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University of Southampton

Faculty of Social Sciences

Southampton Business School

Exploring Emerging Technologies' Impacts on Innovation of the Creative Industries

by

Wenyi Chu

Thesis for the degree of Doctor of Philosophy

[September 2025]

University of Southampton

Abstract

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Exploring Emerging Technologies' Impacts on Innovation of the Creative Industries

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Creative industries are interesting for management study. Creative professionals work on artistic innovations, credited by distinct creativity. Artistic innovations are collective creativity and group interactions by diverse creative professionals with discrepant knowledge, skills and backgrounds. Meanwhile, artistic distinctiveness is obtained by directorial instruction from centre creators within the group, who are great talents and gifted minds with prominent personal knowledge, intelligence, and expertise. Also, creative industries and professionals are often early adopters and heavy users of emerging technologies. Emerging technology is constantly improving and evolving, changing markets and industries, challenging innovation paradigms and open to various collaborations, crossing domains and sectors.

With the increasingly adoption of emerging technology, it is argued emerging technologies, such as GenAI and rooted on its transformative capacity as creative partner and catalyst for creative thinking and collaboration, can help streamline creative process, enhancing creation and reduce creative cost for creative industries as compelling potential for industry contemplation and dynamics. To explore the close interplays between creative professionals and emerging technology, the relational perspective of emerging technology appeared to be one of the beneficial theoretical umbrellas. It is suitable for intricate interactions within creative industries. Digital transformation is often specific to the technology involved (Schneider and Kokshagina, 2021), whereas the creative businesses can engage multiple generations and several types of digital technologies (eg.Hughes, Bendoni and Pehlivan, 2016; Patrickson, 2021). Relational perspective of technology (Bailey et al., 2022; Faraj and Leonardi, 2022) depict the importance and cross flow of relations and functions for the dynamics, rather than put technology in the centre of digital disruption and transformation.

Theoretically, this research mainly joins discourse and advances theories of professional learning, human-GAI collaboration, routine dynamics, and innovation ambidexterity. These contributions constitute a complete picture of emerging technology's impacts on creative industries surrounding the characteristics of artistic innovations identified.

Practically, this PhD project presents various management suggestions for creative professionals, firms and traditional creative incumbents regarding adapting to and deploying emerging technology for artistic innovations.

Methodologically, for a micro-level empirical study with qualitative inquiry, multiple primary data collection methods are deployed, including non-participant observation, interviews and ethnography for a thorough understanding of emerging technology and their profound impact on artistic innovations.

Table of Contents

Table of Tables

Tables of Figures

Research Thesis: Declaration of Authorship

Print name: Wenyi Chu

Title of thesis: Exploring Emerging Technologies' Impacts on Innovation of the Creative Industries

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

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;
5. I have acknowledged all main sources of help;
6. 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;
7. None of this work has been published before submission

Signature: Wenyi Chu Date: 2nd Sep. 2025

Acknowledgements

My deepest gratitude goes to the case firm for giving me full support without reservation over my data collection period. More importantly, their extraordinary integration of emerging technologies into their show production and undisputable resulting performance inspired the entire idea of research. Without the case, I cannot do this Ph.D.

Also, I have to thank examiners for their precious comments for me to improve the thesis substantially. Without their advice, it is far worse than its current status.

My first round of appreciation goes to my main supervisor, David Baxter for agreeing to supervise me and making this Ph.D. learning practical. His supervision makes me productive in every sense. David shared many insightful and detailed comments and revisions for my papers. Whenever I was stuck somewhere, comments from David always opened my mind. Also, I have been ashamed of his editing of my writing. Additionally, he has granted me the freedom to arrange the PhD schedule at my discretion. His permission enabled me to finish my PhD in 2 years. Yang Liu, the second supervisor and Ajit Nayak, the previous supervisor, provided interesting comments on the study. Working with them is interesting.

As a self-funding PhD student, the referencing material from the library of Southampton University is so abundant. I only bought several textbooks I wanted to keep by my side and made my notes along the text, all other learning was from the library. Being appointed a Student Member of the Business and Law Ethics Sub-Committee of the Social Sciences Research Ethics Committee gave me another chance to engage with the university and faculty. The training for this position enhanced my understanding and implementation of ethics for academic research.

