from Tenants' Firms' Viewpoints**



**Figure 9. 15: Challenges of RTPDVTC from Tenants' Firms' Viewpoints**



## **Figure 9. 16: Challenges of RTPKIED from Tenants' Firms' Viewpoints**

### **9.4. Qualitative Data Analysis of Saudi's Policymakers**

This section presents the holistic perspectives from the Saudi's policymakers on the RTP's governance model, performance and growth as it impacts the country. It also demonstrates how the RTP's governance model can be supported by the policymakers and drives the economic impact of the country. The policymakers highlighted the challenges of RTPs' governance in the KSA and provided recommendations on how different governmental authorities can contribute to the success of the RTPs' governance, performance, and growth that directly relate to the realisation of Saudi Vision 2030, since the RTPs' governance, performance, and growth are considered some of the main pillars in the Saudi Vision 2030. The frameworks and strategies provided by the policymakers are debated in detail in the last section.

#### **9.4.1. The Challenges of RTPs' Governance in Saudi Arabia from the Perspectives of Policymakers**

Policymaker1 [PM1-MEP-IB] stated that the role of RTPs' governance authority in the KSA is theoretical only, as the governmental authority responsible for governance of technological areas is MODON. According to the MODON website, "*MODON is also responsible for creating the ideal environment for growth and development of technology zones in the Kingdom of Saudi Arabia*" (Saudi Industrial Property Authority Website, 2017). However, MODON is not yet active in providing the country with programmes to regulate and govern the RTPs, as the majority of its activities are concentrated on the industrial cities. Another major challenge of RTPs' governance in the KSA is that the strategy of the R&D and technology is formulated by a different governmental department. Therefore, the RTPs' strategic visionary roadmap and its governance are dispersed between two different governmental authorities. On the other hand, the policymaker's ministry is responsible for the five years' planning, alignment to the Saudi Vision 2030, and the National Transformation Plan 2020.

Regarding the performance measurement and management of the RTPs, there is no proper framework in place as there is no central governmental body in the KSA to monitor

the RTPs' performance or regulate their policies and activities due to lack of R&D activities, and lack of identifying of NTBFs. Moreover, the existing RTPs' governance model 'owned by universities' does not empower the innovative researchers to commercialise the technology to products, services or processes. Nevertheless, the non-Saudi researchers and tech-entrepreneurs still face some challenges when they want to establish their start-ups. He stated that, *"Currently, most of the RTPs in Saudi are doing real estate activities rather than conducting actual R&D, commercialisation, and licensing activities except for RTPKEI."*

Policymaker 2 [PM-NPC-HM] is considering a re-organisational structure to include RTPs and Technology Valleys in their strategic visionary roadmap, since there are gaps and several actors and players in the field of RTPs; therefore, it is important that the KSA urgent addresses this need and aligns the efforts of the authorities concerned to serve the goal of RTPs' governance.

Policymaker 3 [PM-NPC-HM] stated that the authority responsible for RTPs' governance is MODON. The challenge from the perspective of performance measurement is that even though the authority can conduct performance measurement on the outcomes of research projects, commercialisations, technology and knowledge transfer of RTPs, the authority has not yet been asked to start providing the services of performance measurement to the RTPs, due to the lack of readiness of the RTPs in the KSA. The challenge to the authority to provide accurate and comprehensive measures is that the authority is measuring the performance of only one RTP in the KSA, and even that authority is not associated with a university. Nevertheless, the authority is waiting for the orders to activate the holistic performance measurement of RTPs from all angles such as evaluating the RTPs' performances, and measuring the economic and social impact of RTPs on the KSA.

#### **9.4.2. Policymakers' Perspectives and Recommendations towards RTPs' Governance as part of Saudi Vision 2030**

Policymaker 1 [PM-MEP-IB] stated that the policymaker's ministry is responsible for the five-year planning and it is the main body of Saudi Vision 2030, and the national transformation plan 2020. Therefore, the ministry of policymaker 1 initiated a study on forming a governmental authority or ministry for the scientific research to be responsible all kind of the governance, regulations, policies, monitoring of the RTPs, technology-based entrepreneurship, and the commercialisation of the research and technology outputs and licensees. The study is yet to be implemented. The study might include providing services to RTPs. He claimed that RTPs and R&D/technology should be measured using input, output, and economical impact to influence the economic status of the country.

Policymaker 2 [PM-MON-AS]: The relevance of Policymaker 2 to the RTPs' governance is that the policymaker 2 authority provides consultation services such as online and call centre to the entrepreneurs on the area of Technology & Knowledge Transfer. Additionally, the authority provides services to more than 200 start-ups, including mentoring, support and networking. Moreover, the authority regulates the policies related to the licensing, the accelerators, incubators, the governance, the incentives, infrastructure for co-work spaces around the Kingdom, anchor tenants, and entrepreneurial events.

Additionally, the authority collaborates with the investors for the sake of entrepreneurs' funding, promotes and advances the technology & knowledge transfer, and exchanges and disseminates awareness about and advice for entrepreneurship activities. In addition, it manages the performance measurement of KPIs for start-ups and entrepreneurs. With all that mentioned, the authority is considering becoming the official government authority responsible for the governance, funding, controlling and setting the criteria of RTPs in the KSA.

Policymaker 3 [PM-NPC-HM]: The policymaker's authority is responsible for performance measurement of the economic impact of other entrepreneurial authorities to measure their



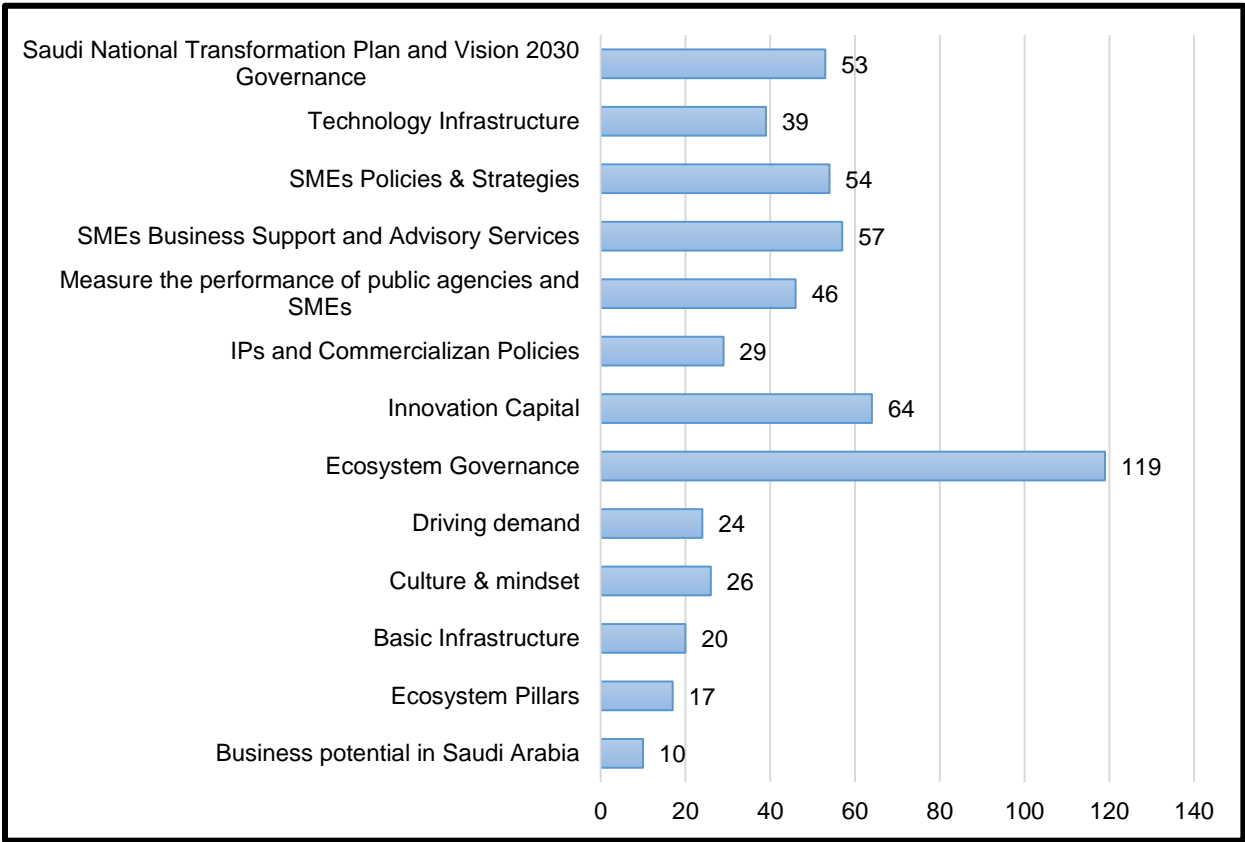
economic impact on the increase of Saudi jobs and other major KPIs, and in turn send the reports to the job creation committee and other interested governmental authorities. The authority considers whether to include the performance measurements of all RTPs in the KSA in its strategic visionary roadmap to provide accurate and transparent performance measurement when measuring the economic impact of RTPs, entrepreneurship, commercialisation, and technology and knowledge transfer in the KSA. The contribution and recommendations of the authority to the realisations of the Saudi Vision 2030 in regards to RTPs can be conducted by *“performance measurement of RTPs and its economic impact on KSA, provide a national portal for performance measurement, collect customers’ feedback and listen to the voice of the customers for any enterprise to enhance the experience of RTPs’ tenants’ firms, provide and conduct performance measurements training, publish official publications to the public, and cross-cutting initiatives for RTPs... Conduct workshops with the authority’s partners to identify the suitable measurements for each sector, such as health KPIs, Technology, waste management, etc.”* [PM-NPC-HM]

Policymaker 4 [PM-JH-DCNC] stated that less governance is happening at a state level, due to the indirect innovation process; therefore, there is limited authority and regulatory influence from the state level on the RTPs. However, the Department of Commerce runs projects such as simplifying the research projects’ outcomes to the audience, governance of the regulations and looking into the whole ecosystem such as helping entrepreneurs with funding grants and federal grants, and promoting the entrepreneurial and commercialisation activities by collaborating with many partners from RTPs, universities, industry, and governmental agencies. Additionally, it provides the companies, communities and universities access to the state’s KPIs to enable them to make the right decisions and plan for any future risks.

Moreover, the Department of Commerce is working extensively with TTO under several universities to help develop policies to support and facilitate the operation for entrepreneurs. The Department manages the creation of the policies engaging the industry, community, entrepreneurs, the universities, TTOs, and the government by

conducting surveys directed to university, investors and entrepreneurs to seek solutions from the participants. One of the surveys “to encourage rural areas to work on creation of ecosystems” successfully resulted in more than 60 proposed solutions, filtered down to six solutions. From these, the final top three solutions were selected and implemented. Most of the remaining solutions are subject to modifications in order to quality to become initiatives on the state level.

Figure 9.17 illustrates the policymakers’ perspectives and recommendations towards RTPs’ governance as part of Saudi Vision 2030.



**Figure 9. 17: The policymakers’ perspectives and recommendations towards RTPs’ governance as part of Saudi Vision 2030**

### **9.5. Data Analysis of RTPs' Associations**

The role of RTPs' associations are non-profit organisations formed to promote research institute/universities-industry-government relations, foster innovation, and facilitate the transfer of technology from such institutions to the private and public sectors. It is an enabler and a driver of growth for the global networks of RTPs to attain internationalisation and operational effectiveness. These associations organise an active network of RTPs' professionals to develop new business opportunities among government, companies, universities and research institutes to promote the development and growth of existing and emerging RTPs and other areas of innovation, and increase the international discernibility of RTPs.

As per RTPA-MA, to create an economic impact, a group must be formed to combine the stakeholder RTPs to create a structure in each area of the RTP such as economic development, entrepreneurship, academia and research. The most important aspect is to have a governance authority to establish, maintain and regulate, and enter partnerships with real-estate developers to provide co-working space, consistent networking platforms to engage with, and access to universities and government resources. Usually, the industry leads when start-ups become the drivers of the economic development; the government will then invite stakeholders who have ideas to contribute. Thus, the RTPs' governance and management teams should be democratic, and welcome what others can provide and the added value they can bring. The success formula is that the autonomy should be driving entrepreneurial culture. In addition, the main challenge for most RTPs is to keep the strategic visionary documentary as simple as possible, with key three goals. The RTPs' leadership teams should benefit from the lessons learnt and the success factors of other RTPs with similar benchmarking criteria in order to drive their parks' and tenants' firms to a successful endeavour. For example, the Research Triangle Park success story started with only gathering of, and agreement among, stakeholders who share the same vision. The leaders of the universities and private sectors and the government came together to reinvent the region's future; this started with the government providing the infrastructure, the universities investing in recruitment of highly qualified personnel and faculty, and the private sectors using their networks to recruit

companies in North Carolina to invest in the state. The Research Triangle Park has one goal initiated by the RTP leadership team asking questions such as how and what they can bring to contribution to the state's economic development. Thus, they created a foundation and vision, setting aside egos, and that ignited the fuse that is serving the people to grow and develop.

There are many forms of RTP governance model. It is necessary in this case to distinguish between the *private* company with share capital and the *public* company with share capital, because *"A public company with share capital is governed by the same laws as any private company operating in the market; however, the regional and local government hold over 50% of the ownership of public companies"*. [RTPA-LS]. Moreover, the public company with share capital can also be classified as a consortium of different parties involved in a form of triple-helix model where the government-industry-university are governing the RTP.

Regarding RTPs' funding sources, most of the funding at the early development stages of the RTP lifecycle comes from the government to foster the parks, and build the initial ecosystem, infrastructure, facilities and utilities that are crucial for the parks' major operations and setup. At then later stages, the RTPs occasionally raise funds from the private sector to improve the park's capabilities and attract the talented resources and tenants' firms to locate on-park. Raising funds from the private sectors is increasing among several RTPs across the world.

RTPA-LS values the importance of the role of RTPs' performance measurement and management in boosting the growth and development of RTPs; therefore the RTPs' Association team is undergoing a study of a conversion to a standardised performance measurement and management methodology that can be implemented in different types of RTPs across the world. By following such methodology, the RTPs can apply various criteria, but the below criteria can form the standard RTPs' KPIs:

- **Inner indicators:** measuring the performance of the RTPs and how they are progressing in reaching the set goals. These may refer to number of tenants per year, employees in the park, overall turnover of companies located in park,

number of patents, number of licensed and commercialised technologies, and a long list of other possible indicators.

- **Exterior KPIs:** these are basically benchmarking and measuring the growth and performance of the RTP against the external indicators from the private sector and economic cities that have similarities to the other industrial or economic areas outside the parks, such as benchmarking the RTP to a nearby or neighbourhood city, or industrial areas, among others. The key variance that makes it somewhat difficult to benchmark the performance measurement of RTPs to external indicators of similar bodies is the very special nature of the RTP's intangible services and qualitative KPIs. Despite the difficulty in measuring these qualitative KPIs of the RTP, they are vital in measuring the real values provided by the RTP that impact and influence the RTP's growth and performance. Therefore, the RTP Association team stated that: *"We are now trying to understand better what the right methodologies are to be able to assess them in a credible way."* [RTPA-LS]

The RTPs' Associate [RTPA-LS] stated that they first need to differentiate between the ownership and the governance structure of the RTP, as the ownership refers to the organisation, university, or governmental authority that owns the land, sites, infrastructure and buildings. Therefore, here they are referring to the governance and management models regardless of the ownership of the RTP, as ownership can be private, public or consortium. The RTPs' Associate [RTPA-LS] agrees that there is a correlation between the RTP's governance model and the RTP's growth rate and performance due to three main reasons as listed below:

- The bureaucracy of some governance models influences the RTP's decision-making processes, which in turn creates bottleneck in rapid response to the changing demands of the tenants' firms' located on-park and the global economic ambience.
- The governance and management model of such RTPs are operated by highly-qualified professionals such as government officials, academic researchers, or

professors. However, they lack the deep understanding of the industrial and economic development; therefore they are less effective in building effective negotiation and collaborations with the businesses and the entrepreneurs.

- The main reason for the success of the RTP's growth is the profiles of the management team, or the members of RTP's board of directors, and the park's director or CEO. Therefore, the autonomy of the RTP's CEO is what helps boost the RTPs.

There is no 'best practice' that can be applied to all RTPs' strategic models. *"To me, best practice is just a good practice without modesty"*. [RTPA-JM]. So, this is considered a tricky question, due to the diversity of RTPs' governance models and excessive combinations of strategic models in the RTP industry. Therefore, to have standard best practices for RTPs' strategic model, first the form of strategic model must be determined, and consideration given to the surrounding context of the RTP. Second, it is important to find RTPs with strategic comparable models. Third, the points of similarity need to be compared, after which benchmarking can take place to elevate the RTP's strategic model to reach its goal. The RTPs' Association promotes the best practices of the RTPs by inspiring its members to submit these practices to the Solutions page on the RTPs' Association website.

## **9.6. Conclusion**

This chapter is the longest chapter in the thesis as it combined the various views of the RTPs' stakeholders from different angles and contributes to Chapter 10 to present the findings of the research project.

The qualitative analyses conducted in this chapter identified significant features of the three RTPs' cases and the key factors impacting the RTPs' strategic visionary management model, such as:

- RTP's goals and backgrounds
- Technology fields of the RTPs

- Governance models of the RTPs
- Funding sources of the RTPs; services provided by the RTPs
- Performance measurements and growth rate of the RTPs, relationship between the parks' governance model and the park's growth rate from a qualitative perspective according to RTPs' CEOs' opinions and their perspectives on governance definition
- Benefits that can be gained from changing the RTP's governance
- Model in case of "Part of the university's structure"
- Problems of the solo-governance model of RTP
- The various strategic and management models of RTPs
- Qualitative data analysis of RTPs' tenants' firms' directors
- The attractions to locate on-park from the perspectives of large corporates
- Academic spin-off and entrepreneurs' tenants
- The collaboration with RTPs: between the RTPs and the Large-Scale Tenants' Firms, between the RTPs and academic spin-off and entrepreneurs' tenants, collaboration between the RTPs' associated universities, other tenants' firms located on-park, and entrepreneurs. Shortcomings of the RTPs from perspectives of tenants' firms
- Challenges to RTPs' governance in the KSA from the perspectives of policymakers
- Policymakers' perspectives and recommendations towards RTPs' governance as part of Saudi Vision 2030
- Data analysis of RTPs' Associations
- Access to the RTPs' and associated University's Services  
Impact of the RTPs' Strategic Model on the performance of the tenants' firms





## **CHAPTER 10: DATA FINDINGS AND CONCLUSIONS**

### **10.1. Introduction**

Drawing conclusions based on responses to the research questions was informed from the following sources:

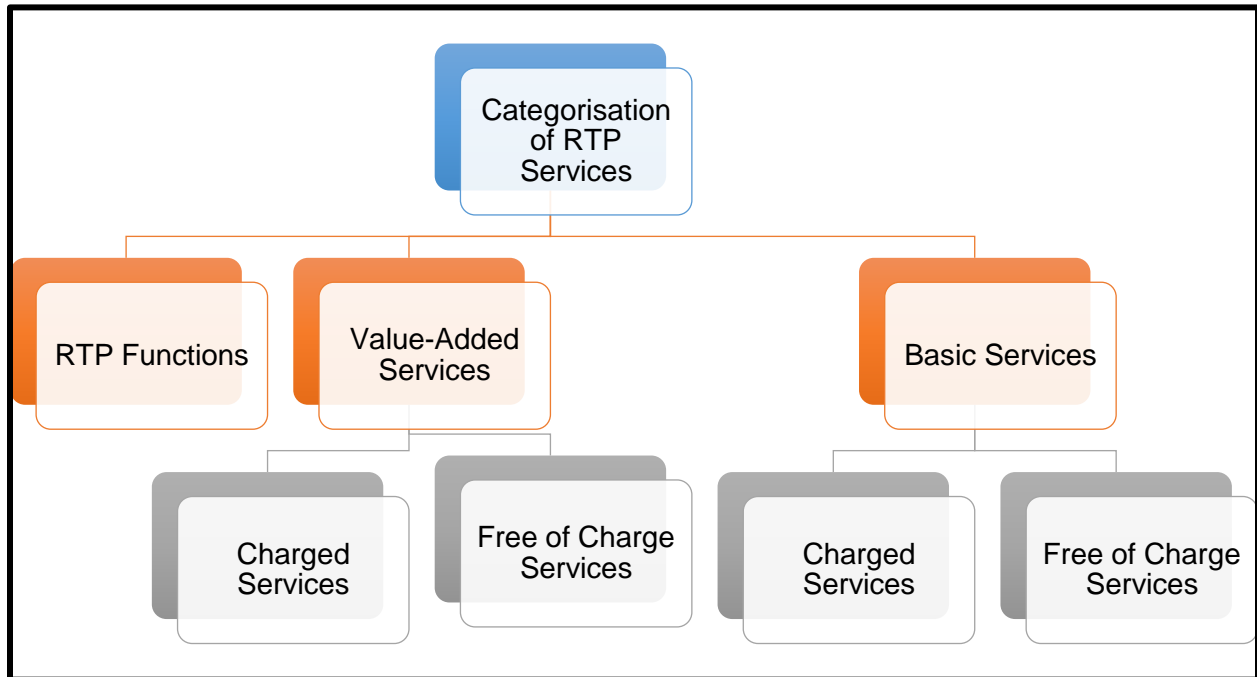
- Literature reviews
- RTPs' CEOs' interviews
- Case studies observations
- Surveys with RTPs' CEOs
- Survey with tenants' firms located on-park
- Documents analysis from three case study RTPs
- Benchmarking against other RTPs
- Field notes of the observations from AURP and IASP conferences attended by RTPs and major stakeholders
- Interviews with the policymakers in the field of RTPs from the Saudi and USA Governments
- Interviews with international RTPs' associations such as IASP and AURP.

The chapter begins by mapping the RTP governance model to the RTP growth rate's performance measures and the opinions of the RTP's stakeholders regarding the relationship between the RTP governance model and the park's growth rate. Therefore, it focuses on data findings and drawing conclusions for the main research questions. The discussion is constructed according to the main categories identified during the qualitative and quantitative data analyses which are presented in Chapter 9.

### **10.2. RTP Services Categories**

According to the observations and interviews conducted with the RTP's directors and RTP's tenants' firms' located on-park, the majority of the parks services are categorised

into: 1) RTP Core Functions, 2) Basic Services, and 3) Value-Added Services. Figure 10.2 below demonstrates the RTP service types.

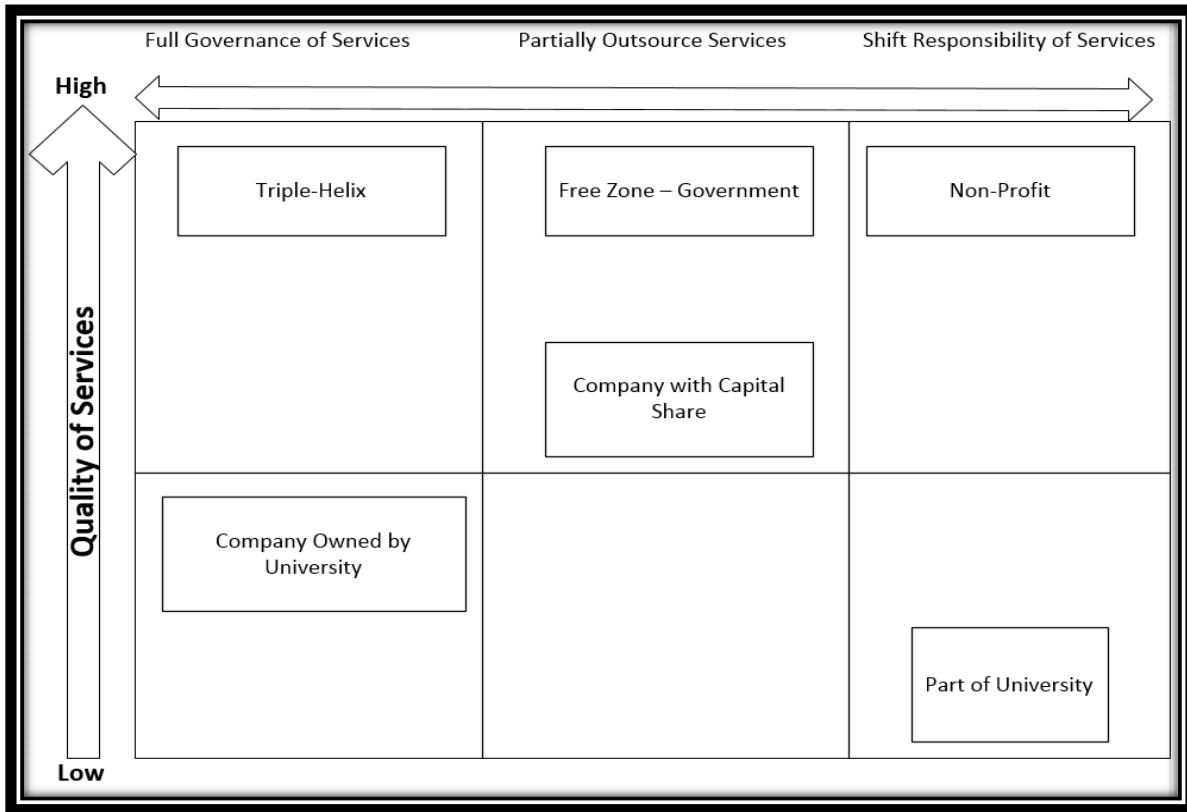


**Figure 10. 1: RTP Services Categories**

### **10.2.1 Governance of Quality of Services Provided to Tenants' Firms in RTPs based on RTP's Governance Model**

The relationship between the RTP's services and the RTP's quality of governance of the services provided to the tenants' firms' located on-park based on the RTP's governance model is illustrated by Figure 10.2 below, revealed in three RTP modes:

- 1) The RTP sets the governance of the quality of services provided to the tenants' firms, such as controlling and monitoring of the quality of services where the services are provided through the park itself.
- 2) The RTP partially outsources the services provided to the tenants' firms; thus the governance of the quality of services is shared between the RTP management and the service providers.
- 3) The RTP management shifts the responsibilities of the governance of the services provided to the tenants' firms to a third party of service providers.



**Figure 10. 2: Governance of Quality of Services Provided to Tenants’ Firms in RTPs based on RTP’s Governance Model**

Figure 10.3 below shows that the level of quality of services provided to tenants’ firms depends on the governance model. The data findings demonstrated that the level of quality of services increased when the governance of services falls under the responsibilities of the RTP directly, which can be seen significantly in the “Triple-helix” RTP model. On the other side, the level of quality of services decreased to a lower degree when the governance of services is governed by the RTP with the “Company owned by a university” model. That is because the overall governance of the RTP is not stable as it relies on the university’s management of and level of authority over the RTP.

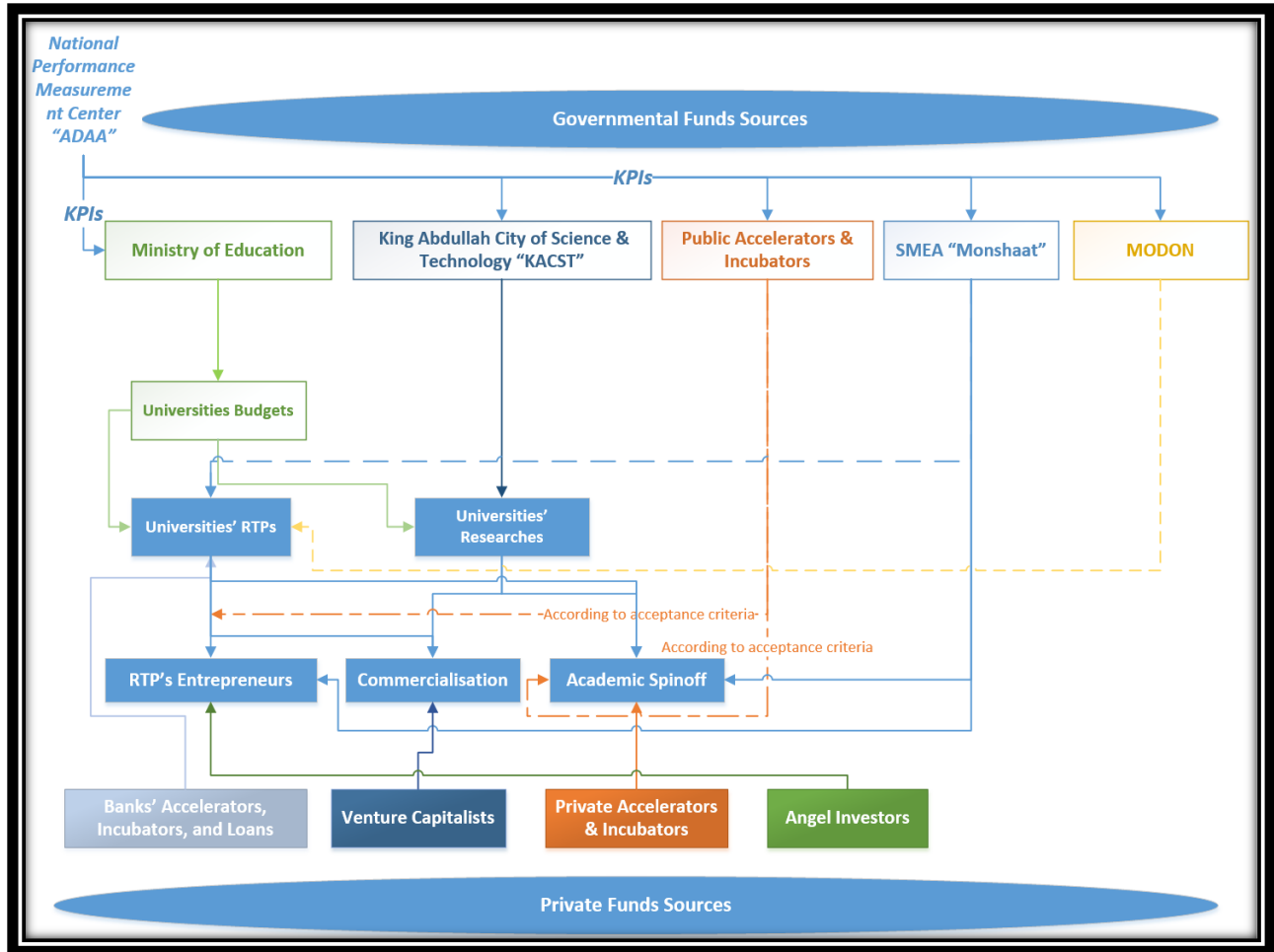
Conversely, the level of quality of services is raised to a higher degree when the governance of services is shared between the RTP and outsourced services providers,

which can be particularly seen in the RTP models of “Free zones” and “Company with capital share”. The explanation of the high-quality services occurred due to the competitiveness and attractiveness among the national RTPs and increasing the revenue customer satisfaction for the companies with capital share.

Nevertheless, it makes perfect sense that the level of quality of services is raised to a higher degree when “Non-profit” RTPs shifted the responsibilities of governance of services to third-party service providers and encouraged real-estate developers and companies to share the success collaboratively with the stakeholders. The goal of “Non-profit” RTPs is to create economic impact on the society and the goal of the service providers is to generate revenue and expand their business; therefore they share the same vision and goals. On the other side, the level of quality of services decreased to a lower degree when the RTPs with “Part of the university” governance model shifted the responsibilities of governance of services to third-party service providers. That is because the overall governance of the RTP is considered to be a department under the university and the RTP’s governance and management are significantly dependent on the university’s governance.