At last, the PhD journey is unique, I must thank my daughter for her support along the way and wish her a bright future.

Definitions and Abbreviations

AI .....Artificial intelligence

AR .....Augmented reality

GAI/GenAI .....Generative artificial intelligence

TF..... The case firm

VR .....Virtual reality

Chapter 1 Introduction

1.1 Research Context

Creative industries are both a significant part of advanced economies and a crucial component of regional innovations (Chaston and Sadler-Smith, 2012). The cultural and creative industries "generate annual revenues of USD 2.25 trillion and account for 29.5 million jobs globally (more than the telecoms or automotive sector in many economies)" (OECD, 2021, 4) and introduce numerous innovations (Jones, Lorenzen and Sapsed, 2015). Creative industries seek to produce economic gains from creative input, cultural expression and resulting artistic innovation (Jones and Maoret, 2018). Caves (2001) has summarised the basic economic properties of creative industry, business and behaviours as uncertain market demand, care and reputation-driven production, diverse and differentiated collaboration, and differentiated offerings. Artistic innovations are critical for the social-economical functioning, as the innovations are taking economic capital, cultural capital, social network capital and transcendent dimension of symbolic capital (Bourdieu, 1986) to produce commercial performance, artistic merit, and societal impact (Hadida, 2015). Artistic innovations of creative industries are interesting for management study as a distinct type of innovation that is creativity-focused (Gilson, 2015) and demands key creators' critical and systematic thinking, cognitive capability and routine competency to mobile creative resources (Cautela, Simoni and Moran, 2022).

1.1.1 Artistic innovations combining creativity and innovation for competition

Creativity is the core driver and antecedent of artistic innovation (Gohoungodji and Amara, 2022). Novelty and usefulness define creativity (Amabile, 1988; Woodman, Sawyer and Griffin, 1993; Harvey *et al.*, 2023) that usefulness set rationality and boundary for novelty (George, 2007). Artistic innovation is combination of both commercial value and artistic quality (Uzzi and Spiro, 2005). Highly rated creative products are innovations with aesthetic and creative distinctiveness (Thompson, Jones and Warhurst, 2007) for high value audience experiencing (Lampel, Lant and Shamsie, 2000). Insufficient market recognizable distinctiveness means less creative value and lower survival rates (Piazza, Phillips and Castellucci, 2020)

Artistic creation requires both creativity and innovation (Khaire and Hall, 2016; Bharadwaj *et al.*, 2017; Lehtonen, Ainamo and Harviainen, 2020; Slavich *et al.*, 2020; Berg, 2022). Such artistic distinctiveness comes from the core creator, i.e. talent artists, who are socially judged and

selected by prove of long term distinct high quality of work (Becker, 2008). Market recognizable artistic innovation of masterpiece is defined by their symbolic content of creativity (Hadida, 2015). Artists carries the portfolio of their creations throughout professional life (Caves, 2001) releasing new products combining the legacy of their own path and the changing environment (Berg, 2022) that constitute their histories for future paths (David, 1994).

These distinct individual creators produce creativity within a supportive organisational context (Amabile and Pratt, 2016). Creative majors support core artists to materialise creativity into artistic innovation. Creative majors as organisers of artistic innovation, have controlled the creativity resources and dominated innovation in the industry (Smith, 2021).