### **10.3. RTP Proposed Funding Model for RTPs in the KSA**

The majority of the RTPs’ funds go to 1) Collaborative research, 2) Infrastructure and RTP expansion, 3) Start-ups Seed-Fund, and 4) Community outreach activities.



**Figure 10. 3: Funding Sources of RTPs in Saudi Arabia**

The major funding of the RTPs' operations and capital budgets in the KSA come from governmental and private sectors. Regarding the governmental sectors, the major and primary funds come from the Ministry of Education to each university and cascade down to the universities' RTPs. The process is that the university's leadership allocates the funds to different university's departments and then allocates the RTP's budget afterwards. Therefore, the university's departmental funds take priority over the RTP's fund. The RTP's funds are then distributed to the 1) RTP's entrepreneurs, 2), RTP's Academic Spin-offs, and 3) RTP's commercialisation activities.

Additional funds come from KACST, which is considered the primary funder for researchers in the KSA. These funds go to the university's researchers and cascade down to the RTP's commercialisation activities and academic spin-offs.

Moreover, SMEA does not provide the RTPs directly with funds but it supports the RTP's entrepreneurs and academic spin-offs with funds through funded programmes, training, and logistics support. In some cases it provides financial funds through conducting hackathons, start-ups and entrepreneurial competitions and the funds provided are based on acceptance and selected criteria approved by the judges.

Likewise, there are financial and support funds provided to the RTP's entrepreneurs and academic spin-offs through the public accelerators and incubator programmes supported by the various governmental sectors and open for all entrepreneurs, but the programmes are based on acceptance and selected criteria.

The final and most important funding source for all technology zones and RTPs in the KSA should come from the MODON authority, which is responsible for governance of these zones and RTPs from operational and strategical perspectives. However, MODON has not yet activated its strategic management plan for governing the RTPs in the KSA and streamlining their activities. Its major focus is on executing the strategy of the industrial zones only. Additionally, KSA established SMEA ([www.monshaat.gov.sa](http://www.monshaat.gov.sa), 2019) to regulate the entrepreneurship and Saudi Venture Capital Company ([svc.com.sa](http://svc.com.sa), 2019) to provide venture capital funds to entrepreneurs.

On the other side, the private sectors are major contributors to the funding of the RTPs, and the major and primary funds comes from private incubators and accelerators, which are open for all entrepreneurs, but based on acceptance and selected criteria. This is the same as the bank's incubator and accelerator, in addition to newly designed loans programmes for entrepreneurs in collaboration with the governmental sectors.

Funding sources from venture capitalists and Angel investors are still emerging, so remain lacking in the KSA, and need to be improved by issuing new regulations and policies to regulate them. This is one of the main sources of the failure of technology start-ups according to the interviews with the various stakeholders such as entrepreneurs,

academic spin-offs, RTPs' directors from RTPs in the three case studies, and policymakers in the KSA.

Mainly, the governance of funds for RTPs applies to funds used for 1) construction, infrastructure, and expansion of the park, 2) research and commercialisation activities, 3) start-up funding, and 4) outreach activities and awareness of entrepreneurial ecosystem.

#### 10.4. The Impact of University's Strategy on the RTP's Strategy and Performance

Figure 10.4 below illustrates the main codes derived from the qualitative analysis of the RTP's vision realisation, which incorporated many aspects of the RTP's strategy and governance models.



**Figure 10. 4: RTP Vision Realisation**

The impact of the university's strategy on the RTP's strategy can happen in any RTP with any governance model; however, it is higher when the governance model's type is 1) a RTP's under university's structure, 2) a company owned by a university, and 3) when the university has a non-profit foundation RTP.

The closer the linkage between the universities with RTPs, the highly impacted RTP's strategy with the associated university's strategy, since the RTP's strategy is dependent

on the university's strategy; that is, a RTP under university's structure will be highly impacted by the university's strategy since it is considered as one of the departments governed by the university. Conversely, the degree of the university's strategy varies with the non-profit RTP's strategy as the RTP's governance consists of multiple stakeholders. The researcher concentrated on the RTPs of the governance models directly governed by the university such as: 1) RTP under university's structure, 2) RTP in the form of a company owned and governed by a university, 3) and RTP in a form of a foundation governed by a university. Although there are some non-profit RTPs which are not governed by the university, in Table 10.4, the researcher focuses on the RTP governed by a university.

Table 29 below illustrates the impact of the university's strategy on the RTP's strategy and performance from various strategic aspects, such as globalisation, benchmarking on local, regional and international aspects, the degree of collaboration and partnerships, the impact on the ecosystem, the level of entrepreneurial culture, funding sources, expansion and infrastructure. Other strategic aspects include the complexity of knowledge transfer and confidentiality in research in particular, sustainability level, performance measurements, attraction and value propositions, changes in governance and management model, services to the tenants' firms, and stakeholders.



**Table 24: The Impact of University’s Strategy on the RTP’s Strategy and Performance**

	<i>Strategic Perspectives</i>									
<b>RTP Governance Model</b>	<i>Quality of tenants' firms' services</i>	<i>Value proposition /Attraction to tenants' firms</i>	<i>Commercialisation</i>	<i>Funding sources</i>	<i>Globalisation</i>	<i>Stakeholders</i>	<i>Financial performance</i>	<i>Complexity of changes in governance /management models</i>	<i>Complexity of research confidentiality</i>	<i>Entrepreneurs</i>
<b>Triple-helix</b>	↑	↑	↑	↑	↑	↑	↑	↓	↓	↑
<b>Non-profit</b>	↑	↑	↑	↑	↑	↑	↑	↓	↓	↑
<b>Company owned by university</b>	↓	↓	↓	↓	↑	↑	↑	↓	↓	↑
<b>Under university structure</b>	↓	↓	↓	↓	↓	↓	↓	↑	↑	↑

As demonstrated in the above figure, a university's strategy impacts each strategic perspective of the RTP's strategy based on the governance model type of the RTP. Each RTP governance model is compared against the below strategic perspectives:

#### **10.4.1. Financial Performance**

Financial performance tends to be strategically important for 'Non-Profits' due to the crucial mandate to monitor the financial aspects of the funds provided by the stakeholders. Likewise, financial performance tends to be high in significance for 'Company owned by the university' since the core goal of the company establishment is to manage and increase the financial performance of the university, and due to the regulations, it is forbidden for all academic institutions to generate any revenue in the KSA. It is worth mentioning that this type of RTP governance model is only found in the KSA; other types of RTP such as 'Company with capital share' are not totally owned by the university. Lastly, the financial performance is the least significant to the RTP 'under university's structure' due to the lack of revenue generation concept; under this governance model, the focus is more on spreading the awareness of entrepreneurial culture among the society.

#### **10.4.2. Collaboration, Partnerships, and Funding Sources**

There seems to be a connection between the collaboration and partnerships and the funding sources. There are a number of reasons for this; such as RTPs looking to diversify their funding sources, gain more value propositions and attract more tenants' firms to locate on-park through the partnerships with large corporations. The findings showed that collaboration and partnership seem to be the highest in strategic perspectives for the 'non-profit' RTP, due to its nature as a facilitator in boosting innovation and entrepreneurship. Its main goal is to bring all stakeholders together at one table to enable the Triple-helix concept 'university-industry-government' to impact the society without the need to generate revenue. Moreover, funding sources seem to be among the most important strategic perspectives for RTPs with the 'non-profit' model due to the legal nature of the RTPs in seeking multiple funding sources.

On the other hand, the RTPs with the governance models 'company owned by university' and 'under university's structure' have limited funding sources since they obtain the funds from the university's budget. However, both types of RTPs are seeking to establish collaborations and

partnerships with external private and public sectors to obtain access to multiple funding sources, but without providing these sectors with any form of governance over the parks.

#### **10.4.3. Quality of Tenants' Firms' Services**

Quality of tenants' firms' services strategic perspective seems to be of less significance in the RTP models 'company owned by the university' and 'under university's structure' due to the lack of autonomy and authority of RTP's director over the park, and the solo-governance model as RTP is a unit or department under the university and should adhere to the university's governance model. In addition, the limited budget provided to both models of RTP through the university makes it difficult to provide a service of excellence to the tenants' firms' located on-park. Conversely, the 'non-profit' RTP seems to have increased quality of services to the tenants' firms over the other types of RTP. This may be because of the diverse funding sources of the park making it easier for the RTP board of directors to provide governance policies for maintaining and increasing the quality of services to attract more tenants' firms to locate on-park. Nevertheless, comparing the financial performance of the 'company owned by university' with its quality of services provided to the tenants' firms, the observation was that the RTP with such a model of governance was working hard to lease the park's land. However, the park does not work on enhancing the level of quality of the services provided to the tenants' firms due to the lack of autonomy and authority over the park's governance, and therefore, the park is diverting more towards real-estate development rather than facilitating and boosting the ecosystem.

#### **10.4.4. Value Proposition and Attraction to Tenants' Firms**

Due to the high quality of services, increased quantity and quality of collaborations and partnerships, and the plethora of funding sources in the 'non-profit' model RTP compared with 'company owned by university' and 'under university's structure' RTPs, the value proposition and attraction to tenants' firms' strategic perspectives usually increased and translated into reality. The above-mentioned strategic perspectives significantly impacted the value proposition and attractiveness of the 'non-profit' RTP. It has been noted that most of the

strategic perspectives of RTPs are to some extent interrelated, connected, and impacted by each other.

### 10.4.5. Stakeholders

The number of stakeholders tends to be among the highest important strategic perspective in ‘non-profit’ and ‘company owned by a university’ RTP models since both consist of multiple stakeholders including external members from the industry contributing to the park’s governance in the form of ‘board of directors’ which is not found in the ‘under university structure’ RTP as it contradicts with the ‘university’s board of trustees’ who usually governs all the aspects of the university. However, the stakeholders in the RTP that falls ‘under university’s structure’ are considered to be just internal stakeholders from different units of the university. Table 30 below identifies the various external and internal stakeholders of any RTP regardless of its governance model, and the interests of each stakeholder group depending on its type (Borgh, 2007). The table demonstrates the common examples of stakeholders in RTPs and the interests they are seeking:

**Table 25: RTP’s Stakeholders and their Interests**

Stakeholders	Interest
<b>Shareholders, Endowment Sponsors, Private Companies Owners</b>	Growth, profits, performance, direction, and globalisation
<b>Government</b>	Economic impact on the region, taxation, regulation, regional and national development, digital transformation, strategic visionary; A tool of innovation policy realisation; Implementation of commercialisation and technology transfer programmes
<b>Multinational Corporates</b>	Commercialisation of research outcomes, Sponsorships for postdocs and Research Collaborations, Publications of research, and IPs ownership and Royalties

<b>Universities, and Research Institutes</b>	Access to advanced facilities and labs for prototyping, co-working spaces, collaboration with multinational companies, government and among start-ups, management support, flexible policies, approximate to the university/research institutes resources, mentoring, funds and grants, and business support
<b>Entrepreneurs and Small Tech Start-ups</b>	
<b>RTP Management</b>	Creation of Entrepreneurial Ecosystem, Performance and Target, Growth, Economic impact on the region
<b>Employees</b>	Jobs, salaries, and 'live-work-play' environment
<b>Local community</b>	Job creation, involvement, resolve environmental and technical issues, shares, stratus, and social impact

**10.4.6. Commercialisation**

Based on the findings, the number of commercialisation activities in the 'non-profit' RTPs increases compared to 'company owned by university' and 'under university's structure'. This can be due to the shared vision among the stakeholders of 'non-profit' RTPs which focused on accelerating the commercialisation activities and increasing the park's value proposition. The stakeholders including the government and the industry consider the commercialisation as the first priority of the RTP's strategy execution, due to the highest impact of 'commercialisation strategic perspective' on local and regional economic development.

On the other hand, the number of commercialisations decreased in the RTPs governed by the university; which might be because of the influence of the 'university-research-based' model that concentrates on publishing research papers impacting those RTPs' models. Moreover, the complexity of the governance policies of the IP between the university and the tenants' firms located on-parks delays the progress of the commercialisation process and in some cases overturns all the efforts spent on the process of commercialisation process to become live.

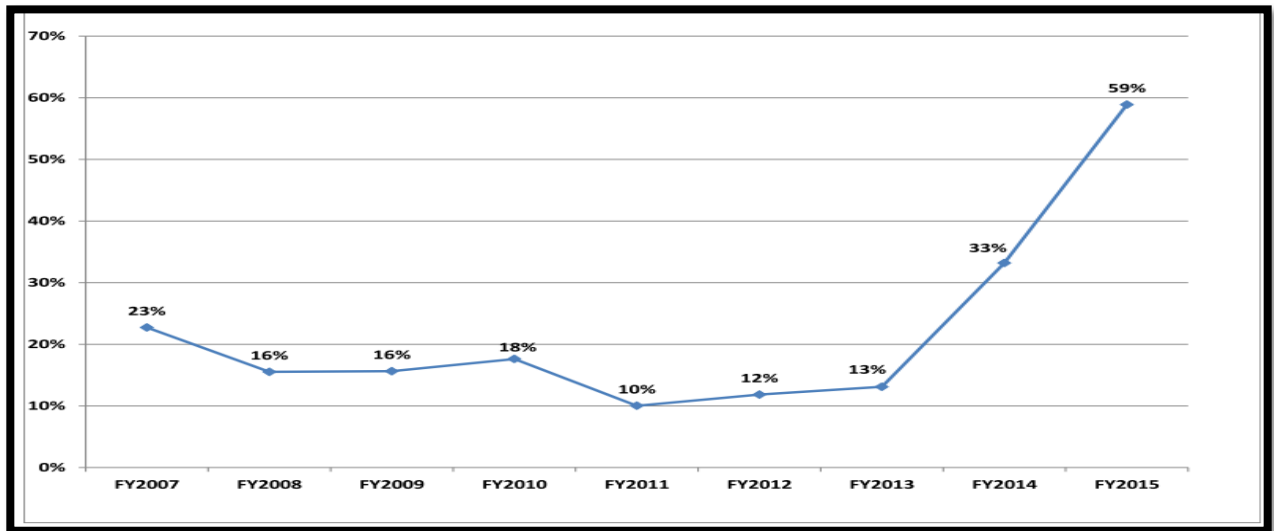
#### **10.4.7. Entrepreneurship**

Entrepreneurship is considered to be the simplest RTP's strategic perspective during the strategy execution. All types of RTP encourage and focus on creating the ecosystem by boosting the entrepreneurial culture among the stakeholders and the university's students and fostering the academic spin-offs, although translating that into a reality is only proven by increased technology transfer and commercialisation and the flexibility and smooth processes and governance around the commercialisation process. Therefore, the only RTP model that shows evidence of enabling entrepreneurship is the 'non-profit' RTP. Besides the increase of commercialisation, the findings showed high levels of participation of 'non-profit' RTP's activities associated with spreading the culture of entrepreneurship, engagement of the community, and outreach activities.

#### **10.4.8. Complexity of Research Confidentiality**

According to the findings, RTPs with 'non-profit' governance models have solid and mature governance policies regarding the research complexity, followed by 'company owned by university' are less affected by the complexity of research confidentiality occurring between the tenants' firms and the university. Usually, the research complexity in confidentiality is handled by the technology transfer office, which reports directly to the university for the RTPs under the 'company owned by university' and 'under university's structure' governance models. Nonetheless, the 'under university's structure' RTP model tends to focus more on the ownership of the IPs of the research and is less concerned about commercialisation. This increased the complexity of the IPs ownership agreements, which varies from six months to three years' negotiations between the parties involved. The reason may be that the universities focus on the number of publications since this is the measurement for the university's ranking among the international standards. The findings demonstrated significant relations regarding the complexities of research confidentiality at Penn State University after they enhanced the governance of their IPs policies for the sponsored research-industrial agreements. Figure 10.5 below shows that the frequency of using the new IPs governance model showed higher frequency rate compared to the old IPs governance model. Moreover, the number of industrial-

sponsored projects increased from four to 14 with significant funds provided by the industry due to the flexibility and ease of adopting the new IPs governance model (Bridger 2015).



**Figure 10. 5: Frequency of Using the Penn State Sponsored Research Agreement**

#### **10.4.9. Complexity of Changes in Governance and Management Models**

According to the findings and observations, the attempts to change the governance and management models in the RTP model that has board of directors such as ‘non-profits’ and ‘company under university’ showed a more flexible and agile manner in the change process, leading to decreases in the complexity of changes in governance and management models in RTP. By analysing the underlying root causes, it is found to be because of the diverse recommendations submitted by the board members for the justification of the changes in the governance model. In addition, the flexibility of amendment to the governance models sustained the RTPs strategically and operationally to attract new tenants’ firms and sustain the loyalty of the existing tenants’ firms, particularly with the competition between the parks. Nonetheless, RTP ‘non-profits’ showed the lowest level of complexity in the changes over the ‘company owned by university’ due to the total ownership of the RTP by the university. On the other hand, the RTP model ‘under university’s structure’ encounters difficulties in changing the governance and management models due to the university’s governance over the RTP and the

lack of autonomy and authority of the RTP's director; therefore, decision-making is mainly taken by the university's leadership without inputs from the RTP's director. Therefore, there is an increase in complexity of changes to governance and management models in the 'under university's structure' RTP.

#### **10.4.10. Globalisation**

The findings revealed that 'non-profit' RTP has more potential to reach out to globalisation, due to the variety of stakeholders, the contribution of the private and public sectors, and the participation of the community in the governance and assessment of the performance management of the parks. Such combination of stakeholders can be found in the Triple-helix model RTP, and 'non-profit' RTP which is basically considered as a subset of the Triple-helix model. The shared vision and individual personal goals drive the stakeholders to work hard to globalise and create an economic impact at the national level.

#### **10.5. Factors influencing RTPs' Governance Change**

Despite the general agreement on the consortium governance model, the findings show that it is difficult to change the governance model to a legal format. In order to change the RTP governance model from 'under university structure' to 'triple-helix', the park's legal registration form must be separated from the university as a department and become a non-profit foundation RTP with board members consisting of the university, local or regional government authorities, and the private and public sectors. In addition, since there is a governmental authority involvement, a governmental regulation should be issued to formalise the establishment. However, the RTP governance model can be changed on an operational level to add more flexibility and autonomy to the RTP, such as establishing a committee of board members and inviting the external stakeholders to become permanent advisory members to the board or committee of the RTP.

There are a number of cases where the RTP governance model changed from 'under university structure' to 'company with capital share' such as the RTP in China; this proved to be a successful case in impacting the economic development, generating revenue, and expanding the knowledge-based economy to the country. On the other hand, the management team of



the RTPUCD which falls under the governance model 'under university structure' is executing the transformation of the governance model to the Triple-helix one as it proved to be more flexible in management style and positively impacted the local economic development.

## **CHAPTER 11: DISCUSSION**

### **11.1. Introduction**

The discussion chapter focuses on and extends the findings to highlight the contributions of this research to theories used throughout the research. The findings are also examined in relation to the key hypothesis introduced in Section 2.5.2. As a result, the new insights contributed by the researcher may be more clearly identified.

The proposed governance model integrates the different elements of the multi-layered analysis to give a customised governance model that best fits the RTPs affiliated with the university in the KSA. Thus, this chapter is organised thematically into two sections – 11.1 and 11.2. First it presents the proposed strategic visionary governance and management model for the main case study RTP to boost its performance.

### **11.2. The Proposed Strategic Visionary Governance and Management Model for KRTPIED**

The strategic visionary governance and management model of the RTPKEID case study is embedded in and aligned within the frameworks, strategies, and national programmes provided by the policymakers such as the Scientific Research Framework Proposal, Entrepreneurship Strategy, Performance Measurement Methodology, Saudi National Transformation Program 2020, and Saudi Strategic Objectives and Vision 2030 Realization Programs.

According to Stoner-Zemel (1988, p. 34-35) four strategies should be followed by the visionary leadership: “1) attention through the vision, 2) meaning through communication, 3) trust through positioning, and 4) deployment of the self through positive self-regard”.

The goal and vision of the company owned by the ‘university governance model’ are very aggressive in achieving its mission in impacting, influencing, and boosting the local economic development. Although it is confronted with the restriction of the bureaucratic management style and obstacles of reporting to the university’s president as he plays dual roles in governing the RTP and simultaneously governing and managing the university. The proposed strategic visionary governance and management model for the RTPKEID is not intending to change the current governance and reporting structure of the RTPKIED. However, the proposed

governance model will add more flexibility and autonomous to the governance model. Figure 11.1 below illustrates the roadmap for the proposed strategic visionary governance and management model to improve the RTPKIED.

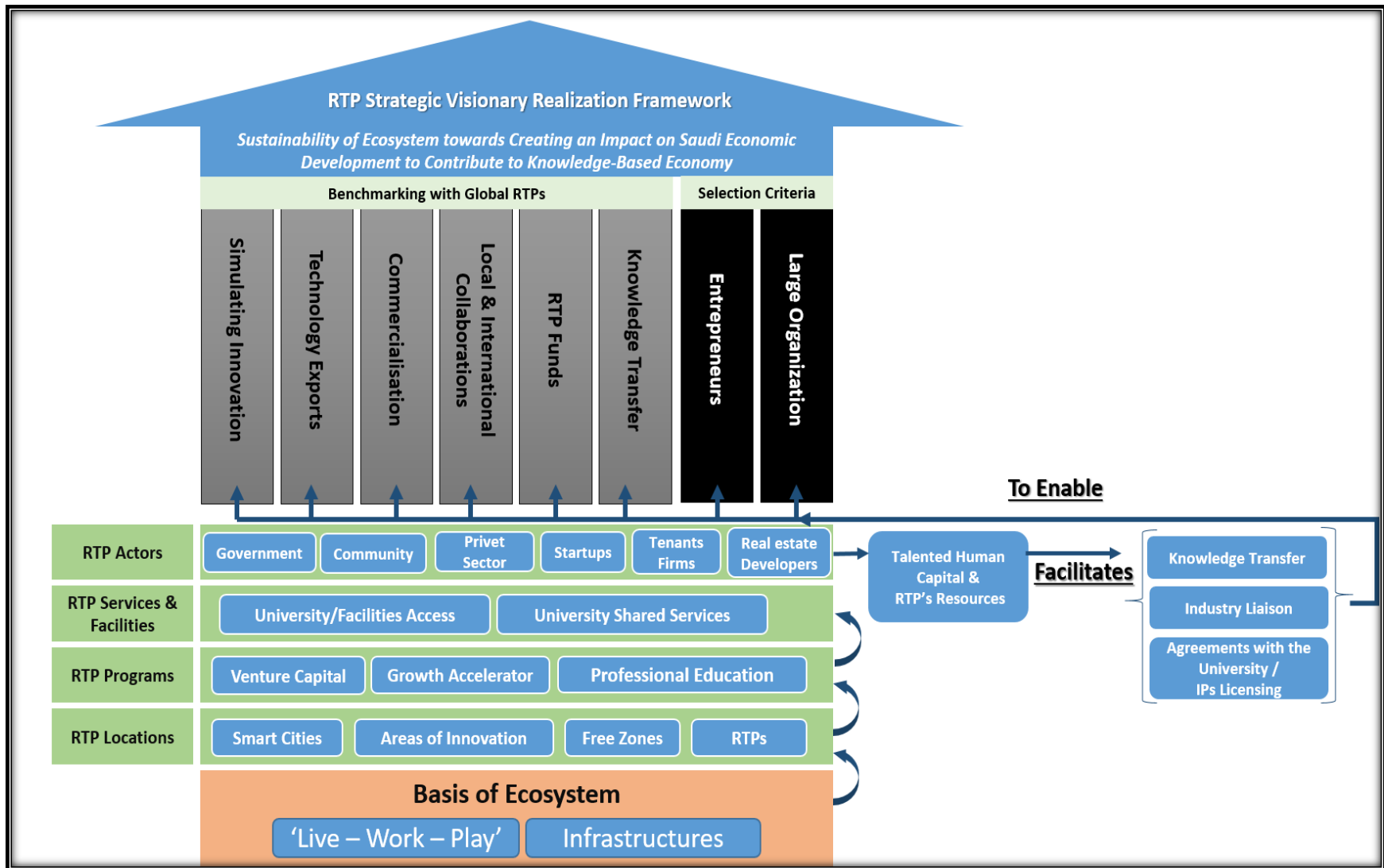


Figure 11. 1: RTP Strategic Visionary Realisation Framework

The proposed governance model should consider the implementation of multi-level strategic initiatives composed of the dimensions described below:

### **11.2.1. Development of Specific Skills in Young Generations**

Conducting outreach programmes to the neighbouring communities can be achieved by running outreach programmes in the neighbouring communities, not just the RTPKEID community. The aim is to incubate young potential entrepreneurs in order to educate them, with a focus on the talented young generation from schools and universities who are registered with the MAWHIBA ([www.mawhiba.org](http://www.mawhiba.org)) through collaboration and coordination with the MAWHIBA organisation in the specific technological focus area of the RTPKIED. The collaboration with MAWHIBA should aim at the management of the educational and cultural exchange initiatives to attract talented human capital from all the schools and universities in the KSA. The RTPKIED can lead a national initiative to build a training centre for national advanced technologies to train and talented national human capital in specific technologies will enable job creation which the KSA lacks such as lab equipment's technicians and operators, and others.

### **11.2.2. Develop RTPKIED's Strategic and Business Model**

The business model is the way to understand how the organisation is running its businesses. Just to make it clear, there is major differentiation between the strategy model and the business model. 1) The *strategy* model concentrates on aspects of competition, value-added, and competitive advantage over the other competitors. 2) The *business* model emphasises collaboration, partnership and creating shared value among stakeholders (Zieli et al., 2014). According to Zieli et al. (2014) the business models are capitalised to explain three phenomena in RTPs: 1) how the information technology is being utilised in RTP, 2) how strategic complexities such as performance measurement are being handled, and 3) how the innovation and technology are being managed.

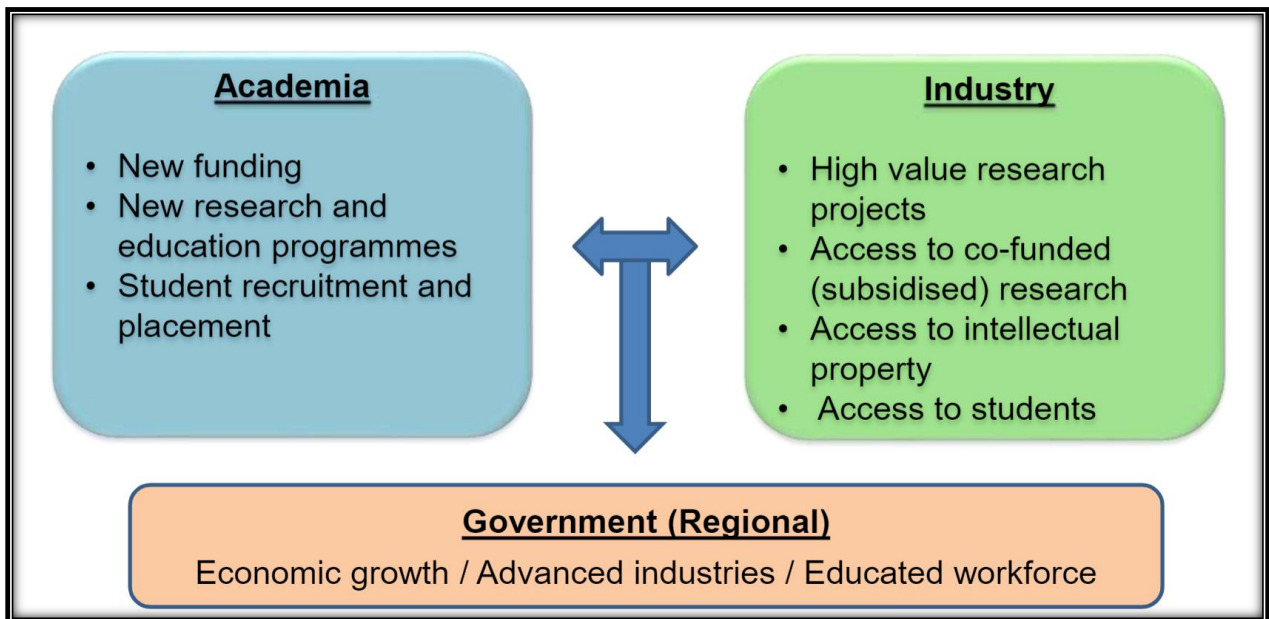
According to Teece (2010) combining the competitive strategy analysis during the design of business model involves determining the market's targeted audience, proposing the value proposition for target audience, establish mechanisms to deliver value propositions to teach

targeted audience, and then determining where the gaps are between those mechanisms to prevent the business and strategy models from becoming disconnected.

The newly created RTPKIED should align with the Saudi Vision 2030 to translate it into a reality with tangible achievements as RTPs have been put in place to become policy interventions to support the local elite growth coalitions since they were established based on the policy variables (Appold, 2004).

From another perspectives, the tenants' firms recommended that it would be great if the RTPs implement an online system that provides incentives to the start-ups who achieved the required milestones of their projects, so they can be provided with points and rewards (reflecting how the companies achieve points in the 'My Points' system run by the Ministry of Labour).

Figure 11.2 below illustrates the benefits that can be gained through the change of governance model to the Triple-helix model, where the RTPKIED remains 'under university's structure'. However it will have a board of directors and voting members from the university, the government, and the industry to govern the operational model. The most important and challenging aspect before the RTPKIED can adopt the Triple-helix model is to introduce a culture change.



**Figure 11. 2: Advantages of Adopting the Triple-Helix Governance Model**

### **11.2.3. Cooperation with the City Authorities to Enhance Infrastructure and Transportation to the Park**

To learn from the success factors of other RTPs, the recommendation is to follow the approach of the Berlin Adlershof Park by collaborating with the city authorities on developing the plans of the road infrastructure around the park in addition to providing transport services to ease the access to the park (Neumann, 2016). The major success was collaboration between the RTP's management with the city authorities in developing a network of transport connecting the RTP's area with all parts of the city utilising the public transport services. Additionally, the park can partner with the public transportation services and shared transportations services such as Uber and Careem, among others, to provide special discounts to the park's tenants' firms commuting to the park. According to Petraite (2010), the commercialisation of technological and R&D innovation policies necessitates significant levels of collaborations and partnerships.

Moreover, the partnership with the public authorities to provide diverse funding mechanism to the RTP will introduce more revenue generation channels for the park due to the enhancement of RTP's services. According to Figlioli (2011) the Brazilian parks, public governmental authorities partially financed the implementation of basic infrastructure.

### **11.2.4. Partnership with External Incubators and Co-Working Spaces**

The main recommendation here is to partner with co-working spaces and external incubators within the main cities of the KSA to provide the park's start-ups with special spaces and discounts for using the facilities. One of the drivers of success is to reduce the expenses for entrepreneurs to make sense of a good business model and let the start-ups focus on producing real innovations. According to Petraite (2010), the main core success factor for RTP is collaborations to ensure sustainability of the RTP's operations, to build talents, and to commercialise services and technological products. Moreover, the networks empowered the Lithuanian firms to influence the approaches towards strategic innovation management, and therefore, increase the Lithuanian's RTPs' growth rates and sources.