1.1.2 Artistic innovations by creative professionals

For supporting core artists' creation, organisations in creative industries are organised around professionalism (Gohoungodji and Amara, 2022), creating artistic innovations by professionals (Mietzner and Kamprath, 2013; Khlystova, Kalyuzhnova and Belitski, 2022). Artistic innovations are collective creativity and dynamic group interactions by diversified professionals with discrepant knowledge, skillsets and background for creative exploration (Mannix and Neale, 2005; DeFlillippf, Grabher and Jones, 2007; Koch *et al.*, 2023). Artistic distinctiveness is obtained by directorial instruction from core creators (Paris and Ben Mahmoud-Jouini, 2019), who are great talent and gifted minds with prominent personal knowledge, intelligence, and expertise (Kaufman and Sternberg, 2015). Core creators provide creative vision to balance artistic pursue, market condition, knowledge constrains, conventional rules, available resources and professional networks (Becker, 1982; Becker, 2008; Chen and Tseng, 2021) with their skills and cognitions (Distel, 2019). Evidenced by Hollywood film production, Cattani and Ferriani (2008) emphasise the importance for artists embedding in groups of creative professionals to collaborate with others for engendering of great creativity. A diverse range of creative professionals with varied skills (DeFillippi, 2015) must collaborate in an interdependent way cross hierarchy levels of professionals within a open learning contexts of communication to create artistic innovation. Creativity as the output of group cognition demands collaborative divergence as ideas and constraints co-evolve (Hatcher *et al.*, 2018).

1.1.3 Artistic innovations as problem-solving routines

The creations of artistic innovation are problem-solving processes. For example, Uzzi and Spiro (2005) studied Broadway shows and concluded that show production relies on collective brainstorming, idea sharing, and joint problem-solving. Several representative processes of creativity and innovation are summarised in Table 1.1.

Table 1.1 Phases and processes of creation

Literature	**Routine phases**	**Process and practice**
Gohoungodji and Amara (2022)	Creativity	Idea generation
	Innovation	Idea exploitation
Anderson, Potocnik and Zhou (2014)	Creativity	Idea generation
	Innovation	Idea implementation
Amabile and Pratt (2016)	Creativity	Task presentation Preparation Idea generation Idea validation Outcome assessment
	Innovation	Agenda setting Stage setting Idea production Ideas testing Idea implementing Outcome assessment
Perry-Smith and Mannucci (2017)	Creativity	Idea generation Idea elaboration Idea champion

Literature	Routine phases	Process and practice
		Idea implementation
Paris and Ben Mahmoud-Jouini (2019)	Creativity	Inspiration Framing Prototyping Validation
Mumford and Todd (2020)	Creativity	Defining the problem Gathering information Selecting and combining concepts Idea generating Idea evaluation Planning Implementation Adaptive monitoring

Group interactions in the creative process are therefore recursive loops of reflections producing collective energy, attention, and understanding that transform individual inputs into creative outcomes (Harvey, 2014; Harvey *et al.*, 2023). These iterations can be conceptualised as a snake-shape progression (Paris and Ben Mahmoud-Jouini, 2019), frequent revision loops with testing (Goh and Pentland, 2019), continuous revisions and contextual repositioning (Håkonsen Coldevin *et al.*, 2019), or rounds of ongoing experimenting, evaluation, and legitimating (Clegg and Burdon, 2021).

Sequence and rhythm of creative process are also critical. Empirical data from US film industry shows routine flexibility and impacts that the later handoff of mature accomplishment from the creative function to production generates lesser creative final products than early involving implementation functions into the creativity development equipping executing actors with sense of creative ownership (Berg and Yu, 2021).

1.1.4 Artistic innovation as collaborations for entertainment projects

Artistic innovations, such as music, movies and shows, are produced as collaborative innovations by temporarily organising diverse teams and opposing forces (Bechky, 2006; Davenport, 2006; Becker, 2008; DeFillippi, 2015; Siciliano, 2016; Li and Ghirardi, 2019).

The creative industries structure has been defined as partitioned in that a few giants dominate the centre and collaborate with a rather large number of periphery studios to promote industry creativity and innovation (Jia, Lewis and Negro, 2023). For instance, Hollywood ring is dominated by flexible hub organizations mobilizing, assembling and bundling dispersed resources into output film and box office sales (Lampel and Shamsie, 2003). Hence the inter firm collaboration are common and led by such powerful majors.

From empirical study of Hollywood production, newcomers working with experienced team inferred higher potential of innovation (Perretti and Negro, 2007). New members whose knowledge is exotic and deviate to established organizational code that new member increase search (March, 1991), discovery and innovation when such new knowledge incorporates well in current context of organizational capability with stock of accumulated knowledge provide large amount of new potential solutions foster feasible innovation (Perretti and Negro, 2007).

With diverse and sometimes opposing interests from various firms, the pursue of elegant originality and commerciality or well-articulated artistic expression of artists and mass entertainment product (Besemer and O'Quin, 1999; Christiaans, 2002; Mears, 2015; Han and Pollock, 2021) among collaborative participants are reflected in the complex design of artistic innovations. Broadway shows' creativity and productivity are generated from collective problem-solving and difficulty addressing (Uzzi and Spiro, 2005).

1.2 Research Motivations

1.2.1 Joining extant discourse with the relational perspective

In recent years, digital technologies, have driven radical transformations of organisational process, innovations and competitive advantages (Autio and Thomas, 2020; Klos et al., 2023). Adopting novel digital technology may instigate incumbent firms reconfigure value creation and capture (Lanzolla, Pesce and Tucci, 2021). Introducing and incorporating digital technology into organisational production and value creation may improve efficiency, increase output, influence knowledge flow, change depth and breadth of innovation, rearrange innovation

process and reconfigure structure and rewrite innovation knowledge (Marion and Fixson, 2021). Moreover, emerging technology, such as AI and VR, is getting intelligent of constant learning, improving, adapting and evolving by themselves and changing market and industry, challenging the innovations and open to various collaborations, crossing technologies and converging industries (Chaturvedi, Hsu and Prescott, 2024).

As a forefront domain of management study, extant research of digital technology application by organisations are proliferated with quantitative with surveys and discussions of managerial firm-level performance and outcome (eg. Aalbers and Whelan, 2021; Appio et al., 2021; Alaimo and Kallinikos, 2022). Adapting to technological disruption is complex and challenging. Emerging digital technology, such as artificial intelligence (AI), virtual reality (VR)/augmented reality (AR), are driving substantial change of human act and interact for innovations (Bailey *et al.*, 2022). Hence, the underexplored micro-level phenomenon is called for study (Nambisan *et al.*, 2017; Vial, 2019; Warner and Wager, 2019). Creative industries are human-centric with abundant interactions and counteractions among individual participants of the artistic innovations that the required qualitative study at the individual micro level could be explored thoroughly.

With the increasingly adoption of emerging technology, it is argued emerging technologies, such as GenAI and rooted on its transformative capacity as creative partner and catalyst for creative thinking and collaboration, can help streamline creative process, enhancing creation and reduce creative cost for creative industries as compelling potential for industry contemplation and dynamics (Amankwah-Amoah *et al.*, 2024). Innovative new product and service used to be taken for granted that ultimately originated from human being's creative thinking and are often relevant with creativity (Mumford and Todd, 2020).

Creativity drives original ideas that do not follow general rules or conventions, whereas machine learning based AI algorithms work on conformity of training data, hence, the prominent potential of AI is acting as a collaborative assistant for creativity (Anantrasirichai and Bull, 2022). Hence, it is necessary for creative professionals to learn, adapt and navigate change. creative industries and professionals are often heavy users and early adopters of emerging technologies from the last generation of social media (Franklin et al., 2013) to latest AI (Landoni et al., 2020), GenAI tools (Chen et al., 2019) and blockchain technologies (Patrickson, 2021). One step further, emerging technology, such as GenAI, may even introduce the evolution of artistic convention, leading to the contemplation of the paradigm of creative industries (Amankwah-Amoah *et al.*, 2024).

To explore the close interplays between creative professionals and emerging technology, which occurred in dynamic creative industries, the relational perspective of emerging technology

(Bailey *et al.*, 2022) appeared to be one of the beneficial theoretical umbrellas. It is suitable for intricate interactions within creative industries. Digital transformation is often specific to the technology involved (Schneider and Kokshagina, 2021), whereas the creative businesses can engage multiple generations and several types of digital technologies (eg.Hughes, Bendoni and Pehlivan, 2016; Patrickson, 2021). Relational perspective of technology (Bailey et al., 2022; Faraj and Leonardi, 2022) depict the importance and cross flow of relations and functions for the dynamics, rather than put technology in the centre of digital disruption and transformation.