Thus, The KIED should explore different types of linkages to achieve global competitiveness:  
1) Alliance with national businesses and partner with other RTPs in the region to commercialise

more technological products, and 2) Develop linkages with local and regional markets, and utilise the local knowledge and competence sources.

#### **11.2.5. Enhance Spaces and Services for Off-Park Entrepreneurs**

“One size fits all” does not satisfy the needs of the tenants’ firms particularly the entrepreneurs. Thus, classifications of the services provided to the entrepreneurs according to their current stage will increase the attraction to the park. Moreover, every start-up company interested in establishing itself or its branch office on the park can receive the “Entrepreneurs Welcome Package”. The services should depend on the stage the start-up company is at with the following elements:

- A fully furnished and equipped office, postal address, landline line, fax, printer and Internet access;
- Entrepreneurs in residence should be provided with a furnished apartment that is ready to move into;
- External and internal public transport;
- Consultations available with local experts on recruitment, local market research, finding partners or suitable venues;
- Tax services, e.g., legal advice, tax training, or public relations training; and
- Three months of soft services (e.g., support from local experts, information about regional market, or legal advice).

#### **11.2.6. Bridging the gap between Entrepreneurs, Government, and Scientific Communities**

By enabling the networking between the business and scientific communities, introducing effective physical channels of exchanging knowledge within the park, and connecting the external stakeholders, tenants’ firms, technology entrepreneurs, and governmental representatives from outside the park to find solutions for the main problems faced by each of the stakeholders, which can be translated to innovative initiatives that will fulfil the goal of the park and positively impact the economic development.



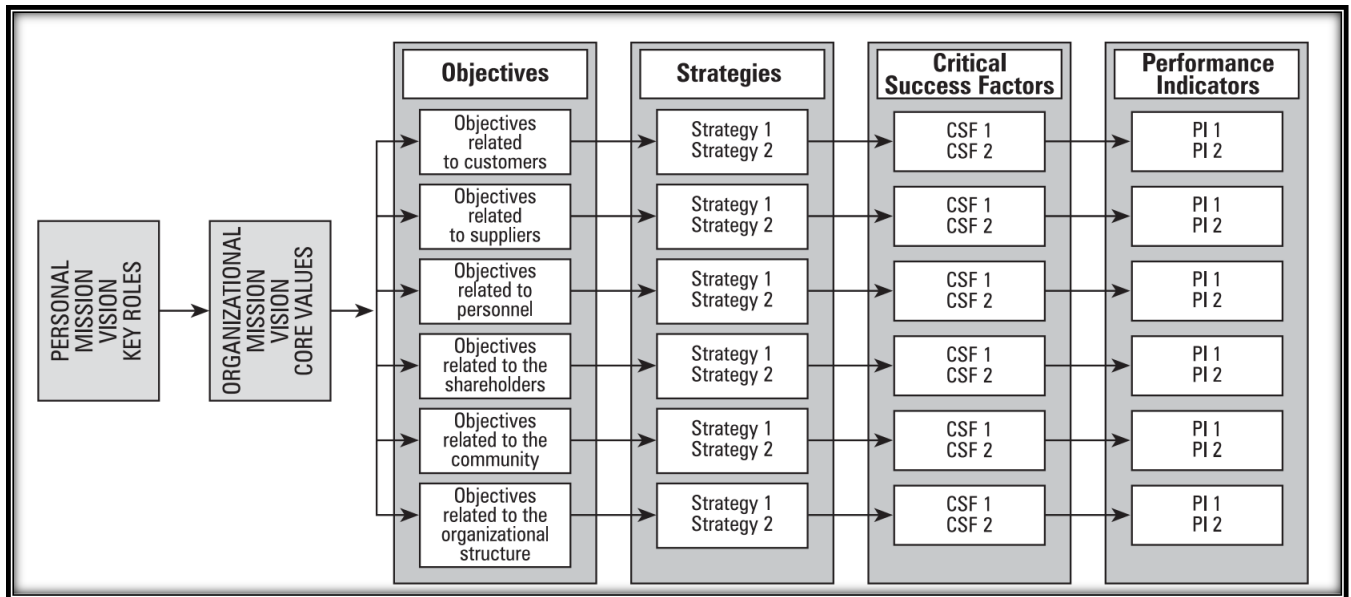
For the RTPKEID to be more open and flexible in communications and collaborations with the RTP's stakeholders, it needs to adopt the clustering principle by funnelling the funds to clusters in the RTPs and coordinating within the universities and government, and other RTPs inside and outside the region. According to Almeida et al. (2008), the recommendation for the developing countries' structural shortages is to adopt an integrated policy method in order to enable the flow of science and research commercialisation and the demands of the tenants' firms.

#### **11.2.7. Introduce more Flexibility to RTPKIED Governance Policies**

It should be very clear to the RTP's stakeholders that the RTP objectives focus on economic development. The IPs policy of ownership should be tweaked to allow sharing the IPs rights with the professors and inventors to motivate them to commercialise their inventions and research outcomes. To improve the growth of the RTP, the management must facilitate the connection between the product market fit and the ways the changes to the rules and culture of the overall stakeholders are implemented. Therefore, to enable the innovation to grow and flourish, the RTP's management must have the right authority and autonomy to tap into the ability of people to innovate by providing them with decentralisation by utilising the concept of a flat management structure. The sense of urgency to innovate and be productive must be embedded into the governance and management of the RTP.

#### **11.2.8. Establish a Solid Framework on Management of Performance Measurement for RTPKIED and the Tenants' Firms**

The RTPKIED management must establish a solid framework for managing its KPIs for the RTP instead of focusing all their efforts on measuring the performance of tenants' firms. According to Rampersad (2001), nothing will be progressed unless the strategies are translated into critical success factors (CSFs). CSFs are crucial to the prolongation of any organisation and entail relentless consideration from management. Figure 11.3 can be employed to monitor the successful deliverable of strategies and initiatives provided to each RTP's tenants' firms such as ASOs, entrepreneurs, and large-corporates, among others.



**Figure 11. 3: Measuring the Performance Indicators for RTPs’ Strategies and Initiatives Provided to Tenants’ Firms<sup>6</sup>**

**11.2.9. Improve the Services and Attraction to Tenants’ Firms**

SMEs’ companies are still having issues in collaborating with the universities and RTPs. The RTP management at RTPKEID-RTP should pay more attention to the collaborations among the tenants' firms, the students, faculty and researchers. Furthermore, the quality and types of research should match the tenants’ firms’ needs and demands.

**11.2.10. Improvement of the National Policies and Governance of RTPs**

According to Andersson and Djeflat (2013) universities’ entrepreneurial activities among faculty members in the KSA shows higher emerging trends and considerations in adapting the change to the knowledge-based economy. That requires them to have in place short-term and long-term measures to empower the culture change. Moreover, the new introduction to the research innovations should be working closely with the governmental funding banks/agencies and entrepreneurs to stimulate the process (Etzkowitz and Leydesdorff, 2000). The national-level

<sup>6</sup> Source: Rampersad (2001, p.212)

incentives should be considered from the policymakers to the RTPs under the structure of the university/owned by the university governance models in order to boost their growth.

One of the main issues in the types of incentive provided to RTPs in the KSA is that they are not attractive or flexible enough for the tenants' firms to locate on-park. However, since Prince Mohammed Bin Salman became Crown Prince of the KSA in 2017, tremendous changes and improvements have happened in the Kingdom related to national policies and governance of RTPs, entrepreneurial culture, and empowerment of local, regional and foreign investments. Such improvements were introduced by the establishment of a national performance management centre by introducing KPIs for all public sectors, and the establishment of SMEA which governs the entrepreneurship. The ambitions contained in the Saudi Vision 2030 introduced by the Crown Prince's quote inspired the researcher to align the research study with the national Saudi Vision 2030: "TOGETHER WE WILL CONTINUE BUILDING A BETTER COUNTRY, FULFILLING OUR DREAM OF PROSPERITY AND UNLOCKING THE TALENT, POTENTIAL, AND DEDICATION OF OUR YOUNG MEN AND WOMEN."

#### **11.2.11. Introduce Revenue Generation Channels in the RTPKIED Business Model**

During the commercialisation activities, the recommendation for RTPKEID TTO and investment fund is to charge a cost for each IP licensed to the estimated efforts for the work being done in licencing the IPs, so it will be charged back to the academic affairs departments who introduced the new innovative research projects, therefore introducing a revenue generation channel to the associated university for sustainability purposes. According to OECD nations, two commercialisation policy initiatives are proposed in the UK to expedite the rate of knowledge transfer from universities to firms: 1) Establishment of commercialisation programmes and regulations to encourage technologies spin-offs between universities and firms such as the European Union Framework Programmes, and 2) Significant update in IPs governance for the sake of the universities (Siegel et al., 2003).

## **CHAPTER 12: CONCLUSION**

### **1.1 Introduction**

This chapter concludes the research and summarises the main findings by answering the research questions. It then states the contributions of the research to the Triple-Helix theory and the Cabral-Dahab Science Park Management Paradigm to the research findings and discussion analysis. Next, it demonstrates the limitations and risks of the research, leading to a discussion of recommended future research directions.

### **12.2. Research Aim**

The research was based on three premises:

- Empirically test the relationship between the RTP's governance and strategic model and performances of the RTP's growth by verifying the performance improvement of RTPs affiliated with universities. The research was conducted by investigating six RTPs' governance models:
  - Triple-helix RTP
  - Non-profit RTP
  - RTPs under university's structure
  - Company with capital share
  - Company owned by the university
  - RTP under government/Free Zones
- To find the best-fit strategic and business models for the RTPKIED carried out from semi-structured interviews with RTPs' Directors, Park's Tenants, and on-park NTBFs, and policymakers, and resulting from benchmarking four aspects of the RTP's strategic model: a) RTP's governance model, b) Entrepreneurship, c) Commercialisation, and d) RTP's Performance Measurements and KPIs Management
- To align the application of the strategic visionary management model at the RTPKEID as an actionable recommendations plan to align with Saudi Vision 2030.

### **12.3. Contribution to Theory and Practice**

From a philosophical perspective, if the RTP governance model possesses three key characteristics – *Autonomy, Mastery* and *Purpose* – then the RTP management team will be able to make the change and impact on economic development. Moreover, the best RTP's governance model is to base its governance policies on the autonomy and collaborations because getting too attached to the university's policies is not going to increase the growth of the park, particularly when the RTP aims are creating and boosting start-up companies.

Additionally, tenants' firms and entrepreneurs need space, amenities, and access to specialised spaces in the theme of 'live-work-play'. Therefore, providing more authority and decision-making ability to the RTP's management team will enable agile and effective management of the park's resources and collaborations with other stakeholders to provide the value-added services and attractions to the tenants' firms. Moreover, the facilitation of the marketplace and entrepreneurial mentalities are the key to success for any RTP in creating the ecosystem. Hence, the policymakers should be focusing on the system not the design by creating virtual elements. Additionally, the policymaker should focus on soft incentives such as training, collaborations, and bringing people together to enable RTPs to become the hub of collaboration and facilitator of economic development. However, this cannot be turned into reality until the soft incentives are put in place.

As per the above-mentioned, the research made contributions to the Triple-helix theory and the Cabral-Dahab Science Park Management Paradigm as explained in the below sections.

#### **12.3.1 Contribution to Cabral-Dahab Science Park Management Paradigm**

To contribute to the research on the Cabral-Dahab Science Park Management Paradigm, the researcher benchmarked the three case-organisations against the Cabral-Dahab Paradigm by evaluating each case organisation against the 10 criteria that must exist in a successful Science and Technology Park. The three RTPs' cases contributed to the Cabral-Dahab Science management paradigm in several aspects: 1) this is the first time that the paradigm has been applied to the KSA context, and 2) the paradigm was applied to the three RTP cases with two different governance models: '*company owned by a university*' and '*RTPs under university's structure*'. This is a very important point, since RTPs in the KSA cannot grow in the same

manner as other RTPs around the world because there are many factors surrounding the KSA's economic-social status from environmental and cultural aspects, particularly in the current era, which will definitely affect the KSA's RTPs' growth in the long term.

Table 31 illustrates the comparative analysis for the degree of relevance to the three case studies used in the research according to the researcher's understanding resulting from the observations, interviews, survey and documentary analysis.

**Table 26: The comparative analysis for the degree of relevance to the three case studies**

Cabral-Dahab Science Park Management Paradigm Criteria		RTPMTV	RTPDTCV	RTPKIED
1	The park has access to talented personnel in R&D in the research knowledge in which the park focuses on	Very Often	Always	Always
2	The park has access to the market for its products and/or services	Sometimes	Very Often	Sometimes
3	The park possesses a set of competencies in business development and managerial skills to provide to its tenants' firms especially for the park's entrepreneurial start-ups	Rarely	Rarely	Very Often
4	The park has the capability to protect product or process confidentiality via patents, security, or any means	University's TTO	University's TTO	Always
5	The park has the capability to select which firm will enter the park and which will be rejected. Two possible selection criteria are firms' market potential and firms' coherence with the RTP identify	Always	Rarely	Rarely
6	The park has a clear identity, quite often expressed in the choice of name for the park	Yes	Yes	No
7	The park has a management with established or recognised expertise in financial matters, and which has presented long-term economic development plans	Yes	Yes	Yes
8	The park has the backing of powerful and dynamic national and local economic actors for instance funding agencies or political institutions	Yes	Yes	No

9	The park includes in its management an active person with the power of decision-making and with highly visible profile, who is perceived by relevant actors in the society as embodying the interface between academia and industry, long-term plans and good management – ‘Mr/Ms RTP’	Yes	No	Yes
10	The park includes a prominent percentage of consultancy firms, as well as technical services firms, including laboratories and quality control firms	To some degree	No	Yes

**Source:** Cabral (1998c)



### **12.3.2 Contribution to the Triple-Helix Model Theory**

This research makes several theoretical and practical contributions. The significance of the main contribution, the *Strategic Visionary Realisation Model* (Figure 41) and its essential component is described as below. The model can be generalised to any RTP's governance model as the study explains the contributions of the main pillars and enablers to execute the strategic visionary realisation model. Generally, the research contributes to a new explanation of the strategy execution roadmap. Additionally, the research contributes to a new understanding of the relationship between the RTP's governance model and the RTP's growth and performance rates and the factors influencing the correlation between them from the perspectives of the RTP's various actors such as RTP's CEO, RTP's tenants' firms, and policymakers.

The findings contribute to 1) literature on RTP's governance models particularly in categorising the RTP's governance models to six governance models, 2) literature on RTP's Performance measurement, and 3) literature on adopting the Cabral-Dahab science management paradigm in the KSA for the first time. The patterns found linking responses, justifications, and personal and organisational outcomes illustrate the significance of the RTP's governance to challenges facing RTPs around the world and RTPs' best practices, regardless of the governance model.

### **12.4. Limitations and Risks**

The main source of risk in the research is to contact the participants without the support of a major sponsor from the RTP. This risk was mitigated by obtaining the RTPKIED's approval to sponsor the research study and support it by contacting the participants from the associations that the RTPKIED has membership in, and introducing the researcher to the participants and associations. Moreover, the RTPKIED encouraged the participants to engage with the interviews and questionnaires. Besides, the associated university has an excellent reputation and connections regionally and internationally, which was the main advantage for the researcher to collaborate with the participants without facing risk of refusal to participate. On the other hand, the researcher mitigated the risk of participants withdrawing by providing them with the research findings that will help the

RTP management to improve their park's performance and growth rate. The risk of access to the case study of the research RTPKIED is eliminated as the researcher works as a full-time staff member at the associated university and the research topic was selected and sponsored by the RTPKIED. Additionally, the access to all confidential materials and documents was approved by the university. The strong relations between the RTPKIED with the RTPDTCV and RTPMWC and the attractiveness of the research topic eliminated the risks for the remaining two RTP cases. Moreover, the participation of KSA policymakers provided the research with the confidence to quickly obtain approval from the three RTPs involved.

The major research limitation for the RTPKIED is the change of the governance model from 'under university structure' to 'Triple-helix'. There are multiple reasons and complexities, as listed below:

1. Changing the governance model requires a royal decree to be issued by the Saudi government and approval from the associated university board of trustees.
2. Currently, there is no policy for Triple-helix in the KSA; no solid commercialisation and RTP governance policies; and no models suitable for different RTPs.
3. The access to the associated university's resources and facilities will be complicated and restricted due to the university's security policy.
4. The park is still emerging in developing its governance, policies and procedures due to the changes of organisational structure and changes in the presidency of the associated university.

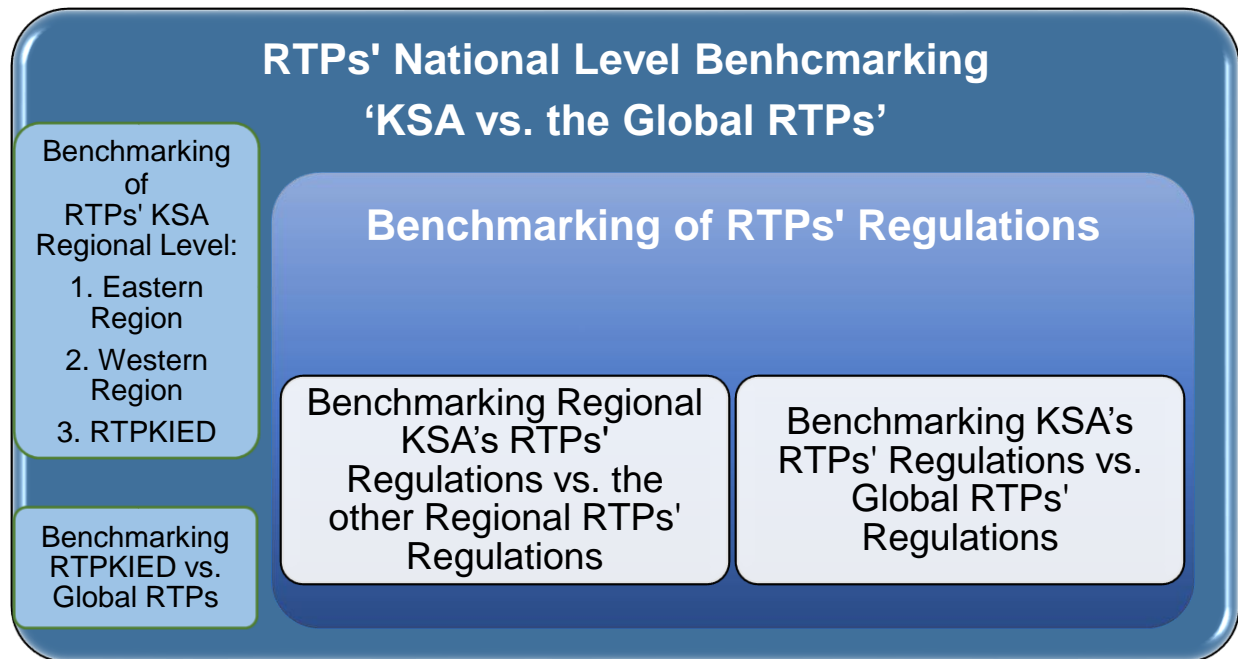
Figure 12.1 below illustrates the bottleneck questions of the questionnaire according to the analytics' tool used for online survey gathering. It shows that the major bottleneck question was the consent to answer the questionnaire with 47.24% abandonment rate, followed by the question with abandonment rate of 26.63% related to the RTP's governance model which might be unique as this research represents the first time that different RTPs' governance models have been categorised.

<b>Field Bottlenecks</b>	
Required fields that are causing users to leave the form before submitting.	
Consent	47.24%
2. What is the Governance Model (registration type) of your Research Park?	26.63%
4. Who provides the budget for your park's activities, to which extent (approx.)? Please select all that apply	7.04%
3.1 Why do you think there is a relationship between park's governance model (legal registration type) and the growth rate of the park	5.03%
6. How many tenant firms located on-park?	3.02%
7. How many Startups / Entrepreneurs on-park?	2.51%
30.1. Please specify the frequency of the collaboration with the following partners?	2.01%
2.1 Please Specify?	2.01%
3. In your opinion, do you see any Relationship between the park's governance model (legal registration type of the park) and the growth rate of the park?	1.51%
20. Please provide figure of the below?	1.51%
13.1. Please specify what are the "Other Business Services" your Research & Technology Park provides?	1.01%
8. How many governmental organizations located on-park? (E.g. Research Centers, Public organizations, etc.)	0.5%

**Figure 12. 1: Bottleneck Questions of the Survey**

### 12.5. Further Research

A recommendation for further research is to study the formulation of KSA governmental policies and regulations on RTPs at a national level, such as visa registration, bankruptcy, ventral capital, and the availability of policies on government contracts which are currently not so open and flexible for SMEs. The diagram in Figure 12.2 below illustrates the researcher's efforts in benchmarking RTPs at national and regional levels against the KSA's RTPs.



**Figure 12. 2: RTPs' National Level Benchmarking 'KSA vs. the Global RTPs'**

The blue boxes demonstrate the research that has been undertaken herein to benchmark RTPs at the regional level in the KSA by investigating the three RTP case organisations in Western and Eastern regions and RTPKIED. In addition to benchmarking RTPKIED with the global RTPs, however, the researcher expanded the study to include a sample of RTPs' policymakers from the KSA, the USA, and the RTPs' associations in the research to make pragmatic recommendations to the KSA policymakers in regards to the regulations of governance models, commercialisations, entrepreneurship, and performance measurements. The researcher identified opportunities for future research in the RTPs' national level benchmarking 'KSA vs. the Global RTPs' by 1) benchmarking the KSA's regional RTPs' regulations and policies against other regional RTPs' regulations in order to improve the RTPs' governance in the KSA, and 2) benchmarking the KSA's RTPs' regulations vs. global RTPs' regulations.

According to the interviews conducted with USA policymakers regarding the RTPs' regulations that facilitate the enhancement of the RTPs' governance and performance

measurement. According to USANSF-JC, the RTPs' funding must be processed to the highest degree of transparency and fairness since it affects all R&D activities within the parks. USANSF formed a review committee to review all the R&D proposals submitted by the institutes and set transparent selection criteria for granting the funds such as 1) **Intellectual Merit**: How the proposal will contribute to its own discipline, 2) **Impact on Science and Society**: How the proposal will advance the related fields and the society, 3) **Training of Manpower**: How the talent will be trained in the new technologies, and 4) **Industrial Collaborations**: How the inter-cross discipline will be handled.

The review committee requires a peer-review process to take place and it is always anonymous by hiding the name of the Principal Investigator's organisation and name, so the reviewer will not know to whom the proposal belongs, therefore enabling the fairness of the review process.

It is crucial to embed incentives and transparency within the funding process to encourage the Principal Investigators to submit the proposal of innovative ideas and gain the return on investment, to maintain a high level of likelihood to positively impact the community. Additionally, to enable the transparency in the process, USANSF does not conduct any R&D activities. Instead, its main role is to measure the performance of the RTPs', ROIs,' industries' and universities' collaborations to enable the commercialisation by adopting an innovation ecosystem programme.

In the USA, the governance of RTPs is more collaborative work among the partners. Therefore, the governmental authority runs them with flexible regulations to indirectly enable the innovation process. So the department runs projects and regulations and looks into the whole ecosystem, with several partners from industry, universities, and research centres, non-profit organisations, and the community. The most important role is the monitoring and controlling of RTPs' KPIs to enable them to make the right decisions by simplifying the research information and commercialisations process to all audience. Moreover, the USANCS provides the entrepreneurs with federal and funding grants, and partners with TTOs at the universities to promote the entrepreneurial activities and commercialisation to develop the policies that support and facilitate the operations for

entrepreneurs. However, the department manages the creation of the policies engaging the industry, community, entrepreneurs, the universities, TTOs, and other governmental authorities to produce comprehensive commercialisation policies. One of USANSC's initiatives was to encourage rural areas to work on the creation of ecosystems; this was executed by disseminating surveys directed to the universities, investors and entrepreneurs seeking solutions from the participants.

The case was a success story with more than 60 proposed solutions, shortlisted to six solutions, in which three solutions have been successfully implemented and the remaining three solutions are under progress/modification.

The major success factors to engage RTPs' stakeholders in collaborative projects are to assign the lead to a neutral and competent leader, who ensures that each stakeholder will get his hands 'dirty' in the collaborative project's work as a group. Moreover, the leader should create an enjoyable collaborative experience and introduce team-building activities during the projects' lifecycles [USANCS-JH, Department of Commerce].

## APPENDIX A: RTPS' DIRECTORS' QUESTIONNAIRE

### Implementation of Strategic Visionary Management of Research Parks Affiliated with Universities

Dear Participant,

I am a Doctorate of Business Administration Student, in the School of Management at the University of Southampton, UK. As part of my research study, I am conducting a survey on the **relationship between the governance model of Research & Technology Park and the performance growth rate of the park.**

I am looking for participants who have an experience in Research & Technology Parks Management, Science & Technology Parks Management, Techno-Valleys management. Your point of view and experience are extremely valuable to my research, and therefore I would very much appreciate your participation by completing this online questionnaire. It takes around 10-15 minutes and there is no correct or wrong answer and your input will be valuable.

Thank you very much for your support.

*Please Note: This is an anonymous survey; the information obtained will be kept strictly confidential and will be used for academic purposes only. All collected data will be dealt on a highly confidential level and will not be disclosed to anyone other than the researcher and her academic supervisor. The questionnaires will be Anonymous and there is no identifications needed from the participants and also the collected data will be coded.*

Consent \*

I have read and understood the information in the Consent Section. I agree to take part in this research project and agree for my data to be used for the purpose of this study. I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected

[Save and Resume Later](#)

# Governance and Strategic Models of Your Research & Technology Park

1. What is the Name of your Research / Science & Technology Park?

2. What is the Governance Model (registration type) of your Research Park? \*

- Triple Helix-Consortium of different governmental local and regional bodies, public & private organizations, universities, and research centers
- Non-for-profit research park, A private, non-for-profit Social Organization
- Part of University organization structure
- Company with Share Capital, Limited company with Public majority
- Company owned by the University
- Under Government Governance, Governmental Free Zone, Municipal Enterprise, part of the Local Government
- Other

3. In your opinion, do you see any Relationship between the park's governance model (legal registration type of the park) and the growth rate of the park? \*

- Disagree    Neutral    Agree

(e.g. the legal format of the park facilitate the collaboration of other research centers and universities and lead to the park's growth, flexible management, etc.)

4. Who provides the budget for your park's activities, to which extent (approx.)? Please select all that apply \*

	1-15%	16-30%	31-60%	61-100%	N/A
park is Self-funded	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The University	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public sources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Private sources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Save and Resume Later](#)

Previous

Next



## General Information on Research Park

5. Does your park has its own identity? \*

- My Park's Identity is part of the university's identity  
 My Park's Identity has its own identity  
 My Park's Identity is part of the other organization's' identity?  
 Other:

6. How many tenant firms located on-park? \*

	Between 1 to 5	Between 6 to 10	Between 10 to 20	Between 21 to 50	More than 50	Not Applicable
What is the No. of on-park's tenants firms under construction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Number of on-park's tenants firms already operational	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. How many Startups / Entrepreneurs on-park? \*

- None   
  1-6   
  7-20   
  21-50   
  More than 50

8. How many governmental organizations located on-park? (E.g. Research Centers, Public organizations, etc.)

- None   
  Between 1 to 3   
  Between 4 to 10   
  More than 10

9. Does your park manage the Technology Transfer Office (TTO)? \*

- No Technology Transfer Office (TTO) available on-park  
 My Park manage the Technology Transfer Office (TTO)  
 Technology Transfer Office (TTO) is managed by the University  
 Technology Transfer Office (TTO) is self-managed organization  
 Other:

10. Does your park has an established criteria for locating tenants firms on-park? \*

- Yes   
  No

11. What is Land area in (m2) (Approx.)?

12. What is Floor area of completed buildings (m2) (Approx.)?

## Research & Technology Park's Services

13. Which of the following Business Support Services does your Research & Technology Park provides whether to the Park's tenants, entrepreneurs, or startups? \*

- Not Applicable
- Amenities (e.g. meeting rooms, cafés, restaurants, office cleaning)
- Business support for SMEs (e.g. finance, marketing, HR, training courses for startup, SME businesses)
- Innovation support (e.g. R&D Intellectual Properties technology transfer services etc.)
- Networking (bringing together businesses from both within the Park and outside for specific events)
- Government affairs services
- Access to HR recruitment services
- Legal support services
- Facilitating access to capital funding programs
- Facilitating access to business funding
- Other

14. Which of the following Research services does your Research & Technology Park provides to the Research Park's tenants, entrepreneurs, or startups? \*

- Not Applicable
- Central lab workshop and clean room services
- Efficient material supply chain
- Lab equipment maintenance
- Hazardous material handling and disposal
- Multiuse office or lab space over short periods
- Library Databases services
- Other

15. Which of the following Information Technology & Communication services does your Research & Technology Park provides to the Research Park's tenants, entrepreneurs, or startups? (Check all that apply) \*

- Not Applicable
- Telecommunication and AV services (Broadband digital telephony video conferencing, Landlines, Faxes)
- Data center
- High performance computing
- IT network infrastructure
- Leasing high capacity IP link
- Software/hardware services
- Mobile phone devices / iPads
- Application / Mobile app. development
- Other

16. Which of the following Development services does your Research & Technology Park provides to the Research Park's tenants, entrepreneurs, or start-ups? \*

- Not Applicable
- Prototyping and scaling up services
- Access to high-bay for pilot plant services
- Quality assurance testing and certification
- Field and outdoor testing facilities
- Software/Application Testing lab
- Other

17. Which of the following Facilities & Community Services does your Research & Technology Park provides whether to the Park's tenants, entrepreneurs, or startups? \*

- Not Applicable
- Facility operation & maintenance services
- Waste management
- Utilities (Water, Electricity)
- Sanitation and landscaping
- Pest control janitorial and office services
- Health safety & environmental services
- Access to catering facility
- Access to conferencing facilities
- Tenant's building security services
- Access to recreational facilities
- Emergency and medical services
- Suitable accommodation for Tenants
- Schools & daycare
- Engineering construction and contracting
- Hotel
- Banks
- ATMs
- Transportations
- Post Office
- Other

18. Who provides the above-mentioned services tenants firms? (Please select all that apply) \*

- Research and Technology Park     External Service Providers     Internal Services Providers
- No Services Provider     The City/Government
- Other:

## Measurement of Innovation Performance & Growth Rate of Research Park

19. Is there a tool used by your park for the assessment of the park's performance? \*

Yes  No

20. Please provide figure of the below? \*

	Not Applicable	1-20	21-40	41-60	61-80	More than 80
No. of IP licenses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No. of filed patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No. of registered patents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What is the Average growth rate of your park (%)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What is the Average growth rate of the park's tenant firms (%)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What is the Average growth rate of the park's startups (%)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. Since its establishment: How many total of products, services, and/or processes have your park introduced that are: \*

	Not Applicable	1-10	11-20	21-40	41-60	<60
New to the establishment but not new to the market	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New to the market (Innovative)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Save and Resume Later](#)

## Background on the Research Park's Management Team

22. What is the highest degree or certification obtained by the managing director? \*

- Bachelor  
  Master  
  PhD/Prof.  
  Other

23. Does the Research Park director has similar previous work experience? \*

- Agree  
  Neutral  
  Disagree

24. How many years of experience does your Research Park director have? \*

- 1-5 years  
  6-10 years  
  More than 10 years

25. Does the Park management team participate in following? \*

	Frequently	Occasionally	Never	Not Applicable
Regularly attend the Park's Board of Director's meeting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate regularly in committees related to regional / local SME innovation programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate regularly in committees related to regional/local entrepreneurs and SME business support programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regularly attend any University committees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regularly attend any Chamber of Commerce committees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chair any committees of local or regional actors relevant to the work of the Research Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Innovation Activities in Research Park

26. Which of the following functions do (or will) you possess on site? (Please tick all relevant boxes) \*

	At Present	When Established	Expect for the next 3-5 yrs.	Not Applicable
Basic research	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Applied research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product development	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Process development	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manufacturing/Assembling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sales/Marketing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchase/Procurement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business or Technology Consultancy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. Does your Research & Technology Park has the following on-park? \*

	Yes	No	Not Applicable
Access to qualified research and development personnel in the areas of knowledge in which the park has its identity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Marketing Department	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incubator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accelerator program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Entrepreneurship center	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consultancy firms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality control firms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Collaboration of Research Parks with Universities and other Stakeholders/Partners

28. How far are your business partners groups such as (geographical scope)? Check all that apply \*

Locally  Regionally  Internationally

29. Do you collaborate with your park's partners on a strategic or operational level? \*

Yes  
 No

30. Is your park associated with one or more of the below? (Please select all that apply) \*

Other universities  
 R&D / Research institutions  
 Research Park & Innovation Centers associations  
 Other local and/or regional Research Parks  
 International Research Parks  
 Not Applicable

[Save and Resume Later](#)

[Previous](#)

[Submit Form](#)

## APPENDIX B: RTPS' TENANTS' FIRMS QUESTIONNAIRE

### IMPLEMENTATION OF STRATEGIC VISIONARY MANAGEMENT OF RESEARCH PARKS AFFILIATED WITH UNIVERSITIES FOR TENANTS FIRM'S DIRECTORS

DEAR PARTICIPANT,

I AM A DOCTORATE OF BUSINESS ADMINISTRATION STUDENT, IN THE SCHOOL OF MANAGEMENT AT THE UNIVERSITY OF SOUTHAMPTON, UK. AS PART OF MY RESEARCH STUDY, I AM CONDUCTING A SURVEY ON THE **RELATIONSHIP BETWEEN THE GOVERNANCE MODEL OF RESEARCH & TECHNOLOGY PARK AND THE PERFORMANCE GROWTH RATE OF THE PARK.**

I AM LOOKING FOR PARTICIPANTS WHO HAVE AN EXPERIENCE AND LOCATED IN RESEARCH & TECHNOLOGY PARKS, SCIENCE & TECHNOLOGY PARKS MANAGEMENT, ON-PARK'S TENANTS FIRMS, ON-PARK'S ENTREPRENEURS / STARTUP ABOVE. YOUR POINT OF VIEW AND EXPERIENCE ARE EXTREMELY VALUABLE TO MY RESEARCH, AND THEREFORE I WOULD VERY MUCH APPRECIATE YOUR PARTICIPATION BY COMPLETING THIS ONLINE QUESTIONNAIRE. IT TAKES AROUND 10-15 MINUTES AND THERE IS NO CORRECT OR WRONG ANSWER AND YOUR INPUT WILL BE VALUABLE.

THANK YOU VERY MUCH FOR YOUR SUPPORT.

*PLEASE NOTE: THIS IS AN ANONYMOUS SURVEY; THE INFORMATION OBTAINED WILL BE KEPT STRICTLY CONFIDENTIAL AND WILL BE USED FOR ACADEMIC PURPOSES ONLY. ALL COLLECTED DATA WILL BE DEALT ON A HIGHLY CONFIDENTIAL LEVEL AND WILL NOT BE DISCLOSED TO ANYONE OTHER THAN THE RESEARCHER AND HER ACADEMIC SUPERVISOR. THE QUESTIONNAIRES WILL BE ANONYMOUS AND THERE IS NO IDENTIFICATIONS NEEDED FROM THE PARTICIPANTS AND ALSO THE COLLECTED DATA WILL BE CODED.*

#### Consent\*

I have read and understood the information in the Consent Section. I agree to take part in this research project and agree for my data to be used for the purpose of this study. I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected

[Save and Resume Later](#)

Next

Progress



## COMPANY REGISTRATION

1. What is the Name of your Company?

2. What is the Governance Model (registration type) of your Research Park?\*

- Single-site company
- A Branch of multi-site establishment
- Head office of multi-site establishment
- Spin-out of university
- Spin-off of other establishment
- Entrepreneur / Startup
- Other

3. Since when your company located in the Research Park?\*

- Under Construction
- Less than a year
- Between 1 to 5
- Between 6 to 10
- More than 10

4. What is your premises type / Size?\*

- Office
- Lab
- Office and Lab
- Stand-alone facility (building/land)

[Save and Resume Later](#)

Previous

Next

Progress

## RESEARCH & TECHNOLOGY PARK'S SERVICES

### 1. Which of the following Business Support Services provided by the Research & Technology Park?\*

- Amenities (e.g. meeting rooms, cafés, restaurants, office cleaning, security services, CCTVs)
- Business support for SMEs (e.g. finance, marketing, HR, training courses for startup, SME businesses)
- Innovation support (e.g. R&D Intellectual Properties technology transfer services etc.)
- Networking (bringing together businesses from both within the Park and outside for specific events)
- Government affairs services
- Access to HR recruitment services
- Legal support services
- Facilitating access to capital funding programs
- Facilitating access to business funding
- Other
- Not Applicable

*(Check all that apply)*

### 2. Which of the following Research services provided by the Research & Technology Park?\*

- Central lab workshop and clean room services
- Efficient material supply chain
- Lab equipment maintenance
- Hazardous material handling and disposal
- Multiuse office or lab space over short periods
- Library Databases services
- Other
- Not Applicable

*(Check all that apply)*

### 3. Which of the following Information Technology & Communication services provided by the Research & Technology Park?\*

- Telecommunication and AV services (Broadband digital telephony video conferencing, Landlines, Faxes)
- Data center
- High performance computing
- IT network infrastructure
- Leasing high capacity IP link
- Software/hardware services
- Mobile phone devices / iPads
- Application / Mobile app. development
- Other
- Not Applicable

*(Check all that apply)*

**4. Which of the following Development services provided by the Research & Technology Park provides to the Research Park?\***

- Prototyping and scaling up services
- Access to high-bay for pilot plant services
- Quality assurance testing and certification
- Field and outdoor testing facilities
- Software/Application Testing lab
- Other
- Not Applicable

*(Check all that apply)*

**5. Which of the following Facilities & Community Services provided by the Research & Technology Park?\***

- Facility operation & maintenance services
- Waste management
- Utilities (Water, Electricity)
- Sanitation and landscaping
- Pest control janitorial and office services
- Health safety & environmental services
- Access to catering facility
- Access to conferencing facilities
- Access to recreational facilities
- Tenant's building security services
- Emergency and medical services
- Suitable accommodation
- Schools & daycare
- Transportations
- Hotel
- Post Office
- Security Services/CCTVs
- Engineering construction & contracting
- Banks
- ATMs
- Other
- Not Applicable

*(Check all that apply)*

**6. Who provides the above-mentioned services ?\***

- Research and Technology Park  External Service Providers  Internal Services Providers
- No Services Provider
- Other:

[Save and Resume Later](#)

## **APPENDIX C: INTERVIEW WITH RTPS' DIRECTORS**

Participant's Name

Participant's Position

Date: DD/MM/YYYY

1. What are the main goals of RTP?
2. What is the background of RTP?
3. What are the main industries or fields of technology of the businesses you work with?
4. What is the registration type of this establishment?
5. What are the funds' sources?
6. What are the services you charge the tenants' firms for?
7. What are the Measurements of Growth rate and Performance?
8. How do you measure the growth rate and performance of the park?
9. Do you think there is a correlation between the Governance model of the park and the park's growth rate? If answer is 'Agree', Why?
10. What are the benefits that can be gained from changing the registration type of Research Park and not being under the University's structure?
11. What is the current strategic and business management model for the park?

## APPENDIX D: INTERVIEW WITH RTPS' TENANTS' FIRMS

Participant's Name

Participant's Position

Date: DD/MM/YYYY

What attracted you to locate on the Research Park?

If you are accessing the university, how do you collaborate in research with the university?

How do you access the university's services?

Do you think that the Research Park strategy will impact your company's performance?  
(Yes/No)

If (4) answered 'Yes'. Please explain how do you think the impact and to what extend?

Do you benefit from Research Park's Technology & Transfer Office? (Yes/No)

If (11) answered 'Yes'. Please list the benefits you get from TTO.

Is there any form of collaboration between your company and start-ups, students, researchers, and/or faculty located on-park? (Yes/No)

If (6) answered 'Yes'. Please explain what collaboration exists and to what extent you benefit from it?

What are the shortfalls on-park?

## **APPENDIX E: INTERVIEW WITH RTPS' ASSOCIATIONS**

Participant's Name

Participant's Position

Date: DD/MM/YYYY

### General Information on Research Park:

What is the goal of RTP Association?

When was it established?

In your opinion what are the main industries or fields of technology of the businesses that Research & Technology Parks need to focus on?

### Legal & Financial formations of Research Parks

What is the most dominant or popular governance model/ legal registration type of Research & Technology Parks? (Please rank them-by %):

Consortium of different governmental, local, and regional bodies, in addition to public and private organisations, universities and research centers

Non-for-profit Research Park

Part of University organisation structure

Company with share capital

Other: \_\_\_\_\_

Why?

From where do most of the Research & Technology Parks get the fund?

Do Research & Technology Parks raise funds from private sources? (Frequently, Occasionally, Never)

What are the fund sources for most of the Research & Technology Parks you observed?

What are services charges the tenants' firms that Research & Technology Parks should consider to increase their growth rate?

**Measurement of Innovation Performance & Growth Rate of Research Park:  
How do you measure the growth rate & performance of the Research & Technology Parks in IASP?**

**Do you use any tool for the assessment for Research & Technology Parks' performance? (Yes / No)**

**If you answer Q.5 with "Yes", what is the name of the tool(s) used?**

**What are the key elements you use in reporting Research & Technology Parks' performance: qualitative information and/or (if applicable) quantitative key indicators?**

**In your opinion, do you see any correlation between the registration type (Governance model) of the park and the growth rate of the park? (e.g., the legal format of the park facilitates the collaboration of other research centres and universities and lead to the park's growth) (*Agree, Neutral, Disagree*)**

**Why?**

**In your opinion, what is/are the suitable / most successful Strategic / Business management model adopted by Research & Technology Parks?**

**In your opinion, what are the suitable / Best Practices for the most successful Research & Technology Parks?**

## **APPENDIX F: INTERVIEW WITH POLICYMAKER**

General Information:

**Please provide a short background of your organisation:**

**What is the goal of this organisation?**

**When was it established?**

**Has it expanded its services?**

**Are you considering including the performance measurement of Research & Technology Parks/Technology valleys/ Accelerators & Incubators in your future strategy?**

**Are you considering including the performance measurement of Entrepreneurs in your future strategy?**

**What are the main industries or fields of technology are measuring the performance for them?**

**Do you provide consultation services to the Techno Valleys / or Entrepreneurs in regards to measuring the performance and growth rate that impact the Saudi economy?**

***If you answered question #2 with (Yes). Please elaborate more on the process of providing consultation services to the Techno Valleys / or entrepreneurs?***

**How many authorities / organisations are you measuring their performance / or providing services to them?**



**Who controls / sets the criteria of technology valleys in the KSA?**

**Have you considered to become the governmental authority responsible for the (OR contribute to) governance & measuring the performance of Smart Cities, Research / Sciences and Technology Parks / Techno Parks / Accelerators & Incubators in the KSA?**

Services:

**What are the services you provide to government authorities?**

**How can your organisation contribute to the success of Research / Science & Technology Parks in the KSA?**

Collaboration of your organisation with the Universities, Techno Valleys, and Other Stakeholders / Partners

**Do you collaborate with other partners in regards measuring the performance of Entrepreneurship, Knowledge & Technology Transfer on a strategic or operative level?** (Please think of other universities and their organisations, other Higher Education Institutions (HEI), other Research and Technology Organisations (RTO), other intermediaries like Chamber of Commerce, incubators, venture capitalist, technology parks, service enterprises, manufacturing enterprises, public & government sector)? **(Yes / No)**

**If you answered question #12 with (Yes). Tell us a bit about the context and content of the collaboration?**

## **APPENDIX G: LIST OF RTPS' SERVICES**

### Added-Value Services

Access to Capital Funding programmes

### *Charged Services*

Accommodations and Tenants' Residential Areas

Emergency and Medical Services

Engineering Construction and contracting

### *IT & Computing Services*

Application and Mobile app. Development

Data Centre

High Performance Computing

ICT, Software-Hardware Consultations and Services

Leasing high-capacity IP Link

Mobile Phone devices and iPads

Software and Application Testing lab

Schools and Childcare

Supermarket

Commercial Evaluation

Consulting Services (Brokerage, Accounting, etc.)

Corporate Office Centre

Crowd Funding Platform

Directory of Tenants' Firms' Information

Efficient Material Supply Chain

Human Resource development and trainings

Introduction Packages

Lawyer & Legal Services

Library Databases services

Local Governmental Services

Mix & Matching with other Tenants' Firms and Faculty Members and Students

New and Innovative Services and Programmes

Product Manufacturing and Assembly

Quality Assurance Testing and Certification

Registration of Business Licenses

Sport Fields and Recreation

Talent Recruitment

Transportation Services

#### Basic Services

ATMs and Banks

Conferences, Co-Working Spaces and Spaces-Offices

Equipment

Internet Connectivity

Parking

Post Office

Rental of Spaces and Lands

Research Centres and Labs

Restaurants, Cafes, and Food Trucks

Technology Transfer Office and Services

Utilities-Facilities-Maintenance services

#### RTPs Functions

Entrepreneurs' Services

Financial Planning

International Relations Networking

Marketing, Promotions, and Networking

Public Investor Relations

Resident Development Services

Strategic and Business Planning and Development

Technology Exports

Tenants Firms Affiliation Services

Trainings and Continuous Professional Education

## APPENDIX H: LIST OF RTPS' KEY PERFORMANCE INDICATORS

**Table 27: The Importance of each Performance Measures for the Various RTP's Governance Model**

RTP Governance Model	Measure Type	Description of the Performance Measurements used by the RTP's Director
Non-profit organisation	Quantitative Measures	<p>RTPs with 'Non-profit' governance model evaluate and measure the performance and growth rate of their parks using the below quantitative KPIs:</p> <ul style="list-style-type: none"> <li>• The park's occupancy level regarding number of overall park's size, the size of the buildings and constructions undergoing on-park, and the number of potential requests of tenants' firms to locate on-park.</li> <li>• The classification includes the number of tenants' firms (large corporates) located on-park.</li> <li>• The number of start-ups, academic spin-offs., and entrepreneurs located on-park.</li> <li>• Financial and profitability KPIs: such as the annual revenue of the RTP's income from leasing the spaces, landscapes, and offices to the tenants' firms.</li> <li>• RTP's Liabilities KPIs such as the taxes paid to local or central government. On the other hand, the tax exemptions and incentives paid to the park by the government.</li> <li>• The number of collaboration activities that took place among the tenants' firms and the park's associated university.</li> </ul>

		<p>Conversely, the RTPs' performance measurement highly depends on the performance of the tenants' firms; thus the parks usually evaluate and measure the performance of their tenants' firms, either on an annually or semi-annual basis. The below KPIs are considered highly important to the RTPs in regards the performance of their tenants' firms:</p> <ul style="list-style-type: none"> <li>• The number of jobs created by the tenants' firms (the large and medium companies) and the number of technology-based job creations that align with the RTP's vision and goal. The classification includes the number of jobs created by the start-up companies and the number of technology-based job creations that align with the RTP's vision and goal.</li> <li>• The number of employees and turnover for the tenants' firms (large and medium companies), start-up companies.</li> <li>• How the tenants' firms (large and medium companies) and start-up companies contributed to the job creation at the local level.</li> <li>• The products, processes, and services produced by the tenants' firms</li> </ul>
	Qualitative Measures	<p>Some of the 'Non-profit' RTPs employ the qualitative measures to focus on the quality of the collaborations among the park and tenants' firms, start-ups and entrepreneurs. In addition, the most important from their perspectives is the quality of R&amp;D collaborative projects, proof-of-concepts, and engagement between the tenants' firms among themselves and the between the tenants' firms and the associated university's faculty members, researchers, postdocs, and students.</p>

		<p>The second performance measure which is highly important in the long term is the economic impact on how the park and the tenants' firms' located on-park contribute at the local, regional, and national economic development levels.</p> <p>The third performance measure of importance to RTPs of 'non-profit' governance model is the social and environmental impact on the economic development of the community on a local-scale, and the influence that the parks have over the society. That can be interpreted by policy changes or policy creation by the policymakers as influenced by the RTP's outcomes to improve the living conditions of the society. Examples can be 'social entrepreneurship', 'increase the level of innovation among the society', and many other qualitative measures that directly or indirectly impact the society. <i>"Qualitative measures such as the contribution of the park to the community, the reputation of the park, business consultancy services done by the community not the park, etc. anything that doesn't cost money to the park will be measured by qualitative measures."</i> [RTPD- URTWDU]</p> <p><i>"The main difficulty here lies in the fact that because of their nature, STPs deal a lot with qualitative aspects, but these are very difficult to measure. Qualitative aspects are very important, but we are now trying to understand better what the right methodologies are to be able to assess them in a credible way."</i> [RTPAC-SL]</p>
<b>Part of University Structure</b>	<b>Quantitative Measures</b>	<p>Since the RTPs with the governance model 'Part of the university structure' are obtaining the funds of the park's operations from the university, they are limited in the funding sources and they differ from one country to another. Some of the participants indicated that it is not a</p>

compulsory to report the performance and growth of the park to the university management. Conversely, some of the participants claimed that they measure the performance of their entrepreneurship centre and incubator by an independent body such as UBI Index which is a European research initiative specialised in incubators' benchmarking. In addition, some of the performance measurements' reports of RTPs located in the USA are prepared by independent organisations such as Economy League of Philadelphia. However, most of them use the below quantitative KPIs to evaluate and measure the performance and growth rate:

- RTP's occupancy's level regarding the tenants' firms located on-park, the overall size of each park, the size of the buildings and ongoing constructions on-park, and the number of potential requests of tenants' firms to locate on-park.
- Financial and Profitability KPIs: such as the annual revenue of the RTP's income from leasing the spaces, landscapes, and offices to the tenants' firms.
- The number of executed incubators and accelerators' programmes.
- The number of attendees of the incubators and accelerators' programmes.
- The number of projects created by attendees of the incubators and accelerators' programmes
- There are some mandated KPIs requested by the university's governance on the number of start-ups and academic spin-offs created from each academic division and research centre.



- The RTPs that receive seed funds from the university; there are special KPIs required for measuring the performance of the ROI for the provided seed funds.
- The number of new and innovative commercialised products that are available to the public resulted from the university technology transfer.
- The number of intellectual property licenses executed.
- The number of filed patents.
- The number of registered patents.
- The amount of funds received by the park in form of donations and grants from the government, the private sectors.

One of the participants stated that they are using automated software for technology transfer to manage online invention disclosures, marketing and customer relations management, intellectual property management, contracts, financial tracking and compliance and a suite of graphical reporting. Moreover, the software is used to evaluate the performance of TTO and geared for commercialisation.

Participants agreed that RTPs' performance measurement highly depends on the performance of the tenants' firms; thus, the parks usually evaluate and measure the performance of their tenants' firms, either on an annual basis, to evaluate their eligibility to continue occupying the spaces on-park, especially for the start-ups and entrepreneurs.

		<p>The below quantitative KPIs are considered highly important to the RTPs regarding the performance of their tenants' firms:</p> <ul style="list-style-type: none"> <li>• The number of jobs created by the start-ups companies and the number of technology-based job creations that align with the RTP's vision and goal</li> <li>• The number of employees and turnover for the tenants' firms' start-up companies</li> <li>• The number of entrepreneurs enrolled in the incubator and accelerator programmes</li> <li>• The number of successful graduated start-up companies that moved off-park</li> <li>• The growth rate of the tenants' firms in USD</li> <li>• The total investment funds raised by the tenants' firms</li> <li>• The venture capital and angel investors and the total amount provided by them to the start-ups companies</li> <li>• The number of start-up companies connected to the industry's firms who invested in the innovations and commercialisations of the start-ups</li> <li>• The prizes (in USD) received by the entrepreneurs located on-park as a result of their participation in local, regional, and international start-up competitions and hackathons</li> </ul>
	Qualitative Measures	<p>In general, from what the researcher observed from the qualitative data analysis, RTPs with the governance model 'Part of university's structure' extensively use qualitative measures due to their attachment to the university non-tangible impact resulting from the university's research. Mainly they use the below KPIs to evaluate the qualitative measures of the park:</p>

- The evaluation of the quality and efficiency of the RTP's performance measurements
- The quality of the environmental factors of the RTP and the impact on the environment
- The degree of the knowledge concentration and quality of knowledge-transfer activities
- The satisfaction degree of the tenants' firms with the RTP's services
- The effectiveness of the long-term relationship between the tenants' firms and the RTP's management
- The impact of the assessment strategy of the park on the tenants' firms
- Community outreach activities and its effectiveness and impact on spreading the entrepreneurial culture in the society
- The impact of flow of knowledge across the RTP's stakeholders
- Economic Performance and Impact KPIs
- Innovation and Research and Development KPIs

Mainly there is a consensus among participants of this RTP's governance model that it is seldom to concretely measure the impact of RTP 'under the university' on the local economic development. Due to several reasons, such as of the unforeseen, multiple factors involved. The RTP's actors and stakeholder and variables involved in the measurement of the impact and the outcomes is unpredictable.

		<p><i>“Nobody can predict if the impact is going to be good or bad, because there are too many factors, too many variables, too many actors that you just do not know.” [RTPD-KRED-KC]</i></p> <p>One the RTP’s managers construed that, <i>“due to the fact that the nature of the business is not instant in early stage it is difficult to have a quantitative number so intangible indicator such as start up spending (too fast, which means spending on unimportant spending)” [RTPM-IF-SS]</i></p>
<p><b>Company Owned by University</b></p>	<p>Quantitative Measures</p>	<p>The RTPs with governance model ‘Company owned by university’ diverges in the degree and depth of their RTPs’ performance measurements. For example, the exercise of the measuring the performance evolves over time depending on the park’s maturity level, the quality of the tenants’ firms located on-park, and the park’s strategic visionary management.</p> <p>The measurement of Park reports is aligned with international and standard performance measurements of RTPs such as IASP measurement. <i>“Measurement criteria and growth rate of the park are highly mature at our RTP and we are using a web-based tool developed in-house” [RTPD-DTVCHR].</i></p> <p>The majority of RTPs use the below quantitative KPIs to evaluate and measure the performance and growth rate:</p> <ul style="list-style-type: none"> <li>• Financial measurement of the valuation of the park’s assets and the revenue’s generated from the subsidiaries’ companies</li> <li>• Entrepreneurship KPIs such as number of academic spinoff and students’ start-up companies, and number of the start-up companies incubated on-park</li> <li>• Number of legally registered start-up companies</li> </ul>

- Number of locally and internationally registered start-up companies
- Number of start-up companies received funding
- Number of start-up companies received venture capital fund
- The valuation of the start-up companies
- Number of tenants with high-tech companies
- Percentage of the park's services expansion
- The park's growth rate over the years
- The tenants' firms' growth rate
- The start-ups' growth rate
- Technology and Knowledge transfer, and Commercialisations KPIs, such as number of filed and registered patents, and number of commercialised IPs
- The degree and quality of collaborative, innovative projects between the park and the associated university's faculty, students, and researchers
- The percentage of the park's contribution to the local jobs domiciliation

The performance measurement of the tenants' firms is a key factor in measuring the RTPs' performance, therefore, the RTPs use the below quantitative KPIs to measure the performance of the on-park tenants' firms:

- Total revenue of start-up companies
- Number of technology products, services, processes produced by the start-ups

		<ul style="list-style-type: none"> <li>• Number of local jobs created by tenants' firms</li> <li>• Number of start-up companies' clients</li> <li>• Number of start-up companies that entered new markets</li> <li>• Ratio of female vs. male entrepreneurs and the employees working on the park</li> <li>• Number of start-up established and registered companies as an outcome of the Entrepreneurship Institute's programmes</li> </ul> <p>Regarding the funds and budgets allocated for the strategic initiatives of the parks, one of the participants stated that <i>"Budgets KPI should be invested in the development of the Park by signing contracts and kick-off projects and not leave the budget on-hold"</i> [RTPD-MWTC-FA].</p>
	Qualitative Measures	<ul style="list-style-type: none"> <li>• Community outreach and Corporate Social Responsibilities activities of the tenants' firms located on-park</li> <li>• Research and Development, and innovations outcomes of the tenants' firms</li> <li>• The measurement of ecosystem creation of the park</li> <li>• The frequency and quality of performance measurements and how the park listen to the voice of customers, whether the customers are tenants' firms of large, medium, small, or start-up companies located on-park</li> <li>• The adoption rate of the incubator's programmes by the start-ups</li> <li>• The park's efforts in Technology and Knowledge Transfer and Domiciliation's Investment and the park's impact on the local economic development</li> </ul>

		<p>The selection criteria set by the one of the parks is that it measures the tenants' firms on the maintenance and the development of the technology-facilities and labs, whereas, among all the others RTPs, the maintenance and the development of the technology-facilities and research labs are the core responsibility of the park. Mainly, the parks are promoting their facilities' research labs to attract tenants' firms to locate on-park.</p>
<p><b>Company with Share Capital</b></p>	<p>Quantitative Measures</p>	<p>The main goals of the RTPs with governance model type 'Company with share capital' is the financial sustainability, therefore, the RTPs performance management and measurements processes are extremely curial in accomplishing the RTP's vision and goals. Like the RTPs with governance model 'Company owned by university', the measurement of RTP's reports must adhere to the industrial international and standard performance measurements of RTPs such as balanced scorecards. These RTPs' companies collect the data from the different parties and departments, tenants' firms, and start-ups to conduct extensive analysis, construct a performance measurements framework, and finally present the results in the RTP's board of directors and management's digital boardroom using dashboards of both qualitative and quantitative KPIs. However, the majority of the KPIs for this type of Park fall under quantitative measure as listed below:</p> <ul style="list-style-type: none"> <li>• The number of talented resources employed by the park</li> <li>• The percentage of growth in the number of tenants' firms located on- and off-park</li> <li>• The value and percentage of increase of commercial revenues generated by the park</li> </ul>

		<p>One of the giant RTPs stated that: <i>“Our RTP’s Revenue’s growth rate has increased tremendously by 990% during the last 16 years”</i> [RTPD-TP-TZ].</p> <ul style="list-style-type: none"> <li>• The increase in the number of incubators run by the company</li> <li>• The number of science cities and RTPs run by the company</li> <li>• The amount of investment funds spent by the company outside the local city</li> <li>• The number of consultation sessions conducted by the RTP’s resources</li> <li>• The number of international projects run and monitored by the park through the collaboration, technology and knowledge transfer, and commercialisation programmes</li> <li>• The number of attendance at to the park’s events, workshops, networking activities</li> </ul> <p><i>“91% of the park is derived from commercialising and commercial activities related to S&amp;T”</i> [RTPD-BPSF-FC].</p>
	Qualitative Measures	<p>The qualitative measures are of high importance to the RTPs governed as ‘company with share capital’ as it includes indicators to the management that directly alert them with the tenants’ firms’ satisfaction levels. These measures periodically requested by the private and public sectors investing on-park, in addition to the local and regional governments to measure the impact of the RTPs on the local and regional economic, social, and environmental development. These qualitative measures are:</p> <ul style="list-style-type: none"> <li>• The extent of contributions to the society from the economic aspects</li> <li>• The impact of the parks on the start-ups and entrepreneurial and cultural change</li> </ul>



		<ul style="list-style-type: none"> <li>• The perceived economic values of the products, services and processes created by the tenant's firms located on-park</li> <li>• The quality and assessment of the RTP's innovation strategic visionary roadmap, which evaluated by a scientific committee consisted of external and internal stakeholders</li> <li>• The satisfaction of tenants' firms on the level of the RTPs' quality of services</li> <li>• The satisfaction of the society with the RTPs' performance</li> <li>• Measuring the RTP's competencies on raising funds for on-park start-ups from joint ventures and angles investors, etc.</li> <li>• The economic, social, and entrepreneurial impact of start-ups located on-park on the local universities</li> </ul>
<b>Triple-helix</b>	Quantitative Measures	<p>RTPs with the 'Triple-helix' governance model have a broad range of performance measurements. Due to the mixed nature of the RTPs' actors and stakeholders, these type of RTPs evaluate and measure the performance and growth rate of their parks using multiple set of quantitative KPIs range from technology and knowledge transfer, innovation, R&amp;D, and occupancy, etc.</p> <p>Each stakeholder and actor of the park can introduce and embed the relevant performance measurements according to the goal he/she interested in achieving from the park. Since the performance measurement process of the Triple-helix RTPs is of high importance to the RTPs' board of directors and stakeholder, the process is carried out by independent third-party organisations to maintain the level of accuracy and transparency.</p>

Below is a summary of the quantitative KPIs used according to the interview transcripts:

- The number of filed and registered patents by the tenants' firms, start-ups, and academic spin-off located on-park
- The number of licensed and commercialised IPs leading to successful creation of high-tech and innovative companies
- The income and net gross generated from the licensed IPs and commercialisation
- The financial revenue from the collaborative and innovation projects
- The number of attendees of the conferences, networking and gathering events, workshops, hackathons, competitions and start-ups weekends programmes, and series of speakers conducted on-park by the RTP's different departments.
- The occupancy rate of the RTP regarding the overall RTP's size, and the size of completed buildings, facilities, and amenities
- The number of tenants' firms, start-ups, and academic spin-off located on-park and off-park
- Measuring and monitoring the progress projects, programmes, and strategic initiatives of tenants' firms, start-ups and academic spin-offs located on-park
- The increased number and percentage of the newly established and registered start-up companies
- The number of job created by tenants' firms

		<ul style="list-style-type: none"> <li>• The amount of financial investment of seed funds in start-ups and entrepreneurs located on-park</li> <li>• The amount of financial investment of seed funds in the R&amp;D activities and collaborative R&amp;D projects</li> <li>• The number of NTBFs and entrepreneurs</li> <li>• The RTP's improvements to the ecosystem: physical and technological infrastructures</li> <li>• Measuring the issues and obstacles of the RTPs and the progress towards resolving them</li> <li>• The number of students' internships</li> <li>• The percentage of the internationalisations of the start-ups, academic spin-offs and entrepreneurs located on-park</li> <li>• The RTP's progress and performance of innovations strategies implementation</li> <li>• The number of formal and informal relationships between the tenants' firms, start-ups, academic spin-offs and entrepreneurs located on-park, in form of projects, mentoring, merging and acquisitions, etc.</li> </ul>
	Qualitative Measures	<p>The qualitative measures are of high importance to Triple-helix RTP as it consists of several stakeholders and actors. These measures are frequently requested from the RTP's management to be presented to the various stakeholders such as local and regional governments, private sectors, the universities, and the society. These qualitative measures are as follow:</p> <ul style="list-style-type: none"> <li>• The significant impact of the RTP on the society</li> </ul>

		<ul style="list-style-type: none"> <li>• The annual satisfaction survey of tenants' firms on the level of RTPs' quality of services and the park's performance and progress of the strategy</li> <li>• The quality and assessment of RTP's innovation strategic visionary roadmap, which evaluated by a scientific committee consisted of external and internal stakeholders</li> <li>• Measuring the interest of the tenants' firms (current and potential) and the community on the RTP</li> <li>• Measuring the alignment of the park on the national innovation strategy and territorial integration</li> <li>• Measuring the RTP's competencies in ranking and developing talented resources</li> <li>• Measuring how the development of RTP contributes to the innovations ecosystem</li> <li>• Assessment of the energy footprints' efficiency and control in the RTPs</li> <li>• Measuring the RTP's strategic value of the capacity of integrating business processes in an innovative educational way</li> <li>• Measuring the level of RTP's' entrepreneurial ecosystem and the talent building and development to encourage effective collaborations and partnerships between universities, public institutions and private innovative companies</li> </ul>
<b>Government- Free Zone</b>	Quantitative Measures	RTPs with the 'Government – Free zones' governance model evaluate and measure the performance and growth rate of their parks and tenants' firms located on-park using multiple set of quantitative KPIs range from technology and knowledge transfer, innovation and R&D, occupancy. Most important is the economic development impact of the technological exports and

industry's domiciliation. Since the performance measurement process of this type of RTP is of high importance to the RTPs' board of directors as the fund of the RTP considered governmental funds, it need to monitored and reported on national level. Therefore, the process of measuring the performance consists of several number of auditors to validate the parks' performance, companies, and start-ups located on-park.