Artistic innovation produced by creative industries is also suitable for micro-level research due to abundant, multiple levels and cross-boundary human actions, interactions and collaborations. Ultimate innovative offering can only be engendered through effective implementation of creative idea realized by collective human endeavour with supportive firm resources (Amabile, 1996). Creativity is the ongoing process that individuals and groups engage within organizational context and work on complex and ambiguous problem toward the ultimate creative goal (Drazin, Glynn and Kazanjian, 1999).

Moreover, adapting emerging technologies is often specific to the technology involved (Schneider and Kokshagina, 2021), whereas the creative businesses can engage multiple generations and several types of digital technologies (eg. Hughes, Bendoni and Pehlivan, 2016; Patrickson, 2021) by managing digital innovations as multiple portfolios (Li, 2020), indicating an interesting potential to study emerging technologies in empirical context of creative industries by the relational perspective of technology.

1.2.2 Studying case

To execute the study and accomplish research with high quality, a case target in China, which I have native cultural background, facilitates understanding data and information context with the least missing, errors and other misunderstandings. Also, Chinese cases are commonly acceptable context and often appeared in extant management literature about innovation and creativity (eg. He and Liu, 2022; Zhang *et al.*, 2023; Venkataramani and Tang, 2024).

The target case a top Chinese show production corporation TF (pseudonyms) with over 300 in-house creative professionals. It has a structure of headquarters/business units/branches/departments/functions and hierarchy levels of board, management, middle and frontline, that can support a microfoundation research and a manageable representative interview sample. The case firm, TF has produced numerous shows, dozens are grand ones with international, regional and national influences over its more than two decades of history.

As background context, show industry, i.e. performing arts, as other creative businesses, is competing with creativity and radical innovation (Gray and Heilbrun, 2001; Bergamini et al., 2018). Artistic innovation in performing art business is an essential competitive strategy (Gray and Heilbrun, 2001). The success criteria of show are combination of both commercial value and artistic quality (Uzzi and Spiro, 2005). Chinese performing art business is a considerable market by global comparison. England theatre has a total earned income of £303 million in the 2022/23 fiscal year (Statista, 2023a). For Broadway shows in New York, the total attendance reached 12.3 million in 2022/2023 contributing gross sales of USD$1.6 billion (Statista, 2023b). According to data collected by the China Association of Performing Arts, the whole sector had a total attendance of over 170 million in 2023 with a turnover of RMB 74 billion, roughly USD$10billion/£8.5 billion, including over 11% from box-office of theatre play, around 27% from box-office of commercial events, such as concerts, and over 22% from box-office of tourism play[1].

The critical justification of the case selection is the theoretical suitability. Regarding the academic discourse to join, the data from the case promise the potential of theoretical development. First, the firm engages with multiple emerging technologies, such as AI, GenAI, VR/AR, that are significant representatives of novel digitalisation widely adopted in creative industries (Anantrasirichai and Bull, 2022; Amankwah-Amoah *et al.*, 2024; Benassi and Rialti, 2024). The case firm has adopted AR/VR and Unreal Engine to merge virtuality and reality, enhance audience consumption from passive watching into actively engaging, substantially disrupt how creative professional innovate, work and collaborate. In such shifting, a large amount of the research pursued micro level interactions among professionals and between human and technology can be captured. Relational perspective is reflected in that technology is not in the centre, rather human interactions are enabled by the novel technology (Bailey *et al.*, 2022).

Moreover, there is a varied but widespread use of generative artificial intelligence (GenAI). GenAI has claimed creative and innovation capability (Bouschery, Blazevic and Piller, 2023; Ritala, Ruokonen and Ramaul, 2023). As creativity and innovation are the core competence of creative firms (Jones, Lorenzen and Sapsad, 2015; Gohoungodji and Amara, 2022), it could be fruitful for driving theoretical exploration of emerging technology impacts on creative industries. The artistic chair of our case of the board had been aware of some adoptions of GenAI and found out one function team performed exceptionally well due to its application. With the verified positive performance, the firm announced, in one management meeting, that all the functions and

[1] https://baijiahao.baidu.com/s?id=1794040563026706008&wfr=spider&for=pc

departments should learn and the firm will give whatever support professionals need for utilisation. During the process, abundant data of GenAI deployment at the microlevel across the organisation is identified as human interaction with technology rather than technology centric.