After the reports of performance issued by the parks, an immediate action plan for each park should be provided to the government to plan for the next funding cycle. Below is a summary of the quantitative KPIs used according to the interview transcripts:

- Number of technology exports
- Percentage of technology exports vs. other exports from the RTP
- Amount of revenue generated from technology sales of the tenants' firms
- Number of employees on RTP
- RTP's occupancy KPIs
- Number of projects undergoing on-park
- Number of international companies investing on-park
- Percentage of foreign R&D investment on-park
- Number of faculty spin-offs
- Percentage of the commercialised IPs
- Percentages of technology fields operating on-park
- Percentage of global brands crated by tenants' firms located on-park

		<ul style="list-style-type: none"> <li>• The ratio of R&amp;D staff to total staff number</li> <li>• The ratio of R&amp;D expense to total expenses</li> <li>• The ratio of R&amp;D revenue to R&amp;D expenses</li> <li>• The ratio of R&amp;D export amount to total export</li> <li>• Percentage of the tenants' firms' and start-ups growth</li> <li>• Number of job creation by tenants' firms</li> <li>• Financial measurements</li> <li>• Infrastructure growth of the park</li> <li>• Number of IPs licensing</li> <li>• Number of registered and filled Patents</li> </ul>
	Qualitative Measures	<ul style="list-style-type: none"> <li>• Ranking and Percentages of the tenants' firms located on-park according to R&amp;D activities, commercialisation, and performance</li> <li>• Measurement of collaboration with different RTP's stakeholders and actors such as foreign companies, research institutes, universities, private and public sectors</li> <li>• RTP's economic impacts on the local, regional, national, and international economic development</li> </ul>

## **APPENDIX I: LIST OF COUNTRIES THAT PARTICIPATED IN THE RESEARCH STUDY**

1. Austria: 2 RTPs observed.
2. Azerbaijan: 1 RTP observed.
3. Brazil: 10 RTP observed.
4. Canada: 1 RTP observed.
5. China: 10 RTP observed.
6. Estonia: 2 RTPs observed.
7. Germany: 1 RTP observed.
8. Greece: 1 RTP observed.
9. Iran: 5 RTP observed
10. Italy: 4 RTPs observed.
11. Kazakhstan: 2 RTPs observed.
12. Mexico: 2 RTPs observed.
13. Netherlands: 2 RTPs observed.
14. Pakistan: 1 RTP observed.
15. Russia: 21 RTPs observed.
16. KSA: 5 RTPs observed.
17. Nigeria: 1 RTP observed.
18. Slovenia: 2 RTPs observed.
19. South Africa: 3 RTPs observed.
20. Spain: 6 RTPs observed.
21. Sweden: 5 RTPs observed.
22. Turkey: 5 RTPs observed.
23. United Arab Emirates: 1 RTP observed.
24. United Kingdom: 2 RTPs observed.
25. United State of America: 20 RTPs observed.

## **APPENDIX J: RTP VISION REALISATION COMPONENTS AND SUB COMPONENTS**

### **Benchmarking to RTPs Globally**

**Lesson Learnt from RTPs' Failures**

**Success Factors from RTPs**

### **Collaborations & Partnerships**

**Collaboration among various RTPs and Universities**

**Collaboration between RTP Tenants' Firms and start-ups, students, researchers, faculty located on-park**

**Collaboration in research & projects**

**International Cooperation & Collaboration**

**Local Industrial & Governmental Collaboration**

### **Eco System**

*Areas of innovation*

**Free Zones**

**Less rigid boundaries**

**Smart Cities**

**Stimulating Innovation Tool**

*Business Incubators and Accelerators*

**Growth Accelerator**

**Pre-Incubator, Incubators, Accelerators & Venture Capital**

**Commercialisation**

**Entrepreneurship**

**Funds Sources & Revenues**

**Infrastructure**

**Knowledge Transfer & Confidentiality**

**Live-Work-Play**

**RTP Resources**

**Selection Criteria**

### **Sustainability**



***The Universities***

**Academic Spinoff**

**Access to the University**

**Agreements with university**

**RTP has a University Industry Liaison Office**

**RTP Shares services and Infrastructure with the university**

**Performance Measurements in RTP**

***RTP Qualitative and Quantitative Measures***

***Qualitative Measures***

**Community Outreach**

**Economic Performance & Impact Measures**

**Frequency & Quality of Collaborations & Networking**

**Frequency & Quality of KPIs**

**Innovation & R&D KPIs**

**Quality of Tenants on-park and Quality of RTP Services**

***Quantitative Measures***

**Eco Systems KPIs**

**Entrepreneurship KPIs**

**Financial KPIs**

**Investment Fund KPIs**

**Occupancy KPI**

**Qualified & Talented Personnel**

**TTO & Knowledge Transfer Performance Measures**

***Tenants Firms KPIs***

**Academic Collaboration with associated university**

**Access to finance**

**Commercialisation**

**No. of Start-ups' Customers**

**Research & Development Outcomes and Progress**

**Technical products**

**The companies' employees and job growth**

**Turnover and revenue**

**RTP Attraction & Value Proposition**  
**Access to the associated university**  
**Access to the Park**  
**Acquire start-ups**  
**Attraction to Invest in the KSA and RTPs**  
**Connecting with Industries and Venture Capitalist**  
**Connecting with Local Governmental Agencies**  
**Excellent infrastructure**  
**Excellent Living Environment**  
**Local Job Creation**  
**Location**  
**Networking & Collaboration opportunities-Potential customers**  
**Reasonable membership fees**  
**Reputation**  
**Supply Chain Management**  
**Talented Resources**  
**Taxes Exemption**  
**Technical and environmental safety**  
**RTP Strategic-Governance-Management Model**  
**Governance management model**  
***RTP Background & Goals***  
**Background of RTP**  
**Goals of RTP**  
**RTP Technologies Areas**  
**RTP Strategy impact on the Tenants' firms' performance**  
**RTPs Competition**  
***RTPs Stakeholders***  
**Private Sector, Investors, Banks, and Real Estate Developers**  
**Public Sector**  
**Tenants**  
**The Society**  
**University, and R&D institutes**



## APPENDIX K: ERGO FORMS: UNIVERSITY OF SOUTHAMPTON (RISK ASSESSMENT FORM)

Please Tick () one:

Undergraduate     Postgraduate (Taught)     MPhil/PhD     Staff

Degree programme/Certificate (if applicable):

**Doctorate of Business Administration – Part time**

<b>Your Name:</b>	Reem Helmi Turkey	<b>Univ of Soton Email:</b>	<a href="mailto:Rht1g14@soton.ac.uk">Rht1g14@soton.ac.uk</a>
<b>Supervisor</b>	<b>First supervisor: Dr. Jonathan Klein</b> <b>Second supervisor: Professor Malcolm Higgs</b>		
<b>Other researchers/ collaborators (if applicable):</b>	Not Applicable		

<b>Title of Study: Implementation of Strategic Visionary Management of Research Parks Affiliated with Universities</b>
<b>Expected start date and duration:</b> <b>3 May 2017 – 30 September 2017</b> <b>Duration: 45-90 minutes for each interview</b>

### Part 1: Who does your research involve?

Does your research involve any of the following?	YES	NO
1. <b>Interviews/</b> Focus Groups	YES	
2. <b>Questionnaires/Surveys</b>	YES	

3. <b>Physical Observation/</b> Factory Visits	YES	
--	-----	--

***If you have answered 'NO' to all of the above, then your research does not need any further risk assessment.***

***If you answered 'YES' to any question, then please continue on the next page***

**Part 2: Description of the intended empirical research:**

<p>Population to be targeted (e.g., list the organisation(s) where you will solicit participation from employees and specify the number of people you intend to recruit):</p>	<p><b>Organisations:</b>  <b><u>Total No. of Participants= 1,542 Participants</u></b>  <b>Surveys (Questionnaires): total of 1500 questionnaire</b>                  Removed for confidentiality purposes</p>			
<p>Nature of survey method (e.g., questionnaire, interview, etc.):</p>	<p><b><i>Interviews, Questionnaire (by emails using iSurvey Soton), Observations</i></b></p>			
<p>Method of data collection (please tick all relevant boxes)</p>	<p>Face-to-face <input type="checkbox"/></p>	<p>Telephone <input type="checkbox"/></p>	<p>Email/Web <input type="checkbox"/></p>	<p>Post <input type="checkbox"/></p>
<p>Location, including full postal address (es) and telephone numbers. (List on a separate</p>	<p><b>Removed for confidentiality purposes</b></p>			

sheet if necessary)	
Time of day that research will be taking place:	<b>From 9AM-5PM</b>

**Part 3a: Risk Assessment: Travel**

Risk/Hazard (Please add any further risks/hazards to which you might be exposed through travel in the spare rows below)	(Tick one box in each row below)		Assessment of Risk (tick one box below in each row)			If Medium or high, what can you do to reduce the risks? (append details on a separate sheet as necessary)
	Yes	No	Low	Medium	High	
Travelling within the UK	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input checked="" type="checkbox"/>			
Travelling outside the UK but to home country	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input checked="" type="checkbox"/>			
Travelling outside the UK but not to home country	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input checked="" type="checkbox"/>			
Mode of Travel to reach address(es) listed above:	<b>Travel to U.K., UAE, Qatar, Eastern Region Saudi Arabia:</b> <b>By Aeroplane</b> <b>Travel within Western Region Saudi Arabia:</b> <b>By Cars</b> <b>Travel within U.K.:</b>					

	<b>By train</b>
--	-----------------

***You must notify either a colleague, friend, housemate or your supervisor of your actual date and time of travel. Ensure that you let them know the exact address where you have gone to and let them know when you have returned.***



**Part 3b: Risk assessment: Empirical Research**

Risk/Hazard <i>(Please add any further risks/hazards to which you might be exposed in the spare rows below)</i>		Assessment of Risk <i>(tick one box below)</i>			If Medium or high, what can you do to reduce the risks?
		Low	Medium	High	
The location of your research:	<i>(Tick one box below)</i>	<input checked="" type="checkbox"/>			
Street	<input type="checkbox"/>				
Office	<input type="checkbox"/>				
Factory	<input type="checkbox"/>				
Other (please describe): <b>Conference</b>	<input type="checkbox"/>				
If you have ticked 'Factory', give details of what is manufactured there:					
Time of research if outside standard office hours:	Start time: _____ End time: _____				

# APPENDIX L: ERGO FORMS: RESEARCH PROJECT CONSENT



## CONSENT FORM FOR RTPs DIRECTORS (V4)

Study title: **Implementation of Strategic Visionary Management of Research Parks Affiliated with Universities**

Researcher name: **Reem Helmi Turkey**  
Ethics reference: **16849**

*Please initial the boxes if you agree with the statements:*

I have read and understood the information sheet (May 2017, V.3) and have had the opportunity to ask questions about the study.

I agree to take part in this research project and agree for my data to be used for the purpose of this study

I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected

### **Data Protection**

*I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing **any personal data will be made anonymous.***

Name of participant (print name).....

Signature of participant.....

Date.....

## APPENDIX M: ERGO FORMS: DEBRIEFING FOR RTPS DIRECTORS

**Study Title:** [Implementation of Strategic Visionary Management of Research Parks Affiliated with Universities](#)

**Researcher:** [Reem Helmi Turkey](#)

**Ethics number:** [16849](#)

**Thank you so much for participating in this study. Your participation was very valuable. It has been acknowledged that you are very busy and I very much appreciate the time you devoted to participating in this study. There was some information about the study that could not be discussed with you prior to the study, because doing so probably would have impacted your actions and thus skewed the study results. This form explains these things to you now.**

### **What is the research about?**

I am Reem H. Turkey, a full-time staff member at RTPKIED and Part-time Doctorate student at University of Southampton. My research study is funded by RTPKIED. My research study is an academic research that I am undertaking as part of the degree fulfilment for Doctorate of Business Administration from University of Southampton, U.K.

**The goal of this research study** is to empirically test the relationship between the governance of Research & Technology Parks and the performance growth rate of the park. In addition, it will explore a method of increasing the performance growth rate by creating a strategic management conceptualisation model generated from benchmarking different successful management models of science parks from all over the world. This research project is expanding the existing knowledge of assessment and Improvement of the research park performance but focusing on the KSA culture and context. The research design will consider both successful research parks and lesson learned from failed cases and how they overcome the failure and become successful cases.

The research methodology will employ Mixed Method. The data of the quantitative approach will be gathered from an expected sample of 1500 RTPs' organisations who are members of AURP and IASA, from different countries and with different governance models.

On the other hand, qualitative approach has been planned to be collected through structured and semi-structured interviews with total of 47~ 79 RTPs' directors, RTPs' managers, and RTPs' tenants' firms and managers from different countries and within the KSA and Gulf countries. Initial approval was already obtained from the RTPs directors to participate in the interviews. The purpose of the semi-structured interviews with the RTPs' tenants is to investigate the stakeholder's point of view in conceptualisation of the best strategic visionary model for RTPs in the KSA. In addition to survey and interviews, observations of selected RTPs will be used as a research method.

#### **Use of active deception or misleading participants**

This Research does not use any active deception.

**We hope this clarifies the purpose of the research, and the reason why we could not tell you all the details about the study prior to your participation. If you would like more information about the research, you may be interested in the following:**

Cabral, R., 1998a. From University Industry Interfaces to the Making of a Science Park Florianopolis Southern Brazil.pdf. *International Journal of Technology Management*.

Cabral, R., 1998b. Refining the Cabral Dahab Science Park Management Paradigm.pdf. *International Journal of Technology Management*, 16(8), pp.813–818.

Cabral, R., 1998c. The Cabral Dahab Science Park Management Paradigm. *International Journal of Technology Management*, 16(8), pp.721–725.

Cabral, R. & Dahab, S., 1998. Science Parks in Developing Countries The Case of BIORIO in Brazil.pdf. *International Journal of Technology Management*.

**If you have any questions or concerns, you may contact me:**

The Researcher Reem Turkey (email: [rht1g14@soton.ac.uk](mailto:rht1g14@soton.ac.uk) ) will answer any questions that a potential participant may have.

**It is very important that you do not discuss this study with anyone else until the study is complete. Our efforts will be greatly compromised if participants come into this study knowing what is about and how the ideas are being tested. Once again results of this study will not include your name or any other identifying characteristics.**

**If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the research support officer ([risethic@soton.ac.uk](mailto:risethic@soton.ac.uk)) or Head of Research Governance, Research Governance Office, University of Southampton, Southampton, SO17 1BJ. Phone: 02380 595058, Email: [rgoinfo@soton.ac.uk](mailto:rgoinfo@soton.ac.uk)**

## APPENDIX N: ERGO FORMS: PARTICIPANT INFORMATION SHEET

**Study Title:** [Implementation of Strategic Visionary Management of Research Parks Affiliated with Universities](#)

**Researcher:** [Reem Helmi Turkey](#)

**Ethics number:** [16849](#)

**Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.**

### **What is the research about?**

I am Reem H. Turkey, a full-time staff member at RTPKIED and Part-time Doctorate student at University of Southampton. My research study is funded by RTPKIED. My research study is an academic research that I am undertaking as part of the degree fulfilment for Doctorate of Business Administration from University of Southampton, U.K.

**The goal of this research study** is empirically test the relationship between the governance of Research & Technology Parks and the performance growth rate of the park. In addition, it will explore a method of increasing the performance growth rate by creating a strategic management conceptualisation model generated from benchmarking different successful management models of research & science parks from all over the world. This research project is expanding the existing knowledge of assessment and Improvement of the research park performance but focusing on the KSA culture and context. The research design will consider both successful research parks and lesson learned from failed cases and how they overcome the failure and become successful cases. The research methodology will employ Mixed Method. The data of the quantitative approach will be gathered from an expected sample of 1500 Research & Technology Parks who are members of AURP and IASA, from different countries and with different governance models.

On the other hand, qualitative approach has been planned to be collected through structured and semi-structured interviews with a total of 47~ 79 RTPs' directors, RTPs'

managers, and RTPs' tenants' firms and managers from different countries and within the KSA and Gulf countries. Initial approval was already obtained from the RTPs' directors to participate in the interviews. The purpose of the semi-structured interviews with the RTPs' tenants is to investigate the stakeholder's point of view in conceptualisation of the best strategic visionary model for RTPs in the KSA. In addition to survey and interviews, observations of selected RTPs will be used as a research method

### **Why have I been chosen?**

The reason why you have been chosen as potential participants in this study is to learn from your experiences in Managing and Contributing to the success of Research/Science & Technology Parks.

### **What will happen to me if I take part?**

- The researcher will provide the participant with information sheet and consent forms ahead of the interview.
- Before the interview, the researcher should collect the consent form from the participant, then the Interview starts and lasts for around 40-60 minutes.
- At the end of the interview, the researcher will provide the participant with the debriefing document.

### **Are there any benefits in my taking part?**

The participants will be provided copies of the debriefing document presenting the contacts and more details about the research, so that they can be introduced to new and innovative business and strategic models for their research parks, therefor, enhance the park's strategy and customer experience on-park.

### **Are there any risks involved?**

No risks involved.

### **Will my participation be confidential?**

All data that will be collected from participants will be dealt with on a highly confidential level and will not be disclosed to anyone other than the researcher and

her academic supervisor. Additionally, all participants will be provided by consent form and sign it before the interviews. The interviews and questionnaires will be linked anonymously and there is no identification needed from the participants and also the collected data will be coded.

### **What happens if I change my mind?**

The participants have the right to withdraw from the interviews at any time.

### **What happens if something goes wrong?**

In the unlikely case of concern or complaint, you should provide a named independent contact with phone number and email address. This should not be the researcher, supervisor, or any other person involved in the study, but may be the Research Support Officer or the research governance officer. Participants may wish to contact the research support officer ([risethic@soton.ac.uk](mailto:risethic@soton.ac.uk)) or Head of Research Governance (02380 595058, [rgoinfo@soton.ac.uk](mailto:rgoinfo@soton.ac.uk) )

### **Where can I get more information?**

The Researcher Reem Turkey (email: [rht1g14@soton.ac.uk](mailto:rht1g14@soton.ac.uk) ) will answer any questions that a potential participant may have after reading this information sheet.



## APPENDIX P: APPROVAL OF QUESTIONNAIRE DISTRIBUTION

**From:** Farhan M. AlShahrani  
**Sent:** Tuesday, January 03, 2017 7:16 AM  
**To:** Reem H. Turkey  
**Subject:** RE: sending questionnaire survey to AURP

Congratulation of reaching this stage in your degree.

Please send it and I will do the necessary. All the best

---

**From:** Reem H. Turkey  
**Sent:** Monday, January 02, 2017 4:42 PM  
**To:** Farhan M. AlShahrani  
**Cc:** Serry A. Bakarman  
**Subject:** sending questionnaire survey to AURP

Dear Farhan,

I am about to start my doctorate research project and I need your assistance to send a questionnaire survey to AURP so they can distribute it to their Research Parks members.  
Please advise?

Best Regards,  
Reem H. Turkey, PMP, LSSGB, MSc.

# APPENDIX Q: POSTING THE RESEARCH QUESTIONNAIRE AT AURP

The screenshot shows the AURP website with a news article titled "AURP Announces 22nd Annual Awards of Excellence Recipients at 2017 International Conference in Huntsville". The article text includes: "The University of Maryland is very proud to act as the host for AURP's 2018 International Conference," said Brian Damody, Associate Vice President for Corporate and Foundation Relations, University of Maryland, and past AURP President. "The Baltimore-Washington area is a thriving technology corridor, and the University of Maryland Discovery District is a perfect venue to demonstrate the value of research parks as the true intersections of science and innovation." [Read more.](#)

**AURP Announces 22nd Annual Awards of Excellence Recipients at 2017 International Conference in Huntsville**

Huntsville, AL, October 12, 2017 – The Association of University Research Parks (AURP) today announced the recipients of the Awards of Excellence recognized during its 2017 International Conference hosted by Cummings Research Park in Huntsville, AL. Additionally, AURP announced the results of the election for its 2018 Board of Directors.

Categories for the 2017 Awards of Excellence include the coveted Outstanding Research Park Award, Emerging Research Park Award, Career Achievement Award, Leadership Award, Developing Communities of Innovation Award and Innovation Award.

**The University of Maryland BioPark**, located in Baltimore, MD, was named the **Outstanding Research Park** in recognition of its ability to excel in the promotion of growth in technological commercialization and collaboration. The University of Maryland BioPark has created a robust community of innovation while being an integral participant in the University of Maryland, Baltimore (UMB), and in the surrounding community. [Read more.](#)

**AURP Research Parks highlighted in**

**AURP Welcomes Its Newest Members**  
[Click here to learn more](#)

**RESEARCH STUDY: Governance of Research & Technology Parks & the Performance Growth Rate of the Park**

Please consider taking the following surveys:

- Research Parks Directors' [survey](#);
- Research Parks' Tenants firms [survey](#);

Contact, Reem Turkey with questions at: [rht14@oton.ac.uk](mailto:rht14@oton.ac.uk)

الجامعة العراقية  
جامعة تكريت  
King Fahd's University of Science and Technology

**APPENDIX R: TABLE 27**

**Table 28: RTPs’ CEOs’ Opinions in the Relationship between the RTP’s Governance and RTP’s Growth and their Perspective on Governance Definition**

No.	Participant	Governance Model	Opinion on the Relationship between RTP’s Governance model and its Growth rate	Perspective of ‘Governance’
1	RTP-ASUP	Non-profit	<p>The reason between RTPs’ governance model and RTPs’ performance and growth is the complex policies and the management style of the academic institutions are not the best suitable for the dynamic of dealing with the industrial sector and businesses. The academic institutions cannot handle the rapid demands and requirements of the private companies and tenants’ firms located on-park. Thus, it will be so complex for academic management to swiftly eliminate the challenges of the RTP’s actors and stakeholder such as entrepreneurs, and private companies located on-park. The more flexibility of RTP’s governance model, the more flexible the process will be, and the more opportunities of RTP in collaborating with external stakeholders and bodies.</p>	Collaboration Model

2	RTP-ATG	Government-Free Zone	There is a relationship between the RTP's governance model and RTP's growth rate and performance, as it provides the investors and RTP's actors the autonomy in projects' selections, use of the projects' funds to financially support the projects each phase.	<ol style="list-style-type: none"> <li>1. Decision-Making</li> <li>2. RTP's Director Autonomy</li> <li>3. Management and Operations</li> </ol>
3	RTP-BPUM	Non-profit	The relationship between the RTP's governance model and RTP's growth rate and performance is understandable because the governance model authorizes flexible processes of knowledge transfer and commercialisation. Therefore, positively and highly impacting the RTP to facilitate the growth rate of the tenants' firms located on-park.	<ol style="list-style-type: none"> <li>1. Authority</li> <li>2. Collaborations Model</li> <li>3. Decision-Making</li> <li>4. Governance of RTP's Functions</li> </ol>
4	RTP-BTCD	Triple-helix	The reason between the relationship between the RTP's governance model and RTP's growth rate and performance. That relationship is due to the collaboration model that creates an exceptional consortium of different entities united towards one shared goal. In addition, the governance model facilitated the access to high-level knowledge and trained professionals which is one of the main reasons behind the highly performance RTPs. That perfect combination of government, technology and academic achievement drive the RTP to minimise the	<ol style="list-style-type: none"> <li>1. Decision-Making</li> <li>2. Business Model</li> <li>3. Collaboration Model</li> <li>3. Authority</li> </ol>

			cost and risks of funding the RTP's infrastructure due to the support of the RTP's stakeholders and actors' network.	
5	RTP-BCC	Triple-helix	There is a relationship between the RTP's governance model and RTP's growth rate and performance, inasmuch the growth of the park driven by the governance model that swiftly cultivates the open innovation ecosystem between the RTP's actors 'government-industry-university. Supported by the fundamental and applied research offered to scientist, entrepreneurs, students and investors. The consortium forms new chances and solutions in sustainability and health that are environmentally sound, business wise, socially positive and boost the economic impact locally and regionally. The RTP governed cooperatively by leadership teams by the consortium board of directors. The governance model enabled the RTP to obtain significant support from the local government, the associated universities, the national government, private sector, several local, regional, and national public funds and bodies.	<ol style="list-style-type: none"> <li>1. Management and Operation</li> <li>2. Collaboration Model</li> <li>3. Business Model</li> </ol>

6	RTP-BPSF	Company with share capital	The relationship between the governance model and its growth rate and performance exists because the governance model creates dependencies on the regulation and authority controlling your park, these obligations can be limited funding sources, less autonomy of the park management, and less decision-making in acquiring the talented resources. The governance model can also limit or increase the park's capabilities to sustain the best services provided to the tenants' firms' located on-park.	<ol style="list-style-type: none"> <li>1. Management and Operation</li> <li>2. Business Model</li> <li>3. Governance of RTP's Functions</li> </ol>
7	RTP-CRP	Triple-helix	The flexibility of the Triple-helix governance model enabled the park to obtain the excellent government support for growth and development of businesses, and the collaborations among the consortium facilitated the park to become the leading RTP regionally.	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Business Model</li> </ol>
8	RTP-CHTP	Government-Free Zone	The empowerment of the governance model supported the RTP to highly growth of the park and enabled the globalisation of the park due to the highly services provided to the tenants' firms due to the effective decision-making and authority that made the park achieves its goal of the open innovation ecosystem. In addition to the flexible investment policies.	<ol style="list-style-type: none"> <li>1. Decision-Making</li> <li>2. Authority</li> <li>3. Collaboration Model</li> <li>4. Ownership</li> <li>5. Governance of RTP's Functions</li> </ol>

				6. RTP's Directory Autonomy
9	RTP-DVTC	Company owned by the university	<p>The relationship between the governance model and the growth rate and performance exists due to multiple reasons. For example: the governance model is the tool that dictate the authority level, the decision-making process, and the degree of bureaucracy in the park. The correlation of the park and its governance model demonstrates the dilemma of many RTPD who has lack of autonomy, due to restricted policies, and therefore, lack of proper decision-making in the management and operation of the park. This in turn can lead to conflict of interests and confusion of governance among the RTP board of directors due to multiple roles and responsibilities. Conversely, there are different management styles between the academic institutions and the park as an enterprise. Which in turn makes the board of director of the park gives less attention towards the talent in the park as he/she plays double roles in managing the university as a president and governing the park as the chair of the board of directors. Thus, gives less focus on the park's staff and management.</p>	<ul style="list-style-type: none"> <li>1. Decision-making</li> <li>2. Autonomy of RTP Director</li> <li>3. Governance of RTP's functions</li> <li>4. Management and Operations</li> <li>5. Organisation Structure</li> </ul>

10	RTP-ETP	Government-Free Zone	<p>The main reason for the relationship between the RTP's governance model and RTP's growth rate and performance is the collaboration opportunities that the governance model enabled, that is the driver for the growth of RTPs. Other than that, the flexible management style to access talented and qualified resources and providing them with incentives to work with tenants' firms on research and innovative collaboration projects. In addition, the tax exemption of income corporate taxes and value-added tax, and the insurance premium support as part of the governance model enabled the tenants' firms to grow tremendously, therefore the RTP's growth rate increased and the park's performance flourished.</p>	<ol style="list-style-type: none"> <li>1. Decision-Making</li> <li>2. Collaboration Model</li> <li>4. Business Model</li> </ol>
11	RTP-GSTP	Triple-helix	<p>The key driver of the relationship between the RTP's governance model and RTP's growth rate and performance is that the governance model determines how flexible the collaboration model between the RTP's various actors will be operated and managed. The smooth and effective collaboration between the RTP's consortium is the catalyst for innovation and collaboration between government, industry and research can trigger innovation and act as an actuate vigour for the innovation and economic development governance, policies, and</p>	<ol style="list-style-type: none"> <li>1. Decision-Making</li> <li>2. Authority</li> <li>3. Collaboration Model</li> <li>4. Management and Operations</li> <li>5. Governance of RTP's Functions</li> </ol>