1.3 Papers and Contributions

This thesis follows the research paper route and is prepared with 3 empirical papers. The first paper was prepared for submitting to British Journal of Management, hence, it mainly responds to the calls of GAI research from the latest papers in this journal (Brown *et al.*, 2024; Chowdhury, Budhwar and Wood, 2024). The second paper was prepared for the Special Issue Call of GAI from Technovation. The third paper was prepared for the Special Issue Call regarding disruption and digitalization from Creativity and Innovation Management.

A PhD study of the impact emerging technology on innovation of creative industries could advance theoretical knowledge and implicate practical suggestions. As an integrative body studying emerging technology impacts on innovations, this thesis compromises three papers of artistic innovation, as creative professional work, through group iterative routines and as project-based collaborative innovations, respectively. In such human-centric industries, I start the research from the people, i.e. creative professionals. Artistic innovations rely on knowledgeable and resourceful professionals that stress professionals' learning, the first paper addresses how the professionals learn GAI exploitatively and exploratively with various practice and process and integrate internal/existing tactic knowledge with external/novel explicit knowledge to create artistic innovations by human-GAI collaboration.

Processes are constructed by actions and interactions from multiple agencies, including people and technology (Orlikowski and Scott, 2008) and other artefacts in logical sequence (Pentland et al., 2012). Answering the second question of how GenAI impacts artistic creation routines, the second paper makes empirical contributions of elaborating GenAI, as both a working tool and a communication facilitator. The collective application of GenAI as the working medium led to the ostensive sequence change of routines as simultaneous exploration of problems and solutions for creativity and innovation.

For studying the last question of "How does an established creative firm manage the threat of digital disruption by organisational ambidexterity?", how the firm manages simultaneous incremental and radical innovation against the external trends of VR/AR through broad collaboration of both intra-firm and inter frirms as a response to digital disruption.

Besides of reflecting main characteristics of artistic innovation in respective papers, the extent of emerging technologies' impact on innovation of creative industries are progressive by the sequence of papers. In the first paper, the impact of emerging technology is mainly reflected in how professionals are learning and adapting for how they create individually with GAI inputs prompting and outputs curation for artistic innovations. In the second paper, beyond individual for collective artistic innovation as human-GAI collaboration, GAI has been adopted as communication medium during collective creation and brought novel dynamics to artistic innovation routines. Such group creation facilitates further and wider exploration of new technological artefacts. GAI as both new tool and medium, the recursive iteration of artistic innovations is enhanced, and the previously sequential creativity and innovation routine clusters are blended. When the technology, VR/AR, is novel and changes the value propositions of artistic innovations the firm has worked on for a long time as on-site entertainment, exploratory innovation is required in addition to exploitative innovations for incumbents to address the market disruption brought by emerging technology.

For the theoretical exploration of relational perspective of emerging technology and organising, each paper reflect different impact of technology on individual work, collective work and firm level With the relational view for a complex entwining between technology and human actions, technologies are emergent, evolving and entangled forces that impact organisations' constitution and transformation (Bailey *et al.*, 2022).