			<p>processes. That is turn, enables the collaboration model to be executed successfully, the networking and collaboration in projects, knowledge and technology transfer, and academic spin-off creation to happen, and the growth of the park to raise among all the RTP's actors in an open innovation system. The role of the local government is vital in driving the governance model of the parks and flourish the growth of the RTP.</p>	6. RTP's Directory Autonomy
12	RTP-KEID	Part of University organisation structure	<p>A relationship exists between the RTP's governance model and its growth rate and performance because the governance model is the manner and practices of all the activities conducted on-park. For example, if the RTPD decided to update a policy to reduce the charges deducted from the tenants' firms, released another policy on the entry gate for locating the tenants' firms' on-park, and selection criteria for the entrepreneurs and engage the tenants' firms on the strategic visionary roadmap of the park. Therefore, the growth rate and performance of the park will be increased dramatically. The governance model does not necessarily mean spin-off from the university's structure, it can be simply shifting the strategic vision of the park by focusing on the engagement between the university and the tenants' firms, which is the engine of the growth and competitive. The more the park concentrate its governance model on the companies</p>	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Governance of the RTP's functions</li> <li>3. Decision-Making</li> <li>4. Business Model</li> <li>5. Management and Operation</li> </ol>

			with innovation imposition and enable the collaboration with them, the more growth for the park.	
13	RTP-IH	Government-Free Zone	Not only the RTPD-IH agrees there is a relationship between the RTP's governance model and RTP's growth rate and performance, he stated that the tenants' firms also related the governance model to collaboration model, claiming that the 85% of the park's tenants sees the dynamics of the governance and collaboration to their growth and therefore, the park's growth.	Collaboration Model
14	RTP-ISURTP	Non-profit	The reason of the relationship between the RTP's governance model and RTP's growth rate and performance is the governance model enabled the policies and flexible processes for the effective collaboration model to be executed. The park owns, manages, and operates %83 of the buildings on-park and the %17 remaining buildings are owned, managed, and operated by the private sectors. The park does not fall under the management and operation of the university. It has its own governance model, and the RTP's board of directors have the autonomy and decision-making over the RTP's management and operation. Such autonomy and collaboration enabled the growth to raise and the park to attract more tenants' firms, therefore, there is an	<ol style="list-style-type: none"> <li>1. Decision-Making</li> <li>2. Authority</li> <li>3. Collaboration Model</li> <li>4. Management and Operations</li> <li>5. Ownership</li> </ol>

			ongoing expansion of the park to accommodate more tenant's firms to locate on-park. The park has more than 1700 tenants' firms' employees and the number expected to raise twice by the year 2025. That enabled the park to have a tangible economic impact on the city because of the governance model.	
15	RTP-ISC	Government-Free Zone	There are several reasons behind the relationship between RTP's governance model and its growth rate and performance. For example: the governance of the park controls how the park collaborate in a triple-helix setting and the policies govern and control the relationships with the park's stakeholders and different actors. Therefore, the governance model should be interpreted to different aspects. For example: if you have a triple-helix governance model but your park lacks the authority and decision-making, and the board of the park reports to the government, the RTP director is appointed by the Minister, and the government governs the universities and large companies, then the collaboration will be diminished and even the industry will not be active. The other reason is the governance model controls the policies and the basics settings of the park, therefore, the more flexibility of the governance model and govern the park as enterprise, the more growth	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Authority</li> <li>3. Management and Operation</li> <li>4. Organisation Structure</li> <li>5. Ownership</li> </ol>

			<p>the park changes to success. Since the development of parks in developing countries is the role of the governmental authority, then RTP board should differentiate between the ownership and the governance by managing the park with highly autonomous of the park's director by collaborating the private sectors by investing and develop the park's services and appoint the stakeholder from the private sectors to become members on the park's board of directors.</p> <p>Final reason, the management and operation of the park by the government or the university only reduces the level of flexibility of the RTP and complex the governance model.</p>	
16	RTP-JSCP	Triple-helix	<p>Mainly, the governance model is the basis for setting the policies and procedures on how the park operated and managed, that mean setting the rules of the RTP's board of directors, the RTP's management roles, the eligibility of the tenants' firms, and what should and should not be conducted on-park. These factors can make or break the collaboration model. Thus, autonomy of the park and the authority enabled the park to provide the tenants' firms with the services and support to focus on the growth of their companies and boost the growth opportunities via the innovation and collaboration projects with other bodies and park's</p>	<ol style="list-style-type: none"> <li>1. Decision-Making</li> <li>2. RTP's Director Autonomy</li> <li>3. Collaboration Model</li> <li>4. Management and Operations</li> <li>5. Business Model</li> <li>6. Governance of RTP's Functions</li> </ol>

			actors and stakeholders. Moreover, the flexibility of the governance model enabled the park to work as a broker to enable the collaborations among all park's actors, provide trainings, coaching, and mentoring to foster the innovation and lead to the growth and drive the performance of the tenants' firms, and the park's stakeholders consortium.	7. Authority
17	RTP-JTV	Company owned by the university	The main reason of the relationship between the RTP's governance model and RTP's growth rate and performance, because when the governance of the park is solo controlled, the RTP's board of director will lack the autonomy to manage and operate the park. Therefore, the daily collaboration, operations, and services will be micromanaged by the university which will lead to wasted efforts by the park's management	<ol style="list-style-type: none"> <li>1. Authority</li> <li>2. Collaborations Model</li> <li>3. Decision-Making</li> <li>4. Management and Operation</li> <li>5. Organisation Structure</li> <li>8. Ownership</li> <li>9. RTP's Director Autonomy</li> </ol>
18	RTP-LBSPHF	Triple-helix	If the governance model enables the collaboration between the RTP's actors, then the growth rate and performance of the park and other stakeholders will be increased. The harmony between the different stakeholders and their clarity on each's one roles and responsibilities in the governance, makes the collaboration among innovation and	<ol style="list-style-type: none"> <li>1. Authority</li> <li>2. Business Model</li> <li>3. Collaborations Model</li> <li>4. Decision-Making</li> <li>5. Governance of RTP's</li> </ol>

			<p>research projects thrive. The different bodies associate and communicate on the management and operations of the park.</p> <p>Recently, the entrepreneur’s association joined the consortium and improved the growth and the performance of the park by adding value to the entrepreneurship experience of the park. The flexible governance model formulated the park’s policies and governance toward achieving a shared goal among the different parties of the consortium bodies who devoted their efforts to effectively collaborate and communicate to minimize the risks and consequences of any potential future power failures.</p>	<p>Functions</p> <p>6. Management and Operation</p>
19	RTP-SC	Triple-helix	<p>The reason of the relationship between RTP’s governance model and its growth rate and performance, because the governance model boosts the collaboration model of the park and enables numerous entities and stakeholders to attract tenants’ firms and start-ups. Moreover, due to the flexible management style of the triple-helix governance model, the governance model contributed to the growth of the park’s revenue, and increased the park’s expansion, as the triple-helix governance model perfectly aligned to the Park’s innovation strategy.</p>	<p>1. Collaboration Model</p> <p>2. Decision-making</p> <p>3. Ownership</p> <p>4. Management and Operations</p>

20	RTP-SV	Triple-helix	<p>The relationship between RTP’s governance model and its growth rate and performance can vary from negatively or positively impact from that relationship. The vision of the park should determine the governance model because the research centres and academic institutes will never be operated and governed as businesses or corporates. The park’s leadership team should focus the efforts to make the park’s vision come true. Therefore, the leadership team should start growing the park internationally to attract, inspire, and fund the technical entrepreneurs.</p> <p>The park should seek and select the right management team and attract talented resources to achieve the park’s strategic visionary roadmap.</p> <p>Globalisation of the park should be the optimum goal of the park, not only working with the companies to locate on-park, but also collaborating with multinational and international companies in research projects. The success of the RTP’s governance model depends on the RTP’s management and board of directors’ decision-making and autonomy. The governance model should allow the RTP to have two managers: Internal RTP’s manager and International</p>	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Decision-making</li> <li>3. Governance of RTP’s Functions</li> <li>4. Management and Operations</li> <li>5. RTP’s Director Autonomy</li> </ol>
----	--------	--------------	--	--

			RTP's manager, who can focus on marketing, international affairs, and present the park globally. In addition to create value-added for the international companies to locate on-park. Conversely, the governance model of the type "University owned RTP, or part of university structure" imposes encumbrance on the park's success and considered as a stumbling block towards achieving the strategic visionary. Therefore, the governance model drives the policies, procedures, commitment of the board of directors to have autonomy, hence, lead to the growth of the park.	
21	RTP-TH	Company with share capital	The governance model is an enabler for the collaboration if it of a sufficient flexibility because it associations the rewards for both public and private sectors. The relationship between the RTP's governance and RTP's growth lies into facilitating the collaborations and partnerships between the different actors of the parks. Therefore, the governance model can enable the public sectors such as local, regional and international governments to fulfil their needs in collaborating and partnering with the park's actors and stakeholders in R&D, technological, and entrepreneurial projects. On the other side, the private sectors will invest in the park to collaborate with the park's	<ol style="list-style-type: none"> <li>1. Authority</li> <li>2. Business Model</li> <li>3. Collaborations Model</li> <li>4. Decision-Making</li> <li>5. Governance of RTP's Functions</li> <li>6. Management and Operation</li> <li>7. Organisation Structure</li> </ol>



			stakeholders and invest in the park's entrepreneurs and spin-offs and generate revenue, hence, boost the growth rate of the park and drive the performance.	8. Ownership 9. RTP's Director Autonomy
22	RTP-UAEURT	Part of University Structure	There is a relationship between the RTP's governance model and RTP's growth rate and performance, because the governance model of the park influences the formation of the park's strategy, goals, objectives, the strategic initiatives, and how the park will measure these objectives.	1. Organisation Structure 2. Authority 3. Business Model
23	RTP-UTP	Part of University Structure University	The relationship between the RTP's governance model and RTP's growth rate and performance depends on the governance model type, for instance, the park with triple-helix governance model significantly drives the park's growth and performance. Conversely, the park with company share capital governance model has a substantial influential power on the market's share and the services provided to the tenants' firms. On the other hand, the park that is under the university structure has inflexible and complex process in operational and management of the park, especially in the procurement and lease of spaces.	1. Authority 2. Collaborations Model 3. Decision-Making 4. RTP's Director Autonomy 5. Management and Operation 6. Ownership

24	RTP-WMC	Company owned by the university	<p>The relationship between the RTP's governance model and RTP's growth rate and performance exists due to several reasons. One of the reasons is RTP's governance model should totally focuses on commercialisation, creation of ecosystem, and facilitating the innovation on-park among the stakeholders and actors. The RTP governance and operational model should avoid engagement in any R&amp;D activities. One of the activities of R&amp;D most of the parks are undergoing is technology transfer and IP registrations, which is a function that should be governed outside of the RTP's scope. The RTP operations and R&amp;D operations are totally different and cannot be governed by within the same organisation. The other major reason is the economic development function is a major a complex and needs complete attention and governance from the RTP. Therefore, the RTP should cautiously evaluate its governance model to fit the highly demands of the RTP's tenants' firms and attraction of international companies and talented start-ups to locate on-park and leave the R&amp;D operations to the university, to boost its growth rate and performance.</p>	<ol style="list-style-type: none"> <li>1. Authority</li> <li>2. Business Model</li> <li>3. Collaborations Model</li> <li>4. Decision-Making</li> <li>5. Governance of RTP's Functions</li> <li>6. Management and Operation</li> <li>7. Organisation Structure</li> <li>8. Ownership</li> <li>9. RTP's Director Autonomy</li> </ol>
25	RTP-NTCP	Triple-helix	<p>Basically, the governance model is the foundation of the successful RTP and one of its indication is the growth rate and performance of the</p>	<ol style="list-style-type: none"> <li>1. Authority</li> <li>2. Business Model</li> </ol>

park. Therefore, the focus of building the business on innovation is a collaborative and continuous efforts. The governance model set the base for the collaboration model, therefore, governance model is the enabler and facilitator for the enterprises, entrepreneurs, the external bodies, and the universities to partner and collaborate on innovation projects to create the dynamics in the ecosystem, secure funds for from the networks of RTP's stakeholder to finance the innovation projects, and increase the growth of the RTP's different actors of the park and the flourish the RTP's growth in turn. With all that said, RTP promotes the local and regional economic development through its collaboration which is mainly based on the governance model.

The more flexible and diverse governance model, the more impact on the growth rate of the park on an international level.

Moreover, the fundamental governance model of our park is collaboration and knowledge sharing for the sake of growth among all RTP's actors. Transparent and flexible collaborations in strategic initiatives is the main factor for boosting the innovation, producing new innovative ideas and strengthen the growth of our tenants' firms.

- 3. Collaborations Model
- 4. Decision-Making
- 5. Governance of RTP's Functions
- 6. Management & Operation
- 7. Organisation Structure
- 8. Ownership
- 9. RTP's Director Autonomy

26	RTP-OTP	Government-Free Zone	<p>The RTP's management should thoughtfully consider many factors when evaluating if the governance model will serve the long-term strategic visionary roadmap of the park, as this influences the relationship between RTPs' governance model and the RTPs' performance and growth. So, if the park's vision is "Globalisation" or "Regional", then the RTP governance model should be more dynamic to support and boost the growth of the local companies, entrepreneurs, and investors by providing global competitiveness and excellent technology infrastructure, facilities, technology exports, and value-added services, technology development free zones. Therefore, create the excellent ecosystem, raise the quality of the innovation among the entrepreneurs' products, promote commercialisation, smoothly govern the investment opportunities in technology interest fields of the RTP, provide the sufficient authority, autonomy, decision-making to the RTP's director to effectively manage the park's operations. The relationship of governance model is proven in the case of our park, with an evidence of technologies exports capacity of on-park tenants' firms worth around 2.4 billion USD.</p>	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Decision-Making</li> <li>3. Authority</li> <li>4. RTP's Director Autonomy</li> <li>5. Management &amp; Operations</li> </ol>
----	---------	----------------------	--	--

27	RTP-PP	Triple-helix	<p>The governance model relates to the growth in several points: it aligns the partners, stakeholder, and actors of the RTP on the policies, processes, and rules on how they interact among them. All the partners have intensive and broad experience matching the RTP's goal and field of technology. The governance model enabled the RTP to collaborate with several academic institutions, private and public sectors tenants' firms in transfer knowledge and technologies, commercialisation, along with innovation projects collaboration to transform the discovers into commercial products, processes, and services. The advantage of the governance model that increase the growth, is that the flexibility in associating and collaborating with several universities to provide the tenants' firms with value-added services and pool of talented human capital to serve the needs and expectations in specific fields of technologies related to the park's goal and vision.</p>	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Business Model</li> <li>3. Authority</li> <li>4. RTP's Director Autonomy</li> <li>5. Management &amp; Operations</li> </ol>
28	RTP-PDTP	Triple-helix	<p>The park ownership is non-profit, although the governance model is based on Triple-helix governance model. That enabled the park to have a strong collaboration model with all the RTP's stakeholders such as university, the government, the private corporates, and have access to the market. The governance model enabled our park to eliminate the</p>	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Decision-Making</li> <li>3. Authority</li> <li>4. Management &amp; Operations</li> </ol>

			dependency on the RTP's actors and provided the RTP management with the autonomy and decision-making to set the relevant policies, and rules to work in harmony with all our partners.	5. RTP's Director Autonomy
29	RTP-PRFRP	Non-profit	The park governed by fifteen individuals representing the RTP's board of director, and they are responsible for managing and operating the park, monitor the services provided to the tenants, and most importantly authorises the governance model framework, policies, and the park's processes. The governance model built with the voice of the customer in the first place. The governance model relates to the park's performance and growth as the governance model enables the corporates, entrepreneurs, and other RTP's actors' located on-park to perform their daily work toward achieving their goals and raise their growth rate. It also enabled the park to become a key influencer in commercialisation and economic development among the local and regional players, and it helped the park in reaching to its goal in internationalisation.	1. Collaboration Model 2. Decision-Making 3. Authority 4. Governance of RTP's Functions 5. Management & Operations
30	RTP-RTP	Non-profit	There is a relationship between the RTP's governance model and RTP's growth rate and performance, as the governance model initiates	Collaboration Model

			the collaboration between the companies, universities, and society to come together in cross-sectoral projects, and that in turn lead to tremendous achievements and growth in the performances among all actors.	
31	RTP-SRTIP	Government-Free Zone	The relationship between the RTP's governance model and RTP's growth rate and performance is obvious due to major reason: the governance is the policy management of any RTP, therefore it must have equipped with the power to impact the local economic development, and in turn facilitates the RTP with the autonomy and authority to assist the entrepreneurs, the tenants' firms into their daily operations. Therefore, transforming into the knowledge-based economy, to take the local economy to the next level in the field of specialized technologies, innovation-based start-ups. That will never happen if the governance model lacks the sufficient support to the infrastructure and services required to succeed.	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Management &amp; Operations</li> <li>3. Authority</li> <li>4. Governance of RTP's Functions</li> </ol>
32	RTP-SRP	Triple-helix	The relationship between the RTP's governance model and RTP's growth rate and performance is fairly possible as the governance	<ol style="list-style-type: none"> <li>1. RTP's Director Autonomy</li> <li>2. Decision-Making</li> </ol>

			model contingent on the policies, obligations to provide the autonomy to the RTP's management.	3. Authority 4. Governance of RTP's Functions
33	RTP-TPIAS	Government-Free Zone	The strategic model of the park based on partnership and collaboration with various stakeholder from the government, the private and public sectors, local, regional, and international universities, and RTPs Associations. The model depends on the collaboration between the local government, the defence industrial, technological and engineering authorities, the chamber of commerce, the associated university and it is divided into five clusters: 1) aviation sector innovation cooperation 2) R&D Centres Communication and Collaboration, 3) Aviation Sector Innovative Cooperation, 4) Defence, Aeronautics and Space Cluster, and 5) design and engineering services of ships.	1. Collaboration Model
34	RTP-TSPT	Triple-helix	There is a relationship between the RTP's governance model and RTP's growth rate and performance, because when the governance model orchestrating the park's operations to serve the tenants' firms, with main goal of driving the growth of the start-ups, develop new ideas to continuously add value to the services of the park to tackle the needs	1. Business Model 2. Collaboration Model 3. Governance of RTP's Functions



			and expectations of the tenants' firms. The proof is that current governance model impacted the growth rate of the park, is we have more than 200 tenants' firms from start-ups to large corporate and large global-players companies, who started as entrepreneurs. The key role that the governance model play is to raise the growth of the technology-based firms by fostering the collaboration model and networking opportunities with several universities, private and public sectors, and local government. In addition to provide the excellent living environment to achieve our globalisation goal.	
35	RTP-TPL	Triple-helix	The reason behind the relation between RTP's governance model and RTP's performance is that the solution for the park's growth is basically the governance model, particularly the Triple-helix governance model.	<ol style="list-style-type: none"> <li>1. Business Model</li> <li>2. Collaborations Model</li> </ol>
36	RTP-TP	Part of University Structure	There is a relationship between the RTP's governance model and RTP's growth rate and performance as the governance directly influences the degree of policies bureaucracy and promptness of the park. The tenants' firms located on-park look for RTP that enable them to effectively collaborate with other tenants' firms, local and regional governments, researchers, universities, and international corporates in	<ol style="list-style-type: none"> <li>1. Business Model</li> <li>2. Collaborations Model</li> <li>3. Decision-Making</li> <li>4. RTP's Director Autonomy</li> <li>5. Management &amp;</li> </ol>

			fulfilling the technology transfer, commercialisations, and research and innovative projects cooperation and partnership opportunities in an agile and flexible environment that contribute to the growth of their businesses.	Operations
37	RTP-TSLTP	Government-Free Zone	The governance of RTP is the backbone of the policies that manage the daily work of the park. Therefore, if the governance model enables the streamline communications between the universities, the private sectors, and the government. In addition, the collaboration model is the driver for the growth. Therefore, there is a high possibility of park's growth improvement. The responsibilities shared between the RTP's actors and the most importantly, all are focusing on a shared goal and vision in boosting the innovation, entrepreneurship, and research and technology transfer.	1. Collaborations Model 2. Management & Operation
38	RTP-TLKPC	Triple-helix	Many reason behind strong relationship to growth of the park, such as governance model is an enabler for an effective interaction between the academic institutions, the private sectors, and government to cultivate the commercialisation of the innovation, research, and entrepreneurship. Moreover, the governance model allows the	1. Business Model 2. Collaborations Model 3. Management & Operation 4. Governance of RTP's

		<p>networking and partnership opportunities between the commerce and trade associations, growth of tenants' firms internationally, collaboration and streamline the incubators' efforts, attract investors and academic spin-offs and memberships. Nevertheless, the governance model facilitates the park to work with their actors to develop the required local talented human resources capital, select from the top-notch, local entrepreneurs' pool. The governance model facilitates the creation of the ecosystem from combining the efforts from government, private companies, and the academia. In addition, the governance model enables the tenants' firms to be attracted on-park to enjoy the exclusive taxes exemptions and special incentives, acquisition of IPs, and enjoy the special economic zone services and excellent supply chain management system and import duty exemptions. The governance model of Triple-helix is the basis on how the park is combining the best of all sectors and the management of the daily operations of the park smoothly and the autonomy given to the RTP's management team to grow the park and drive the performance to create the best ecosystem with the "Live-Work-Play" theme to the tenants' firms and stimulate the innovation and transfer the knowledge. Nevertheless, the governance model enables the park</p>	<p>Functions  5. Authority  6. Ownership  7. RTP's Director  Autonomy</p>
--	--	---	---

			to engage the community to participate actively in achieving the park's vision.	
39	RTP-TSTPA	Triple-helix	The governance model has a strong relationship to growth of the park. The governance model contributed to the RTP's growth and expansion dramatically. The reason behind the relationship is that the governance model contributed to the RTP's flexibility of management style, in addition, facilitated the proximity and collaboration between the RTP to ten research institutes and more than six institutes in the Humboldt University. Because of the governance model, the RTP's growth rate reached out to more than 1000 tenants' firms and the park expanded to 4.2 square kilometres. Nevertheless, the RTP has expanded globally by collaborating and partnering with more than 15 biggest science parks across the world.	<ol style="list-style-type: none"> <li>1. Business Model</li> <li>2. Collaborations Model</li> <li>3. Management &amp; Operation</li> <li>4. Governance of RTP's Functions</li> </ol>
40	RTP-TSTPC	Triple-helix	The governance model has a strong relationship to growth of the park. That's because governance model empowers the park's growth to efficiently adjust upfront to the emerging requirements of the local and regional entrepreneurial, research, innovation, and technology development, research institutions, universities, and research	<ol style="list-style-type: none"> <li>1. Business Model</li> <li>2. Collaborations Model</li> <li>3. Management &amp; Operation</li> <li>4. Governance of RTP's</li> </ol>

			communities. Moreover, the governance model simplifies the process of collaborations among RTP's actors and stakeholders, allows the park to provide specialised professional and technical services and facilities to several tenants' firms from all ranges to enable them to focus on their technology transfer, commercialisation activities, and prototyping. The governance model enabled the park to smoothly run the daily operational activities for the benefits of the tenant's firms and fostered the growth rate of the park.	Functions
41	RTP-TCP	Triple-helix	The main concept behind it is the governance model simply identifies how the park executes its collaboration model among the various stakeholders and partners. The most important part is that the park cannot reach its strategic vision as a solo operator and governor of the daily processes and policies, and that is exactly is the success story "collaboration and consortium of different entities". Because of the best-fit design of the governance model, the park created an entrepreneurship-friendly ecosystem providing the best in class-products and services that foster and enabled the growth of the tenants' firms and the park thereafter.	<ol style="list-style-type: none"> <li>1. Business Model</li> <li>2. Collaborations Model</li> <li>3. Management &amp; Operation</li> <li>4. Governance of RTP's Functions</li> </ol>
42	RTPD-USP	Triple-helix	There is a relationship between the RTP's governance model and RTP's growth rate and performance because the governance model	<ol style="list-style-type: none"> <li>1. Collaboration Model</li> <li>2. Business Model</li> </ol>

strengthens the execution of the park’s vision in attracting regional and international corporates to locate on-park by simplifying the policies, and roles of entering the RTP and selection criteria. Additionally, collaboration model attracted the top talented skilled resources in the region to collaborate in R&D projects with the tenants’ firms.

**APPENDIX S: TABLE 28**

**Table 29: Summary of RTPs’ Strategic Models Interpreted from Interviews’ Transcripts**

#	Participant	Governance Model	Strategic Model of RTPs
1	RTP-SV	Triple-helix	<p>The strategic model and the ecosystem of RTPC-SV encourage both large firms and start-ups. Thus, it became the core of emerging and innovative technologies trusted worldwide.</p> <p>The key actors of the strategic model are:</p> <ol style="list-style-type: none"> <li>4. World leading universities (Stanford, UC Berkeley, UCSF)</li> <li>5. The government</li> <li>6. Large firms such as IBM, Google, and Apple</li> <li>7. Technology entrepreneurs and start-ups</li> <li>8. Service providers of the business infrastructure (law firms, accounting firms, mentors, etc.)</li> <li>9. Funding agencies such as venture capitalists, angel investors, etc.</li> </ol>

			<p>RTPC-SV focuses on specific fields of technology, such as revolutionising computers, telecommunications, and manufacturing procedures. The major characteristics of its strategic model come from the evidence of its name, which signifies and encourages the high-risk business and an entrepreneurial culture that accepts rapid failure and considers it as a lesson learnt. Moreover, RTP balances between “open innovation”, and intellectual property and secret protection, particularly in it promoting high management and talented jobs mobility, as it attracts national and international tenants’ firms particularly the technology entrepreneurs and start-ups from ideation to senior start-ups from all around the world to gain high financial returns.</p> <p>Its strategic goal is to continue to be the icon of the innovation area. RTPC-SV strategic model eliminates the government restrictions and therefore it possesses highly transparent operational model and gives great attention when it comes to selecting the park’s management team.</p> <p><i>“All you require is the model that needs to be more dynamic and advance the park, if the park cannot attract companies from international and other technologies and if the park doesn't have impact on the job creations, then the park's model needs to be changed.” [RTPC-SV-BH]</i></p>
2	RTPD-WL	Part of University Structure	<p>Since the RTPD-WL governance model is ‘Part of university’s structure’, the park owns the land and lease it to the tenants’ firms to cover RTPD-WL’s operational expenses. Although the park is established and managed by the university, it is funded by public-private partnership fund. The park received a fund of \$1.5 million to enable the partnership and collaborations with the other universities and research institutions to boost the tech start-ups activities and increase their growth.</p>

			RTPD-WL strategic model concentrated on fostering the economic development on a regional level only with main goal of attracting the firms to locate on-park and collaborate with the park's associated university. Lastly, its strategic model to boost the growth and performance of the entrepreneurs graduated from the park's associated university.
3	RTPD-LS	Triple-helix	The strategic model of RTPD-LS concentrated on "Live-Work-Play" environment, magnifying the concept of interdisciplinary development, Start-ups ecosystem education. The park concentrates on orchestrating the right marketing mix to achieve the goals of the park's strategic model using Kano's model. Therefore, executing the strategy of the park by focusing on the park's products. RTPD-LS mentioned that categorising the products into two groups: 1) tangible product, which are the park's facilities (building, amenities, utilities, etc.), and 2) intangible product, which are the park's services (all the attributes that the park possesses, such as: reputation, community, quality of services, etc.) will enable the park to orchestrates the right marketing mix for its products. Regarding RTP's competition, the park considers the city as the main competitor and at the same time contributor to the park, since most of the tenants' firms compare the prices of the park's products with the prices of the city. Finally, the strategic model of the park applies certain selection criteria to the entry of the park, one of the main criteria is the alignment of the tenants' firms' strategies to the regional economy policy. Thus, the successful implementation of the Park's strategic model positively impacted the local economic development, "Carinthia city where Lakeside STP located, was the poorest city in Austria, now it became the best urban area in the city" [RTPM-LSSTP-DP]



4	RTPD-UWMU	Non-profit	<p>The RTPD-UWM's strategic model align very well with the governance model as 'Non-profit', therefore, the park purchases the landscapes from the associated university at very low-rates, less than the lands worth. The park builds and owns the research centres, labs, and tenancy buildings, and leases the buildings (research centres and labs) to the university and leases the lands to tenants. Regarding the services provided to the tenants' firms, the park contracts with private service providers to provide high-quality services to the tenants' firms' located on-park. In addition, the park utilising its talented resources to provide the tenants' firms with private consultancy services.</p> <p>According to the strategic model of the park, the activities of the university should be prioritised and have the 2<sup>nd</sup> priority after the priority of the park's activities. The park strategic model gives a great attention to connecting the on-park tenants' firms to the associated university and eases their access to the university and its facilities to enable the collaborations with the faculty members, students, and researchers. The strategic model of the park enabled the smooth collaborations and communications with the associated university, as the park communicating regularly with the corporate relationship office under the associated university to facilitate the access and handles the requests coming from the park's tenants' firms.</p> <p>According to the park's strategic model, the park does not manage any TTO and it is partnering with 3<sup>rd</sup> independent party and the university in regarding the technology and knowledge transfer and registration of patents. Around 30 years ago, confidentiality and handling the disclosure of information was one of the complex issues of the park during the early stage of the park's</p>
---	-----------	------------	--

			<p>establishment, but now the park uses NDAs and sign contracts with the tenants to smooth the confidentiality process, and that is working very well, especially that these are being handled by 3<sup>rd</sup> independent party and the university. Yet, the IPs licensing process is limited according to the strategic model.</p> <p>The strategic model of the park fulfilled the goal of the park as owning the building increased the number of the tenants' firms to located on-park by providing the start-ups graduated from the park's incubator with special privileges, most of the graduated start-ups are leasing spaces on-park. The park established strong collaborations channels with major actors of the park such as: private banks, the affiliated university, and some local community who contribute and support with the park in boosting the regional economic development.</p>
5	RTPD-DTVRTP	Company Owned by University	<p>DTV RTP strategic and business model is based on a holding company with subsidiaries. Currently, there are three independent subsidiaries: 1) development company, 2) knowledge company, and 3) investment company. The role of the DTV RTP holding company is to provide strategic leadership, governs and provision the capabilities to its subsidiaries, and distinctiveness that should integrate all the elements of the strategic model.</p> <p>Development company is the key driver in the establishment of a knowledge-based ecosystem in the local and regional levels. It is responsible for the management of the park and commercialisation of technology originating from the research activity occurring in the ecosystem with the associated university.</p>

Knowledge company is established to become a regional centre of excellence for capabilities development and the transformation of knowledge into know-how. It provides the tenants' firms located on-park with services such as training and consultancy services, managing K-12 schools, and hosting science and technology related events.

Investment company responsible for the governance and management of the real estate development activities and investment management of the associated university, such as development, delivery and management of the Park, provides advisory and investment management services that would enhance the development of the ecosystem.

The strategic model focuses on becoming the world largest technology cluster encompassing petroleum energy related R&D centres by planned to develop as self-sustaining ecosystem that links technology advancement activities with true economic development. The main objectives of the park's strategy are:

- Lead the energy and related industries national RTPs
- Deliver world-class services to tenants' firms
- Enable the collaboration between tenants' firms located on-park, the associated university, national giant companies, and other drivers of innovation on local, regional, and international levels
- Facilitate the local entrepreneurs to launch their NTBFs
- Provides the support to technology SMEs

6	RTPD-BIPSFSPA	Company with Share Capital	<p>The strategic model of RTPD-BIPSFSPA concentrated on the improving the park's capabilities to provide tenants' firms on-park with the competitive advantages to increase their growth. Moreover, enable the networking events for the sake of collaborative opportunities at local level among the various actors of the park to achieve the commercialisations goal.</p> <p>Furthermore, the park's strategic model focuses on the improvement of the on-park R&amp;D capabilities and builds the right communications and networking channels with various research institutes to recruit talented resources to work on these R&amp;D collaborative projects with the large tenants' firms, and therefore, fulfil the park's goal in becoming the marketing catalysis on local level.</p> <p>Regarding the entrepreneurship aspect of the strategic model for, the park conducts regular communications and follow ups to enable the networking events between the entrepreneurs, research institutes, and the large firms, also attract and sustain the local and international entrepreneurs. In addition, as part of the strategic model, the park provides training sessions to the region's entrepreneurs conducted by the park's resources and some of the sessions and workshops are conducted by the RTP's director. Some of the sessions includes managerial, technical, and regulatory subjects are charged to the entrepreneurs but with discounts for the tenants' firms' located on-park. Finally, the park strategic model created a cultural association that conduct entrepreneurial events to community, free of charge. The strategy now is to attract off-park companies such as consultancy services to join the park as 'off-park' companies by evolving innovations, and evaluate and exploited the emerging technologies, and hence</p>
---	---------------	----------------------------	---

commercialise these technologies. The park strategic model includes new marketing techniques to attract new start-ups acceleration and expand the park's strategic model to nationalisation goal to drive the performance and growth of the tenants' firms to go internationally.

*"The success of the start-up is to be able to sell the product in global levels." [RTPD- BIPSFSPA-FC]*

The park strategic model is 1) to provide the consultancy services to the tenants' firms utilising the RTP's resources, as the on-park consultancy services companies are becoming competitors to the park. 2) Develop a strong park's branding and improve the marketing activities to attract more talented technical resources to located on-park to enhance the park's technical capacities. 3) Recruit external advisory board to assess and plan for the park to expand internationally and advises on regulatory aspects and knowledge about a specific market abroad. 4) Improve the shared services for start-ups such as catering, cafes, restaurants, and car sharing, which provided by the start-up's companies. 5) Sustainability the commercialisations and licensing activities, as currently 91% of the park's revenue comes from these activities. 6) The park's strategic model is open collaborations with multiple universities locally, regionally, and internationally and the park secures its confidentiality using a framework agreement overseen by a management committee and reviewed on case-by-case basis.

*"Sustainability is the most important to sustain in the park with the company with limited share governance. Therefore, it is more dynamic." [RTPD- BIPSFSPA-FC]*

7	RTPD-ASURTP	Non-profit	<p>Our park's strategic model is focused only on large tenants' firms located on-park, thus it only attracts large companies to collaborate with the park's associated university on projects. Therefore, the park strategy is to focus on the demands of the current tenants' firms of large-scale companies, analyses these demands, mix and match between the tenants' firms and the faculty members of the associated university, and finally connect them via networking events. In addition, the park's strategic model enables it to coordinate the daily operations and connections between the park's actors: the associated university, the tenants' firms, and the government agencies to collaborate on projects and invest in the R&amp;D activities. In addition, the park strategic model allows the non-for-profits organisations to lease spaces on-park. Lastly, the strategic model of the park does not manage, allow, or engaged in technology transfer activities such as signing the NDA agreements between the tenants' firms and the associated university, as the technology transfer office reports to the associated university directly.</p>
8	RTPD-TH	Company with Share Capital	<p>The strategic model of RTPTP is a holding company, its main goals are 1) to govern, develop, operate and manage RTPs and Science cities worldwide, 2) expand to reach globalisation level, and 3) acquisition of market leaders and integrate talented resources to manage the park to reach to its globalisation ultimate goal.</p> <p>The strategic model helped the park to become venture capitalist and invest in angle and tenants' firm's investments. Although the governance model is 'Company with share capital' but the strategic model is 'Triple-helix' and the strategy is to integrate the Triple-helix actors: government, the industry and Private sectors, and the associated university.</p>

			<p>The strategic model avoided the conflict of interest issues related to local IPs that usually occur between the faculty members and the tenants' firms located on-park, therefore it shifted the activities of technology and knowledge transfer to a professional 3<sup>rd</sup> party consultancy TTO services to handle the protections of IPs, and also the tenants' firms can handle the IPs protections with the associated university, once they located successfully on-park, and strategic model sets guidelines for the IPs that the associated university are interested to invest in. This allowed the TTO of the park to focus its efforts on the strategic goal which is the international commercialisations.</p>
9	RTPD-IIT	Part of University Structure	<p>The strategic model of the park is focuses on leasing by aggressive clustering of Chicago in the field of clean technology, materials and life sciences, biomedical engineering, medical devices and diagnostics, green and clean technology, food safety, information technology targeting the technology entrepreneurs and start-ups, therefore, it focuses on conducting multiple events for them to enable their growth and collaborations with other parties and actors on-park. The park's strategic model associates with 1) Government leaders mainly the ministry and the city council in fostering the success of high-tech firms at all development stages and help in attracting potential firms, 2) Innovation partners from industry to boost the collaborations with the tenants' firms located on-park and find ideas and resources for growth, 3) Other services-oriented associations to invests in the park, 4) Collaborate with global partners in biotechnology, and energy foundation to identify the companies that focused on the new and clean sources of energy.</p>

The strategic model does not allow additional headcounts recruitment on-park as the recruitment policy depends on the associated university and it does not permit to hire more staff in the park. Moreover, the park strategic model permits the park's executive director to sets the selection criteria of locating on-park.

The strategic model enables and promote the collaborations between the park, and the tenants' firms, faculty members and researchers of the associated university by adopting the below process:

- Faculty members engage their students to do the work for the tenants' firms
- Some faculty members hired by the tenants' firms to do the work
- Faculty members are allowed once a week to do their own work for the tenants' firms

The strategic model protects the university's IPs, disclosures, and inventions by signing agreements between the faculty members and the tenants' firms to access the labs and research centres and access any confidential information. Additionally, the park strategic model depends on the acceptance use policy to be signed by the tenants' firms, which allow them to use of the resources and the equipment of the university's divisions, for flexible access.

The strategy for marketing the park, depends on website, social medias, SEO, and Newsletters, therefore, most of inquires come through the website.



The strategic model of the park allows an effective partnership with the industry associations to utilise the resources in the industrial networks by providing the following services to the tenants' firms located on-park by:

- Supporting university-based and other local high-tech ventures through mentor teams
- Connecting the tenants' firms located on-park such as start-ups and innovation-driven enterprises with service providers, research and academic institutions, and community leaders to accelerate job creation and economic growth via a web-based network
- Cultivate and attract research and technology-based investment, regional talent and job growth. In addition to attract and retain smart grid innovators to enhance market opportunities, accelerate business and product development, create jobs and advance deployment of a smarter grid.
- Offer the tenants' firms located on-park with educational programmes and networking opportunities to increase the number of life sciences in the region while boosting the success of existing companies

Moreover, the strategic model also allows the park to provide services to the tenants' firms located on-park through the government partnership to provide the following services:

- The city officials provide support for new technology-based businesses

			<ul style="list-style-type: none"> <li>• The regional authority provides technical support and access to regional awarded grants, conduct training investment programs and grants for renewal energy resources, solar, and thermal energy.</li> <li>• National governmental agency secures funding for the start-ups through the grants programs, and providing the start-ups with grant-writing workshops to prepare them for successful applications for government support</li> <li>• Venture capital and angel investors agency links NTBFs with local, regional, and international investors and investment companies to invest in NTBFs innovation</li> </ul>
10	RTPD- RTPMWC	Company Owned by University	<p>The strategic model cannot depend on the associated university to fund the park as this will trigger high-risk of delaying the park's growth. Therefore, the park's aim is to enable the collaboration between the park, public and private sectors, other international RTPs, RTPs associations, and the banks. For example. One of the goals that is essential to the park's development and growth is to collaborate with one of the major development banks to build scientific and research centres on-park to tackles various industrial problems of the bank and simultaneously boost the park's and local growth.</p> <p>The key goals that will be contributing to the park's vision by 2022 are: 1) list the park on the local stock market, 2) invest in 100 emerging technologies start-ups and entrepreneurial companies, 3) increase the market value of the park by more than 100 million SAR, and 4) expansion of the park geographical sales and investments</p>

The strategic model will help the park by allowing effective partnerships, collaborations, and strategic alliances with national and international associates, organisations, and industries, therefore, attract the foreign investment to invest in the park. Consequently, the performance growth rate will increase as the investment will be pumped into the park construction. Conversely, the strategic model permits the park to leases the untapped lands to private companies and the park can utilise the revenue to further develop and expand the park and its services.

Regarding the IPs, the strategic model does not engage in the technology and knowledge transfer activities and it assigned this task to the associated university. The park's strategy is to focus on managing the park as an enterprise and focus on the strategic visionary roadmap such as 1) Investment in the associated university's landscapes, cultural knowledge, commercialisation, localisation, technology incubators, and development industry, 2) Attracting outstanding competencies and talented resources such as scientists and consultants, 3) Facilitates the establishment of academic spin-offs and start-up companies, 4) Attract local and foreign investments to participate in supporting the strategic objectives of the park, and 5) Qualifies the graduates and students of the associated university students through intensive technical training, workshops, to seek highly-technical job opportunities in private sectors

The strategic model provides the park with the permission to builds and owns its research centres and labs to serve the tenants' firms located on-park and attract potentials tenants' firms. Moreover, the tenants' firms can access the research centres and the labs of the associated

			<p>university using the park's access cards, or the university access cards since most of them are faculty members, students, and researchers.</p>
11	RTPD- RTPKEID	Part of University Structure	<p>The strategic model of the park has two types of topologies technology-led model of small spaces that focus on technology transfer and the incubation function, to increase the reference to the external environment and the founding PRTOS have a determining/important role in their management and operation. In addition to a property-led development model where priority is given to the attraction of firms and other high-tech activities inside the Parks' infrastructure. The proposed and improved version of the strategic model is the direction of the flow of university activities such as research, publications, innovations, processes, skills, and IPs technologies, which are conducted by the RTPs 1<sup>st</sup> type of actors, such as researcher, faculty members, students, and postdocs.</p> <p>These activities come to the RTP station to get transformed, transferred, translated, and commercialised. Therefore, the role of RTP is to facilitates the collaborations to happen between the different actors of the innovation system, such as enable the accessing of the facilities, consultancies, collaborative research, creation of companies, engaging and networking the RTP's 2<sup>nd</sup> type of actors, such as start-ups, individual entrepreneurs, students, spin-offs, SMEs, large-corporates, government partners and agencies, who are going to receive these types of knowledge and create the impact on the society from the inputs taken from the research, facilitated by the RTP. Such impact can be local job creations through the tenants' firms from the research of the university. Therefore, the main goal of the strategic model is to develop</p>

strengthen, deepen the close relationships and collaboration between the tenants and actors & stakeholders to get the greatest impact on the society. The strategic model avoids converting the park to a real estate place.

The second important goal for the strategic model is to enable the research collaborative projects and close engagement among the university and the tenants' firms and the flow of knowledge.

*“You need to view the Park as an integral part of the overall approach to developing relationships with the tenants and stakeholders such as they can engage with the university and take the knowledge and create impact. That is simple, and I am always getting uncomfortable in Park in isolation.” [RTPKIED-RTPD-KC]*

One of the most important aspects of the strategic model of our park is that the RTP is not meant to generate revenue, and its main purpose is to create a tangible impact on the community and society.

The strategic model pays a special attention to the government and the society and consider them as actors and stakeholder in the strategic model. *“Much of our research will be forming government policies, regulations, legislations... If the government changed the policy by subsidizing solar energy because we have giving them a research evidence that this is what is needed in order, make it. That will end up creating more jobs and products more than we could ever do.” [RTPKIED-KC]*

The strategic model focuses more on the collaborations rather than concentrating on the IP licensing, as the collaboration is going to create an impact more than anything else in the

			<p>knowledge flow model. Sort of the collaboration is the Outreach activities such as the university sending the people to a conference, going to meeting a bunch of SMEs, going to local schools to talk about innovation and entrepreneurship. For example, STEM challenge led by one of the park's entrepreneurship partner, attended by more than 210 local young students from across the country to develop entrepreneurial solutions for real industrial problems, and engaging with big companies, which will create connections and networks that we have would not have before. Another aspect of the strategic model is the Continuous professional development activities provided by the park's resources or the park's partners through enabling the innovation into private and public sectors. Continuous professional development activities could be on-park or off-park.</p> <p>Additionally, the strategic model enables the entrepreneurship programmes to be conducted on-park, which is run by the park's strategic partners from the government.</p> <p>Lastly, the most important aspect of the strategic model of the park is to put the RTP's resources' effort to simplify the complex ecosystem by facilitating the knowledge flow model across all the actors, players, stakeholders, and mechanism in one place to help move the knowledge from "Research" to "Economic Development", by utilising the RTP as a 'mean for knowledge flow'.</p>
12	RTPD-SC	Triple-helix	<p>The strategic model of the park operates by empowering the Triple-helix model by facilitating the Public-Private-Partnership between the park's actors: university, industry, and the government. The model provides significant autonomy for the RTP's director and favours to have successful technology entrepreneurs on the board of directors rather than the standard management team</p>

			<p>members, as this will boost the RTP's strategic goal by spreading the entrepreneurial culture in the park. The strategic model is set and run the park's management team, therefore, the park's management team must have a research experience, knowledge in technology transfer &amp; commercialisations, and outstanding personality and soft skills as these skills and knowledge play a tremendous role in the success of park. The liaison between the associated university and the park regarding the collection of data of the innovations and researches, is the responsibility the vice president of research at the associated university, then the RTP mix and match the collaboration projects with the tenants' firms. The strategic model allows the faculty member, researchers, and staff of the associated university to work as 'part-time' or partners for the tenants' firms after signing NDA and confidentiality agreements with the tenants' firms facilitated by the RTP.</p>
13	RTPD- RTPISC	Government – Free Zone	<p>The strategic model based on Triple-helix model in collaboration between the government, the industry, and the university. Although, the dominant engine of the collaboration activities and the decision-maker is the government, as the university and industry both reporting to the government. The private sectors involvement is not effective as they are not willing to participate in the collaboration due to the dominant of the government.</p>

## **APPENDIX T: CODED IN NVIVO**

### **Codes in Figures 8.22, 8.23, 8.24, and 8.25**

Types of RTP Measurement

The universities

Tenants' Firms point of view on RTP Shortfall

Success Factors from RTPs

Strategic and Management model of RTP

Stimulating Innovation Tool

Smart Cities

RTPs' Stakeholders

RTPs' Measurements

RTP Technologies

RTP Strategy impact on the company's performance

RTP Strategy

RTP resources

RTP Marketing

RTP Fields of technology

RTP Attraction

Reason of the Correlation between the park's Governance model and its growth rate

Quantitative Measures

Qualitative Measures

Qualitative and Quantitative Measures

Part of University organisation structure

Other

Non-for-profit Research Park

Neutral

Measurement of RTP

Lesson Learnt from RTPs Failures

Less in rigid boundaries



Knowledge Transfer  
International Cooperation  
International and Local Industrial Collaboration  
Growth  
Governance Model  
Governance  
Goals of RTP  
Funding Sources  
Entrepreneurs  
Entrepreneurial-minded people  
Eco System  
Disagree  
Correlation between the park's Governance model and its growth rate  
Consortium  
Company with Share Capital  
Company owned by the University  
Collaboration in Research  
Collaboration between RTP Tenants' Firms and start-ups, researchers, faculty located on-park  
Charged Services  
Business Incubators  
Benefit from TTO  
Benchmarking to RTPs' Globally  
Basic Services  
Background of RTP  
Areas of Innovation  
Agree  
Added-Value Services  
Access to the University

## **Main Categories and Sub-categories "Codes" in NVivo**

### **1. Challenges of RTPs in Saudi Arabia**

### **RTPDVTC Challenges**

- Insufficient communications and collaborations from the park management
- Insufficient infrastructure
- Insufficient Logistics and issues with supply chain system
- Lack of autonomy and governance for RTP's CEO
- Lack of Communications and collaboration among different RTPs in Saudi Arabia
- Lack of funding mechanism for start-ups
- Lack of Networking events
- No sufficient Services
- Saudi Market & Regulations Issues
- The engagement with the customer to be open and more collaborative
- Lack of appreciation to KAUST start-ups

### **RTPKIED Challenges**

- Lack of appreciation to KAUST start-ups
- Lack of Collaboration
- Lack of Flexibility in KAUST Policies & Procedures
- Lack of Government Affairs Services
- Lack of HR services to access Talented resources
- Lack of IT services and Resources
- Lack of Professional Trainings for Local
- No Clear Benefits to Tenants and SMEs
- No core focus on KAUST Vision & Mission
- No track for IP numbers at KAUST
- one-size-fit-all RTP Model
- Reduced Services

### **RTPMWC Challenges**

- Duplicated cost due to female and male sections

- Funds for RTPs come from the Universities
- High Infrastructure cost
- Labs access to female start-ups
- Lack of Live-Work-Play Theme
- Lack of Voice of Customer
- Limited Services
- The bureaucracy of the local government
- The location of the park is not proximate to the associated university

### **Policymakers' Perspectives**

#### **SMEs' Challenges**

- Bureaucracy
- Financing
- Inefficient and slow judicial system
- Information related
- Managerial
- Market access
- Technical
- Workforce related

### **Tenants' Firms' Perspectives**

#### **Tenants' Expectations and Needs**

- Entrepreneurs' Needs
- Large Corporates' Needs

### **Tenants' Firms' points of view on RTP Shortfall**

- Collaboration issues
- Communications Issues
- Government regulations bureaucracy
- High Rental prices for start-ups

- IPs & Commercialisation Issues
- Lack of collaboration with universities and HEIs
- Lack of financial resources
- Lack of Infrastructure
- Lack of Performance measurement of RTP's Services
- Lack of Qualified Research and Scientific cadres
- Lack of R&D Activities
- Lack of trade and industry support
- Lack of TTO Services
- Limitation of DB access to library
- Networking and Collaborations issues
- No Single Governance Authority for RTPs in Saudi Arabia
- Slow take-up of property
- Weakness venture capital investment

## **2. Governance Model**

- Company owned by the University
- Company with Share Capital
- Consortium-Triple Helix model
- Non-for-profit research park
- Part of University organisation structure
- Under Government-Free Zone

## **3. Policymakers Perspectives on RTPs Governance as part of Saudi Vision 2030**

### **Business potential in Saudi Arabia**

#### **Ecosystem Pillars**

- Basic Infrastructure
- Culture & mind-set
- Driving demand
- Ecosystem Governance

- Innovation Capital
- IPs and Commercialisation Policies
- Measure the performance of National RTPs and SMEs
- SMEs' Business Support and Advisory Services
- SMEs' Policies & Strategies
- Technology Infrastructure

## **RTPs' Governance as part of Saudi National Transformation Plan & Vision 2030**

### **4. Relation between RTP's Governance and Growth**

#### **Correlation between the Governance model and the park's Growth**

- Agree
- Disagree
- Neutral

#### **Governance**

- Authority
- Business Model
- Collaborations Model
- Decision-Making
- Governance of RTP's Functions
- Management & Operation
- Organisation Structure
- Ownership
- RTP's Director Autonomy

#### **Growth**

#### **Reason of the Correlation between the park's Governance model and its**

## **growth rate**

- Autonomy
- Capabilities to Identify and Develop Talent Resources
- Collaboration Opportunities with other bodies
- Create Ecosystem by Combining Best of Government, Industry, with World-Class Research & Universities
- Economic Development Dynamics for on-park tenants and the RTP
- Financial Support & Revenue
- Flexible Management Model and Less Bureaucracy
- Flexible Policies
- High-Growth Companies & RTP
- Influence
- Supporting & Constructing the Park's infrastructure and Networks
- Sustainability & Globalisation

## **RTP Services**

### **Basic Services**

- ATMs & Banks
- Conferences, Co-Working Spaces and Spaces-Offices
- Equipment
- Internet Connectivity
- Parking
- Post Office
- Rental of Spaces & Lands
- Research Centres and Labs
- Restaurants, Cafes, and Food Trucks
- Technology Transfer Office and Services
- Utilities-Facilities-Maintenance services

### **RTPs' Functions**

- Entrepreneurs services
- Financial planning
- International relations networking
- Marketing, Promotions, and Networking
- Public investor relations
- Resident development services
- Strategic and Business Planning and Development
- Technology Exports
- Tenants' Firms' Affiliation Services
- Trainings & Continuous Professional Education

### **Value-Added Services**

#### **Access to Capital Funding programmes**

#### **Charged Services**

- Accommodations and Tenants' Residential Areas
- Emergency and medical services
- Engineering construction and contracting

#### **IT & Computing Services**

- Application and Mobile app. development
- Data centre
- High performance computing
- ICT, Software-Hardware Consultations & Services
- Leasing high-capacity IP link
- Mobile phone devices and iPads
- Software and Application Testing lab

#### **Schools and Childcare**

#### **Supermarket**

#### **Commercial Evaluation**

#### **Consulting Services (brokerage, Accounting, etc.)**

**Corporate office centre**  
**Crowd Funding Platform**  
**Directory of tenant's firm's information**  
**Efficient material supply chain**  
**Human Resource development and Trainings**  
**Introduction packages**  
**Lawyer & Legal Services**  
**Library Databases services**  
**Local Governmental Services**  
**Mix & Matching with other tenants' firms and Faculty members & Students**  
**New & Innovative Services & Programmes**  
**Product manufacturing and assembly**  
**Quality assurance testing and certification**  
**Registration of business licenses**  
**Sport Fields & Receptions**  
**Talent Recruitment**  
**Transportation services**

## **5. RTP Vision Realisation**

### **Benchmarking to RTPs Globally**

- Lessons Learnt from RTPs; Failures
- Success Factors from RTPs

### **Collaborations & Partnerships**

- Collaboration among various RTPs and Universities
- Collaboration between RTP Tenants' Firms and start-ups, students, researchers, faculty located on-park
- Collaboration in research & projects
- International Cooperation & Collaboration
- Local Industrial & Governmental Collaboration



## **Eco system**

### **Areas of innovation**

- Free Zones
- Less rigid boundaries
- Smart Cities
- Stimulating Innovation Tool

### **Business Incubators and Accelerators**

- Growth Accelerator
- Pre-Incubator, Incubators, Accelerators & Venture Capital

### **Commercialisation**

### **Entrepreneurship**

### **Funds Sources & Revenues**

### **Infrastructure**

### **Knowledge Transfer & Confidentiality**

### **Live-Work-Play**

### **RTP Resources**

### **Selection Criteria**

### **Sustainability**

### **The Universities**

- Academic Spinoff
- Access to the University
- Agreements with university
- RTP has a University Industry Liaison Office
- RTP Shares services and Infrastructure with the university

## **Performance Measurements in RTP**

### **RTP Qualitative and Quantitative Measures**

### **Qualitative Measures**

- Community Outreach
- Economic Performance & Impact Measures
- Frequency & Quality of Collaborations & Networking
- Frequency & Quality of Performance Measures (KPIs)
- Innovation & R&D KPIs
- Quality of Tenants on-park and Quality of RTP Services

### **Quantitative Measures**

- Eco Systems KPIs
- Entrepreneurship KPIs
- Financial KPIs
- Investment Fund KPIs
- Occupancy KPI
- Qualified & Talented Personnel
- TTO & Knowledge Transfer Performance Measures

### **Tenants' Firms' KPIs**

- Academic Collaboration with Associated University
- Access to Finance
- Commercialisation
- No. of Start-ups' Customers
- Research & Development Outcomes and Progress
- Technical Products
- The Companies' Employees and Job Growth
- Turnover and revenue

### **RTP Attraction & Value Proposition**

- Access to the Associated University
- Access to the Park
- Acquire Start-ups

- Attraction to Invest in Saudi Arabia and RTPs
- Connecting with Industries and Venture Capitalist
- Connecting with Local Governmental Agencies
- Excellent Infrastructure
- Excellent Living Environment
- Local Job Creation
- Location
- Networking & Collaboration Opportunities-Potential customers
- Reasonable Membership Fees
- Reputation
- Supply Chain Management
- Talented Resources
- Taxes Exemption
- Technical and Environmental Safety

## **RTP Strategic-Governance-Management Model**

### **Governance management model**

#### **RTP Background & Goals**

- Background of RTP
- Goals of RTP
- RTP Technologies Areas

#### **RTP Strategy impact on the Tenants firms' performance**

#### **RTPs' Competition**

#### **RTPs' Stakeholders**

- Private Sector, Investors, Banks, and Real Estate

## Developers

- Public Sector
- Tenants and Start-ups
- The Society
- University, and R&D institutes

## **Strategic and Management Roadmap of RTP**

## LIST OF REFERENCES

1. Saudi Industrial Property Authority Website (2017). About MODON. Available from: <https://www.modon.gov.sa> [Accessed 30 September 2019]
2. Michael I. Luger and Harvey A. Goldstein (1991) *Technology in the Garden: Research Park & Regional Economic Development*
3. Manuel Castells and Peter Hall (2015) *Technopoles of the World: The Making of 21<sup>st</sup> Century Industrial Complexes*
4. Tashakkori, A. and Teddlie, C. (1998) *Mixed Methodology: Combining Qualitative and Quantitative Approaches*. Thousand Oaks, CA: Sage
5. Michael Q. Patton (2002) *Qualitative Research & Evaluation Methods*. 3<sup>rd</sup> Edition
6. King Abdullah City of Sciences and Technology (KACST) (2019). Available from: [www.kacst.edu.sa/eng/about/Pages/About.aspx](http://www.kacst.edu.sa/eng/about/Pages/About.aspx) [Accessed 30 September 2019]
7. Saudi Venture Capital Company (2019). About. Available from: <https://svc.com.sa/?lang=en> [Accessed 30 September 2019]
8. King Abdulaziz and His Companions Foundation for Giftedness and Creativity (MAWHIBA) (2019). About MAWHIBA. Available from: <https://www.mawhiba.org/en/About/Pages/default.aspx> [Accessed 30 September 2019]
9. Adams, S. B., 2005. Stanford and Silicon Valley: LESSONS ON BECOMING A HIGH-TECH REGION. *California Management Review* [online], 48 (1), 29–51. Available from: <http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=19077684&site=ehost-live&scope=site>.
10. Al-Filali, I. Y. and Gallarotti, G. M., 2012. Smart Development: Saudi Arabia's Quest for a Knowledge Economy. *International Studies* [online], 49 (1–2), 47–76. Available from: <http://www.scopus.com/inward/record.url?eid=2-s2.0-84890836624&partnerID=tZOtx3y1>.

11. Al-Sultan, K. and Alzaharnah, I., 2012. Academia-Industry Innovation Linkages in the Case of Saudi Arabia: Developing a University-Industry Triple-Helix Framework to Promote Research and Development Collaboration. *In: The Global Innovation Index 2012*. 89–95.
12. Al-Sultan, Y. Y., 1998. The Concept of Science Park in the Context of Kuwait. *International Journal of Technology Management*, 16 (8), 800–807.
13. Albahari, Alberto, Klofsten, Mangus, Perez Canto, S., 2011. Managing a Science Park: A study of value creation for their tenants. *In: Triple Helix IX International Conference. Silicon Valley: Global Model or Unique Anomaly?* Stanford, USA: Triple Helix Association, 1–15.
14. Almeida, A., Santos, C., and Silva, M. R., 2008. Bridging Science to Economy: The Role of Science and Technologic Parks in Innovation Strategies in 'Following' Regions. *FEP Working Papers*, (302).
15. Alvandi, K., 2010. Focused and General science parks : a study of New Technology Based Firms within Life-sciences in Sweden. Lund University.
16. Amaral, M., 2015. Management and assessment of innovation environments. *Triple Helix* [online], 2, 19. Available from: <http://link.springer.com/10.1186/s40604-015-0030-5>.
17. Andersson, T. and Djeflat, A., 2013. *Innovation , Technology , and Knowledge Management*. Springer.
18. Anselin, L., Varga, A., and Acs, Z., 1997. Local Geographic Spillovers between University Research and High Technology Innovations. *Journal of Urban Economics* [online], 42 (3), 422–448. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0094119097920325>.
19. Appold, S. J., 2004. Research parks and the location of industrial research laboratories: an analysis of the effectiveness of a policy intervention. *Research Policy* [online], 33 (2), 225–243. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0048733303001240> [Accessed 27 Nov 2014].
20. Asheim, B. T. and Coenen, L., 2005. Knowledge bases and regional innovation systems: Comparing Nordic clusters. *Research Policy*, 34 (8), 1173–1190.

21. Aulicino, A. L. and Pfeiffenberger, M. W., 2014. *Directory of Science Parks and Areas of Innovation*. International Association of Science Parks and Areas of Innovation.
22. Bashir, M., 2013. Knowledge Economy Index (KEI) 2012 Rankings for Islamic Countries and Assessment of KEI Indicators for Pakistan. *International Journal of Academic Research in Economics and Management Sciences* [online], 2 (6), 28–43. Available from: <http://search.proquest.com/docview/1500940058?accountid=17193%5Cnh>  
[http://sfx.brad.ac.uk/sfx\\_local?url\\_ver=Z39.88-2004&rft\\_val\\_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%3Aabiglobal&atitle=Knowledge+Economy+Index+%28KEI%29+2012+Rankings+for+](http://sfx.brad.ac.uk/sfx_local?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%3Aabiglobal&atitle=Knowledge+Economy+Index+%28KEI%29+2012+Rankings+for+).
23. Basile, A., 2011. Networking System and Innovation Outputs: The Role of Science and Technology Parks. *International Journal of Business and Management*, 6 (5), 3–14.
24. Bement, A. L., 2011. Research Parks as a U.S. Innovation Strategy. *In: International Conference on Technology Policy and Innovation*. Bogota, Colombia, 1–9.
25. Benner, M., 2012. *Cluster policy as a development strategy: Case studies from the Middle East and North Africa* [online]. No. 255. Available from: <http://hdl.handle.net/10419/73171>.
26. Beverland, M. and Lindgreen, A., 2010. What makes a good case study? A positivist review of qualitative case research published in *Industrial Marketing Management*, 1971-2006. *Industrial Marketing Management*, 39, 56–63.
27. Bigliardi, B., Dormio, A. I., Nosella, A., and Petroni, G., 2006. Assessing science parks' performances: directions from selected Italian case studies. *Technovation* [online], 26 (4), 489–505. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0166497205000039> [Accessed 21 Nov 2014].
28. Borgh, M., Clodt, M., and Romme, a. G. L., 2012. Value creation by knowledge-based ecosystems: evidence from a field study. *R&D*

- Management* [online], 42 (2), 150–169. Available from: <http://doi.wiley.com/10.1111/j.1467-9310.2011.00673.x>.
29. Borgh, W. Van der, 2007. Governance and Business Models at the HTCE : Disrupting Science Parks. Technical University Eindhoven.
  30. Bridger, A., 2015. The Tangible Effect of Implementing an Industry-Favorable Intellectual Property Policy. *In: AURP 2015 Proceedings*. Buffalo: AURP.
  31. Bryman, A., 2006. Integrating Qualitative and Quantitative Research. *Qualitative Research*, 6 (1), 97–113.
  32. Cabral, R., 1998a. From University Industry Interfaces to the Making of a Science Park Florianopolis Southern Brazil. *International Journal of Technology Management*, 16 (8), 778–799.
  33. Cabral, R., 1998b. Refining the Cabral Dahab Science Park Management Paradigm. *International Journal of Technology Management*, 16 (8), 813–818.
  34. Cabral, R., 1998c. The Cabral Dahab Science Park Management Paradigm. *International Journal of Technology Management*, 16 (8), 721–725.
  35. Cabral, R. and Dahab, S., 1998. Science Parks in Developing Countries The Case of BIORIO in Brazil. *International Journal of Technology Management*, 16 (8), 726–739.
  36. Centre, C. C. and Kings, L., 2015. *Cambridge Research Park*. Cambridge.
  37. Cetindamar, D., 2010. ISTANBUL: A CANDIDATE CITY FOR THE GLOBAL INNOVATION LEAGUE? *Journal of Global Strategic Management*, 07, 74–88.
  38. Chan, K. A., 2010. INTERORGANISATIONAL KNOWLEDGE FLOWS BETWEEN AND INNOVATIVE PERFORMANCE OF SCIENCE PARK FIRMS: AN EXPLORATORY STUDY OF SOUTH AFRICAN NEW TECHNOLOGY-BASED FIRMS by ( Technology Management ). University of Pretoria.
  39. Chan, K. F. and Lau, T., 2005. Assessing technology incubator programs in the science park: the good, the bad and the ugly. *Technovation* [online], 25 (10), 1215–1228. Available from:



<http://linkinghub.elsevier.com/retrieve/pii/S0166497204000677> [Accessed 30 Oct 2014].

40. Charmaz, K., 2006. *Constructing Ground Theory\_A Practical Guide through Qualitative Analysis*. Sage Publications Ltd, London, UK.
41. Chen, S. and Choi, C. J., 2004. Creating a knowledge-based city: the example of Hsinchu Science Park. *Journal of Knowledge Management*, 8 (5), 73–82.
42. Connelly, B. L., Hoskisson, R. E., Tihanyi, L., and Certo, S. T., 2010. Ownership as a form of corporate governance *Journal of Management Studies*, 47 (8), 1561–1589.
43. Cooke, P., 2001. Regional innovation systems, clusters, and the knowledge economy. *Industrial and Corporate Change* [online], 10 (4), 945–974. Available from: <http://www.scopus.com/inward/record.url?eid=2-s2.0-0035210147&partnerID=tZOtx3y1>.
44. Cooke, P. and Leydesdorff, L., 2006. Regional development in the knowledge-based economy: The construction of advantage. *Journal of Technology Transfer*, 31 (1), 5–15.
45. Creswell, J. W., 2007. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* [online]. 2nd Editio. Sage Publications. Available from: [https://charlesbickenheuserdotcom.files.wordpress.com/2015/03/creswell\\_2007\\_qualitative\\_inquiry\\_and\\_research\\_design\\_\\_choosing\\_among\\_five\\_a\\_pproaches\\_\\_2nd\\_edition.pdf](https://charlesbickenheuserdotcom.files.wordpress.com/2015/03/creswell_2007_qualitative_inquiry_and_research_design__choosing_among_five_a_pproaches__2nd_edition.pdf).
46. Creswell, J. W., 2013. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Research design Qualitative quantitative and mixed methods approaches.
47. Currall, S. C. and Towler, A. J., 2003. Research Methods in Management and Organizational Research: Toward Integration of Qualitative and Quantative Techniques. *In: Handbook of Mixed Methods in Social and Behavioral Research*. Sage Publications, 513–526.
48. Dahab, S., 1998. Services Firms in the IDEON Science Park. *International Journal of Technology Management*, 16 (8), 740–750.

49. Dasgupta, M., 2015. Exploring the Relevance of Case Study Research. *Vision: The Journal of Business Perspective* [online], 19 (2), 147–160. Available from: <http://vis.sagepub.com/lookup/doi/10.1177/0972262915575661>.
50. David, G. E., 2004. THEORETICAL PERSPECTIVES AND RESEARCH METHODOLOGIES. In: *DOING RESEARCH in the REAL WORLD*. Sage Publications, 25.
51. Deakin, M., 2014. Smart cities: the state-of-the-art and governance challenge. *Triple Helix* [online], 1 (1), 1–16. Available from: <http://search.proquest.com/docview/1704791404?accountid=10659>.
52. Dierckx de Casterle, B., Gastmans, C., Bryon, E., and Denier, Y., 2012. QUAGOL: A guide for qualitative data analysis. *International Journal of Nursing Studies*, 49 (3), 360–371.
53. Easton, G., 2010. Critical realism in case study research. *Industrial Marketing Management*.
54. Echols, A. E. and Meredith, J. W., 1998. A Case Study of the Virginia Tech Corporate Research Center in the context of Cabral Dahab Paradigm with Comparison to other US Research Parks. *International Journal of Technology Management*, 16 (8), 761–776.
55. Eghbal, M. K., 2017. The Governance of Science and Technology Parks and Areas of Innovation. In: *34th World Conference on Science Parks and Innovation Areas*. Istanbul: IASP.
56. EIB/ CMI - ISESCO, 2013. *REGIONAL WORKSHOP: GOVERNANCE AND MANAGEMENT OF SCIENCE AND SCIENCE AND TECHNOLOGY PARKS IN MENA REGION*. Casablanca.
57. Eileen, H., 2007. *The triple helix model of innovation*. Tech Monitor.
58. Eisenhardt, K. M., 1989. Building theories from case study research. *Academy of management review*, 14 (4), 532–550.
59. Eisenhardt, K. M. and Graebner, M. E., 2014. THEORY BUILDING FROM CASES : OPPORTUNITIES AND CHALLENGES diverse, 50 (1), 25–32.
60. Eto, H., 2005. Obstacles to emergence of high/new technology parks, ventures and clusters in Japan. *Technological Forecasting and Social*

- Change* [online], 72 (3), 359–373. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S004016250400112X> [Accessed 2 Nov 2014].
61. Etzkowitz, H. and Leydesdorff, L., 2000. The dynamics of innovation: from National Systems and “Mode 2” to a Triple Helix of university–industry–government relations. *Research Policy*, 29, 109–123.
  62. European Commission, 2013. *SETTING UP , MANAGING AND EVALUATING EU SCIENCE AND TECHNOLOGY PARKS An advice and guidance report on good practice* [online]. Brussels, BELGIUM. Available from: [http://ec.europa.eu/regional\\_policy/index\\_en.cfm](http://ec.europa.eu/regional_policy/index_en.cfm).
  63. Feilzer, M. Y., 2010. Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4 (1), 6–16.
  64. Feldman, J. M., 2007. The Managerial Equation and Innovation Platforms : ping and The Case of Linko Berzelius Science Park. *European Planning Studies*, 15 (8), 1028–1045.
  65. Figlioli, A., 2011. Financing of Technology Parks Originated from Public-Private Partnerships: Outlining Business Models.
  66. Fikirkoca, A. and Saritas, O., 2012. Foresight for science parks: the case of Ankara University. *Technology Analysis & Strategic Management*, 24 (10), 1071–1085.
  67. Flatau, P., 2002. Hicks's The Theory of Wages: Its Place in the History of Neoclassical Distribution Theory. *History of Economics Review* [online], (187), 0–13. Available from: [http://www.murdoch.edu.au/Murdoch-Business-School/\\_document/Working-Papers/previous/187.pdf](http://www.murdoch.edu.au/Murdoch-Business-School/_document/Working-Papers/previous/187.pdf).
  68. GHOURI, P., 2003. Case study. *In: .*
  69. Del Giudice, M., 2014. Creating conditions for innovative performance of science parks in Europe. How manage the intellectual capital for converting knowledge into organizational action. *Journal of Intellectual Capital*, 15 (4), 576–596.
  70. Gkypali, A., Kokkinos, V., Bouras, C., and Tsekouras, K., 2016. Science parks and regional innovation performance in fiscal austerity era: Less is

- more? *Small Business Economics* [online]. Available from: <http://link.springer.com/10.1007/s11187-016-9717-x>.
71. Guan, J. and Ma, N., 2007. China's emerging presence in nanoscience and nanotechnology. A comparative bibliometric study of several nanoscience 'giants'. *Research Policy*, 36 (6), 880–886.
72. Gulati, R., Nohria, N., and Zaheer, A., 2000. Strategic networks. *Strategic Management Journal*, 215 (21), 203–215.
73. Guy, E. K., Hogan, B., Laamanen, T., and Marinazzo, M., 1996. *The Science Park Evaluation Handbook* [online]. Technopolis. Available from: [http://www.technopolis-group.com/resources/downloads/reports/098a\\_EVALMETH\\_final.pdf](http://www.technopolis-group.com/resources/downloads/reports/098a_EVALMETH_final.pdf).
74. Guy, I., 1996. A look at Aston Science Park. *Technovation* [online], 16 (5), 217–218. Available from: <http://linkinghub.elsevier.com/retrieve/pii/0166497296000028>.
75. Haxton, B. M. and Meade, F., 2008. 21 st Century Vision : Developing a Global Sustainable Science and Technology Park Strategy and Creating Economic Development Worldwide. *Facility Management Journal*.
76. Hellmann, G., 2009. Beliefs as Rules for Action: Pragmatism as a Theory of Thought and Action. *International Studies Review* [online], 11 (3), 638–662. Available from: <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Beliefs+a+s+Rules+for+Action+:+Pragmatism+as+a+Theory+of+Thought+and+Action#0>.
77. Hu, A. G., 2007. Technology parks and regional economic growth in China. *Research Policy* [online], 36 (1), 76–87. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S004873330600148X> [Accessed 23 Oct 2014].
78. Huizing, A., 2007. The Value of a Rose: Rising Above Objectivism and Subjectivism. *Information Management: Setting the Scene*, (January 2007), 91–110.

79. Hurmerinta-Peltomäki, L. and Nummela, N., 2006. Mixed methods in international business research: A value-added perspective. *Management International Review*, 46 (4), 439–459.
80. Ivankova, N. V. and Stick, S. L., 2007. Students' persistence in a distributed doctoral program in educational leadership in higher education: A mixed methods study. *Research in Higher Education*, 48 (1), 93–135.
81. Japan Imperial Household Agency and Japan, M. of F. A., 2017. *The Compass of New Partnership: Saudi Japan Vision 2030*.
82. Jimenez-Zarco, A. I., Cerdan-Chiscano, M., and Torrent-Sellens, J., 2013. Challenges and Opportunities in the Management of Science Parks: design of a tool based on the analysis of resident companies. *Review of Business Management* [online], 15 (48), 362–389. Available from: <http://rbgn.fecap.br/RBGN/article/view/1503> [Accessed 2 Nov 2014].
83. Jousma, H., Scholten, V., and Rossum, P. van, 2009. Framework for Analyzing the Growth of University Research Parks Applied to the Bioscience Park in Leiden, the Netherlands Paper presented at the 7 Triple Helix Conference in Glasgow, UK, on June 18, 2009. In: *the 7th Triple Helix Conference*. Glasgow, U.K.: Triple Helix Association, 1–7.
84. Kang, B.-J., 2004. A Study on the Establishing Development Model for Research Parks. *The Journal of Technology Transfer* [online], 29, 203–210. Available from: <http://link.springer.com/10.1023/B:JOTT.0000019538.83442.b4>.
85. Kang, B.-J., 2014. Exploring Governance Models of Science & Research Parks and Related Organizations. *World Technopolis Review* [online], 3 (1), 39–54. Available from: <http://koreascience.or.kr/journal/view.jsp?kj=SGGHBZ&py=2014&vnc=v3n1&sp=39>.
86. Khorsheed, M. S., 2015. SAUDI ARABIA: FROM OIL KINGDOM TO KNOWLEDGE-BASED ECONOMY. *Middle East Policy*, XXII (3), 147–157.
87. Kim, H., Lee, Y.-S., and Hwang, H.-R., 2014. Regionalization of planned S&T parks: the case of Daedeok S&T Park in Daejeon, South Korea. *Environment and Planning C: Government and Policy* [online], 32 (5), 843–

862. Available from: <http://www.envplan.com/abstract.cgi?id=c1269r> [Accessed 8 Nov 2014].
88. KLOCHIKHIN, E., 2013. PUBLIC POLICY IN (RE)BUILDING NATIONAL INNOVATION CAPABILITIES: A COMPARISON OF S&T TRANSITIONS IN CHINA AND RUSSIA. *Ivmsp 2013* [online]. Ieee. Available from: <http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=6611889>.
89. Koh, F. C. C., Koh, W. T. H., and Tschang, F. T., 2005. An analytical framework for science parks and technology districts with an application to Singapore. *Journal of Business Venturing* [online], 20 (2), 217–239. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0883902603001228> [Accessed 13 Nov 2014].
90. Lai, H.-C. and Shyu, J. Z., 2005. A comparison of innovation capacity at science parks across the Taiwan Strait: the case of Zhangjiang High-Tech Park and Hsinchu Science-based Industrial Park. *Technovation* [online], 25 (7), 805–813. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0166497203002062> [Accessed 26 Nov 2014].
91. Laimer, C. G., 2014. Determinants of Interorganizational Relationships in Science and Technology Parks: Theoretical and Empirical Evidence Determinantes Das Relações Interorganizacionais Em Parques Científicos E, 31, 1–17.
92. Leech, N. L. and Onwuegbuzie, A. J., 2009. A typology of mixed methods research designs. *Quality and Quantity*, 43 (2), 265–275.
93. Leydesdorff, L., 2012a. The Triple Helix of university-industry-government relations. *Scientometrics*, (February), 14–19.
94. Leydesdorff, L., 2012b. The Triple Helix, Quadruple Helix, ..., and an N-Tuple of Helices: Explanatory Models for Analyzing the Knowledge-Based Economy? *Journal of the Knowledge Economy*, 3 (1), 25–35.
95. Leydesdorff, L. and Etzkowitz, H., 1996. Emergence of a Triple Helix of university-industry-government relations. *In: Science and Public Policy*. Beech Tree Publishing, 279–286.

96. Leydesdorff, L. and Fritsch, M., 2006. Measuring the knowledge base of regional innovation systems in Germany in terms of a Triple Helix dynamics. *Research Policy*, 35 (10), 1538–1553.
97. Leydesdorff, L. and Zawdie, G., 2010. The triple helix perspective of innovation. *Technology Analysis & Strategic Management* [online], 22 (7), 1–26. Available from: <http://strathprints.strath.ac.uk/29709/>.
98. Liang, Z., 2013. Entrepreneurial Experience and Science Parks and Business Performance in Beijing China. [online]. Durham University. Available from: <http://etheses.dur.ac.uk/7760/>.
99. Lindelöf, P. and Löfsten, H., 2002. Growth , management and Financing of new technology-based firms — assessing value-added contributions of firms located on and o Science Parks. *Omega International Journal of Management Science* [online], 30 (3), 143–154. Available from: <http://www.sciencedirect.com/science/article/B6VC4-450HCS5-1/2/8be575f11eb3ed2e0c0450db41f8648f>.
100. Link, A. N. and Link, K. R., 2003. On the Growth of U . S . Science Parks. *Journal of Technology Transfer*, 28, 81–85.
101. Link, A. N. and Scott, J. T., 2006. U.S. university research parks. *Journal of Productivity Analysis*, 25 (November 2002), 43–55.
102. Lockett, A., Siegel, D., Wright, M., and Ensley, M. D., 2005. The creation of spin-off firms at public research institutions: Managerial and policy implications. *Research Policy* [online], 34 (7), 981–993. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0048733305001113> [Accessed 26 Aug 2014].
103. Ma, B.-Q., 1998. A Project for the 21st Century in China Kwanghua Science Park. *International Journal of Technology Management*, 16 (8), 808–812.
104. Malek, K., Maine, E., and Mccarthy, I., 2013. A Benchmark Analysis of Canadian Clean Technology Commercialization Accelerators. *In: 2012 Proceedings of PICMET '12*. 836–845.



105. Mariotto, F. L., Zanni, P. P., and Moraes, G. H. S. M. De, 2014. What Is the Use of a Single-Case Study in Management Research? *Rae*, 54 (4), 358–369.
106. Mason, J., 2002. *Qualitative researching*. London: SAGE.
107. Melorose, J., Perroy, R., and Careas, S., 2015a. *Vision 2030 Saudi Arabia*. Statewide Agricultural Land Use Baseline 2015. Riyadh, Saudi Arabia.
108. Melorose, J., Perroy, R., and Careas, S., 2015b. *KING ABDULAZIZ CITY FOR SCIENCE & TECHNOLOGY Report*. Statewide Agricultural Land Use Baseline 2015.
109. Miles, M. B., Huberman, bullet A. M., and Saldaña, J., 2013. Qualitative Data Analysis- Chapter 4. *In: Qualitative Data Analysis*. SAGE.
110. Miles, M. B. and Huberman, A. M., 1994a. *Data Analysis: An Expanded Sourcebook*.
111. Miles, M. B. and Huberman, M. a, 1994b. *Qualitative data analysis: An expanded sourcebook*. Evaluation and Program Planning. Sage Publications.
112. Miles, M., Huberman, A., and Saldaña, J., 2014. *Qualitative data analysis*. 3rd ed. *Qualitative Data Analysis A Methods Sourcebook*. Sage Publications.
113. Miles, M. P. and Munilla, L. S., 2004. The potential impact of social accountability certification on marketing: A short note. *Journal of Business Ethics*, 50, 1–11.
114. Ministry of Economy and Planning, 2010. *Ninth Development Plan* [online]. Knowledge-Based Economy. Riyadh, Saudi Arabia. Available from: <http://www.mep.gov.sa/en/wp-content/plugins/pdf-viewer-for-wordpress/web/viewer.php?file=/wp-content/uploads/2015/10/Ch-5-knowledge-based-economy.pdf>.
115. Ministry of Economy and Planning, 2014. *NATIONAL ECONOMY UNDER THE NINTH DEVELOPMENT PLAN* [online]. Ministry of Economy and Planning. Riyadh, Saudi Arabia. Available from: [www.mep.gov.sa/inetforms/themes/clasic/file/download.jsp](http://www.mep.gov.sa/inetforms/themes/clasic/file/download.jsp).



116. Morgan, D. L., 2007. Paradigm Lost and Pragmatism Regained: Methodological Implications of Combining Qualitative and Quantitative Methods. *Journal of Mixed Methods Research* [online], 1 (1), 48–76. Available from: <http://mmr.sagepub.com/cgi/doi/10.1177/2345678906292462>.
117. Motohashi, K., 2013. The role of the science park in innovation performance of start-up firms: an empirical analysis of Tsinghua Science Park in Beijing. *Asia Pacific Business Review* [online], 19 (4), 578–599. Available from: <http://www.tandfonline.com/doi/abs/10.1080/13602381.2012.673841> [Accessed 27 Oct 2014].
118. Nauwelaers, C. and Kleibrink, A., 2014. *The Role of Science Parks in Smart Specialisation Strategies*.
119. Ndonzuau, F. N., Pirnay, F., and Surlemont, B., 2002. A stage model of academic spin-off creation. *Technovation* [online], 22 (5), 281–289. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0166497201000190>.
120. Nelson, R. R. and Winter, S. G., 1982. *An evolutionary theory of economic change*. Cambridge MA Belknap.
121. Neumann, H., 2016. Tips to attract and connect customers to STP / AOI. *In: IASP 2016 Conference*. Istan: IASP.
122. Oh, D., Phillips, F., and Cities, T., 2014. *Technopolis: Best Practices for Science and Technology Cities* [online]. Springer. Available from: <http://link.springer.com/10.1007/978-1-4471-5508-9>.
123. Olsen, W., 2004. Triangulation in Social Research: Qualitative and Quantitative Methods Can Really Be Mixed. *Developments in Sociology*, 1–30.
124. Omolo, I. O., 2011. Do New Technology-Based Firms Located in Science Parks Really Perform Better ? A case of Norwegian Firms . MSc in Innovation and Entrepreneurship Isaiah Ouma Omolo. University of Oslo.

125. Onsman, A., 2011. It is better to light a candle than to ban the darkness: Government led academic development in Saudi Arabian universities. *Higher Education*, 62 (4), 519–532.
126. Othman, F. Al, Hawryszkiewicz, I., and Kang, K., 2014. The Influence of Socio-technical Factors on Knowledge-based Innovation in Saudi Arabia Firms. *In: Proceedings of the 25th Australasian Conference on Information Systems*. Auckland, New Zealand: ACIS.
127. Owolabi, S. W., Owolabi, O. O., Adeleke, Y. S., and Abubakar, K., 2012. Strategic Approach to R and D Commercialization in Nigeria. *International Journal of Innovation, Management and Technology*, 3 (4), 382–386.
128. Petraite, M., 2010. Approaches towards Strategic Innovation Management in R & D Intensive Sectors : Lithuanian Case. *Socialiniai mokslai*, 3 (69), 32–38.
129. Phan, P. H., Siegel, D. S., and Wright, M., 2005. Science parks and incubators : observations , synthesis and future research. *Journal of Business Venturing*, 20, 165–182.
130. Phillimore, J., 1999. Beyond the linear view of innovation in science park evaluation An analysis of Western Australian Technology Park. *Technovation* [online], 19 (11), 673–680. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0166497299000620>.
131. Phillips, S.-A. M. and Wai-chung Yeung, H., 2003. A Place for R&D? The Singapore Science Park. *Urban Studies* [online], 40 (4), 707–732. Available from: <http://usj.sagepub.com/cgi/doi/10.1080/0042098032000065263> [Accessed 2 Nov 2014].
132. Powell, W. W., Snellman, K., Powell1, W. W., and Snellman2, K., 2004. The Knowledge Economy. *Source: Annual Review of Sociology*, 30180208 (May), 199–220.
133. Quintas, P., Wield, D., and Massey, D., 1992. Academic-industry links and innovation : questioning the science park model. *Technovation*, 12 (3), 161–175.
134. Rampersad, H. K., 2001. *A visionary management model*. The TQM Magazine.

135. Ravenswood, K., 2011. Eisenhardt's impact on theory in case study research. *Journal of Business Research* [online], 64 (7), 680–686. Available from: <http://dx.doi.org/10.1016/j.jbusres.2010.08.014>.
136. RITCHIE, J., LEWIS, J., Snape, D., Spencer, L., Elam, G., Arthur, S., James, N., Legard, R., Keegan, J., Ward, K., Finch, H., O'Connor, W., White, C., and Woodfield, K., 2003. *The Foundations of Qualitative Research*. First Edit. Qualitative research practice: A guide for social science students and researchers. London, United Kingdom: Sage Publications Ltd, London, UK.
137. Rodríguez-pose, A. and Hardy, D., 2014. *Technology and Industrial Parks in Emerging Countries Panacea or Pipedream* [online]. 9th ed. Springer. Available from: <http://www.springer.com/series/10096>.
138. Ruiz-palomino, P., Jimenez-moreno, J. J., and Martí, R., 2013. Cooperation, Clusters, and Knowledge Transfer. *In*: Ferreira, J. J. M., Raposo, M., Rutten, R., and Varga, A., eds. *Cooperation, Clusters, and Knowledge Transfer* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg, 19–34. Available from: <http://link.springer.com/10.1007/978-3-642-33194-7> [Accessed 10 Dec 2014].
139. SAGIA, 2012. *Saudi Arabia's Economic Cities* [online]. Riyadh, Saudi Arabia. Available from: <http://www.oecd.org/mena/investment/38906206.pdf>.
140. Saldana, 2008. One An Introduction to Codes and Coding. *In: Qualitative Researcher* [online]. Sage Publications, 1–31. Available from: [https://www.sagepub.com/sites/default/files/upm-binaries/24614\\_01\\_Saldana\\_Ch\\_01.pdf](https://www.sagepub.com/sites/default/files/upm-binaries/24614_01_Saldana_Ch_01.pdf).
141. Sanni, M., Egbetokun, A., and Siyanbola, W., 2010. *A Model for the Design and Development of a Science and Technology Park in Developing Countries* [online]. Munich Personal RePEc Archive. Ile-Ife, Nigeria. Available from: <http://mpira.ub.uni-muenchen.de/25342/>.
142. Saunders, M., Lewis, P., and Thornhill, A., 2009. *Research Methods for Business Students*. Pearson.

143. Schuh, K. L. and Barab, S. A., 2008. 7 Philosophical Perspectives. *Handbook of Research on Educational Communications and Technology*, 67–82.
144. Shin, J. C., Lee, S. J., and Kim, Y., 2012. Knowledge-based innovation and collaboration: A triple-helix approach in Saudi Arabia. *Scientometrics* [online], 90 (1), 311–326. Available from: <http://link.springer.com/10.1007/s11192-011-0518-3> [Accessed 1 Nov 2014].
145. Siegel, D. S., Westhead, P., and Wright, M., 2003. Assessing the impact of university science parks on research productivity : exploratory firm-level evidence from the United Kingdom. *International Journal of Industrial Organization*, 21, 1357–1369.
146. Soon, D., Cho, Y., Il, W., and Keun, H. J., 2011. Management and Governance Issues in the Development of Science and Technology Based Innovation Cluster. *IEEE*.
147. Squicciarini, M., 2007. Science parks: seedbeds of innovation? A duration analysis of firms' patenting activity. *Small Business Economics* [online], 32 (2), 169–190. Available from: <http://link.springer.com/10.1007/s11187-007-9075-9> [Accessed 22 Nov 2014].
148. Stoner-Zemel, M. J., 1988. Visionary leadership, management, and high performing work units : an analysis of workers' perceptions. [online]. University of Massachusetts Amherst. Available from: [http://scholarworks.umass.edu/dissertations\\_1%0Ahttp://scholarworks.umass.edu/dissertations\\_1/942](http://scholarworks.umass.edu/dissertations_1%0Ahttp://scholarworks.umass.edu/dissertations_1/942).
149. Storey, D. and Westhead, P., 1995. *Financing Technology-Based Firms in the United Kingdom*.
150. Tamásy, C., 2007. Rethinking Technology-Oriented Business Incubators: Developing a Robust Policy Instrument for Entrepreneurship, Innovation, and Regional Development? *Growth and Change* [online], 38 (3), 460–473. Available from: <http://doi.wiley.com/10.1111/j.1468-2257.2007.00379.x>.

151. Teddlie, C. and Tashakkori, A., 2010. Overview of contemporary issues in mixed methods research. *Handbook of Mixed Methods in Social & Behavioral Research*, 1–41.
152. Teece, D. J., 2010. Business models, business strategy and innovation. *Long Range Planning*, 43 (2–3), 172–194.
153. Thierstein, A. and Willhelm, B., 2001. Incubator, technology, and innovation centres in Switzerland: features and policy implications. *Entrepreneurship & Regional Development*, 13, 315–331.
154. Tian, M., 2013. The birth , growth , and dynamics of innovation systems in less-favoured regions : A case study on the Optics Valley of China, Wuhan. University College London.
155. Tobergte, D. R. and Curtis, S., 2013. TECHNOLOGY PARKS (TP) STRATEGIC CAPACITY EVALUATION STRUCTURE: A FRAMEWORK PROPOSAL FOR IMPLEMENTATION IN LATIN AMERICA. *Journal of Chemical Information and Modeling*, 53 (9), 1689–1699.
156. Tsai, M.-C., Wen, C.-H., and Chen, C.-S., 2007. Demand choices of high-tech industry for logistics service providers—an empirical case of an offshore science park in Taiwan. *Industrial Marketing Management* [online], 36 (5), 617–626. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0019850106000575> [Accessed 27 Nov 2014].
157. Tsamis, A., 2009. Science and Technology Parks in the less favoured regions of Europe : an evaluation of their performance and the parameters of success Thesis submitted for the degree of Doctor of Philosophy Achilles Tsamis The London School of Economics and Political Sc. The London School of Economics and Political Science.
158. Vaidyanathan, G., 2008. Technology parks in a developing country: The case of India. *Journal of Technology Transfer*, 33, 285–299.
159. Vedovello, C., 1997. Science parks and university-industry interaction: Geographical proximity between the agents as a driving force. *Technovation* [online], 17 (9), 491–502. Available from:

<http://www.scopus.com/inward/record.url?eid=2-s2.0-0031234158&partnerID=tZOtx3y1>.

160. Villani, D. and Antonietti, A., 2013. *Encyclopedia of Creativity, Invention, Innovation and Entrepreneurship* [online]. Encyclopedia of Creativity, Invention, Innovation and Entrepreneurship. Available from: <http://link.springer.com/10.1007/978-1-4614-3858-8>.
161. Voss, C., Tsiriktsis, N., and Frohlich, M., 2002. Case research in operations management. *International Journal of Operations & Production Management*, 22 (2), 195–219.
162. Wang, H., 2010. Hi-tech Industrial Cluster in China: Based on the case of Zhongguancun Science Park. Blekinge Institute of Technology.
163. Wang, Z. and Wang, N., 2012. Knowledge sharing, innovation and firm performance. *Expert Systems with Applications*, 39 (10), 8899–8908.
164. WESTHEAD, P. and Storey, D., 1995. Links Between Higher Education Institutions and High Technology Firms. *Omega International Journal of Management Science*, 23 (4), 345–360.
165. Wilson, T., 2012. *A Review of Business – University Collaboration* [online]. London, United Kingdom. Available from: [www.nationalarchives.gov.uk/doc/open-government-licence](http://www.nationalarchives.gov.uk/doc/open-government-licence).
166. Wong, K. W. and Bunnell, T., 2006. 'New economy' discourse and spaces in Singapore: A case study of one-north. *Environment and Planning A*, 38, 69–83.
167. World Bank Institute, 2007. *Building knowledge economies: advanced strategies for development* [online]. World Bank Institute. Available from: <http://books.google.com/books?hl=en&lr=&id=cZyvZX0JCfAC&amp;oi=fnd&pg=PR9&dq=Building+KNOWLEDGE+ECONOMIES:+Advanced+Strategies+for+Development&ots=gye5onkaPi&sig=fkzdho1M5PV0lskuFZCNS1pRyo>.
168. Yan, M.-R. and Chien, K.-M., 2013. Evaluating the Economic Performance of High-Technology Industry and Energy Efficiency: A Case Study of Science Parks in Taiwan. *Energies* [online], 6 (2), 973–987. Available from: <http://www.mdpi.com/1996-1073/6/2/973/>.

169. Yigitcanlar, T. and Fachinelli, A. C., 2011. The 4th Knowledge Cities World Summit. *In: Yigitcanlar, T. A. N. and Fachinelli, A. N. A. C., eds. The 4th Knowledge Cities World Summit.* Bento Goncalves, Brazil: Knowledge Cities World Summit, 433.
170. Yin, R. K., 2003. *Case Study Research: Design and Methods.* Essential guide to qualitative methods in organizational research. Sage Publications.
171. Yin, R. K., 2004. Case Study Methods. *COSMOS Corporation*, 480.
172. Yin, R. K., 2006. Case Study Reserach - Design and Methods. *Clinical Research*, 2, 8–13.
173. Yuehua, Z., 2002. A developing economy oriented model for science park management. [online]. University of Wollongong Thesis Collection University. Available from: <http://ro.uow.edu.au/theses/989>.
174. Zhang, M., 2013. University capabilities and science park performance: An empirical study of the national university science park of China. *2013 6th International Conference on Information Management, Innovation Management and Industrial Engineering* [online], 632–634. Available from: <http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=6703666>.
175. Zhou, C., 2014. Four dimensions to observe a Triple Helix : invention of 'cored model' and differentiation of institutional and functional spheres. *Triple Helix*, 1 (Etzkowitz 2002), 1–20.
176. Zieli, M., Rogala, A., and Takemura, M., 2014. Business Model of Science and Technology Parks : Comparison of European Best Practice Business Model of Science and Technology Parks : Comparison of European Best Practice. *In: Proceedings of International Conference for Entrepreneurship, Innovation and Regional Development.* 15–28.
177. Zouain, D. M. and Plonski, G. A., 2015. Science and Technology Parks: laboratories of innovation for urban development - an approach from Brazil. *Triple Helix* [online], 2 (1), 7. Available from: <http://link.springer.com/10.1186/s40604-015-0018-1>.