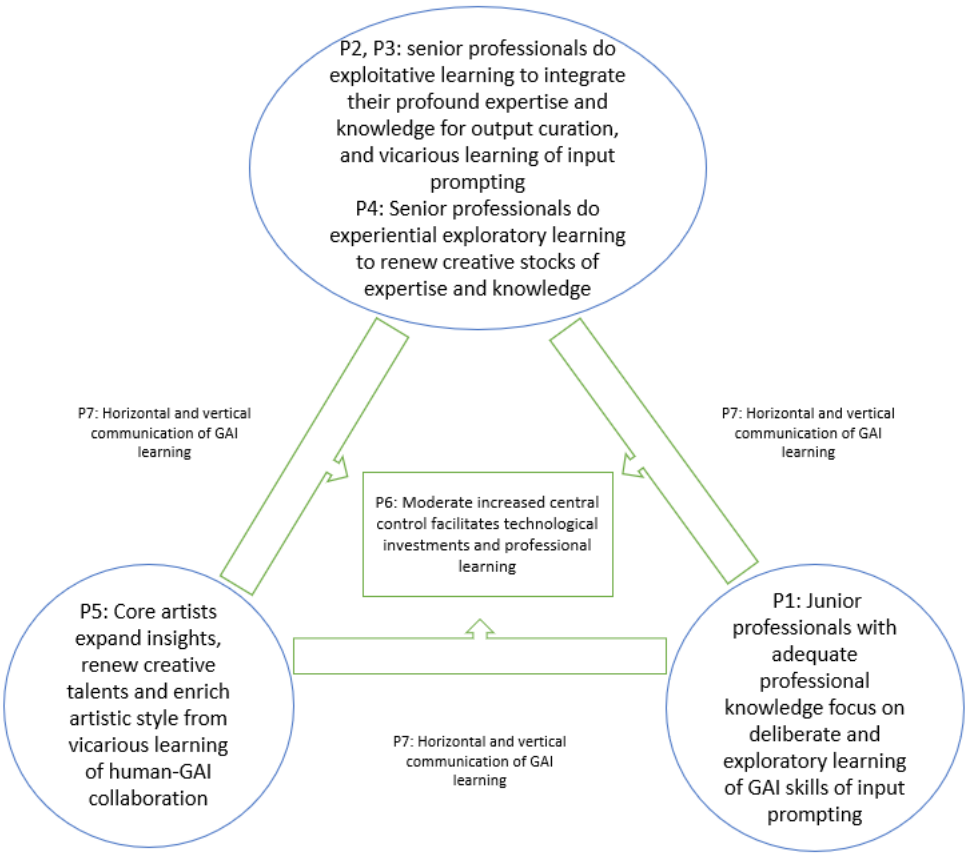
In the conclusion chapter, relational perspective of technology (Bailey *et al.*, 2022; Faraj and Leonardi, 2022) is adopted to analyse harmonising between emerging technologies and people in creative firm. Emerging technology could bring artistic innovations to new domains that reflects cross flow relations and relational functions of artistic innovation and value co-creators (Li, 2020).

With relational view, the exploration and exploitation innovation and learning depends on where people locate in the hierarchy, whereas the process and routine adaptation for emerging technologies not only change how they carry out work, but also shift who do what but also what to do and when to do what. The holistic and systematic adaptation of emerging technologies is occurred in micro level, influence every actor involved. As a whole, the organisational level outcomes is changing voluntarily, as a top-bottom simultaneous phenomena. It is also a response to the call by Bailey et al. (2022) to adaptively apply the technology relational view (Faraj and Leonardi, 2022) for innovation research.

Paper 1: Exploring Creative Professionals' Learning for Human-GAI Collaboration

Question: How could creative professionals learn to collaborate with GAI for artistic innovation?

With a rich empirical study of creative professionals' various learning activities for human-GAI collaboration, our contributions are four-fold. First, we show how professional competence reconfiguration varies depending on the level of professional competence. Both junior and senior professionals learn by doing, in a collaborative process. Upon new technology application, senior experts may enjoy senior advantage (Jia *et al.*, 2023), or may maintain authority and seniority by interactive practice of seeking, stalling, leveraging, and confronting (Beane and Anthony, 2024). In contrast, we found senior creative professionals are enhancing their disciplinary leadership through experiential learning of human-GAI collaboration, in combination with interactive coordination with junior professionals to renew their competence and enhance outcomes artistic innovations by GAI leverage. As professional leaders, core artists learn through vicarious learning during creation with both senior and junior professionals. Second, we show how the existing professional competence is critical for professionals to reconfigure their knowledge (Verona and Ravasi, 2003; Cepeda and Vera, 2007). For human-GAI collaboration of artistic innovation, senior creative professionals, compared to junior professionals and profession leaders, are the main users of GAI, integrating novel knowledge of GAI with artistic innovation. Third, we confirm the findings that GAI contributes to creativity (Ameen *et al.*, 2024b) even for creative professionals. Rather than being doubtful about the output credibility of GAI due to their seniority (Wang, Gao and Agarwal, 2024), they learn from and are inspired by GAI outputs, which we term as human-GAI creativity (Jiang *et al.*, 2023). Fourth, we identify the importance of learning context. To generate competitive innovation, creative firms must support professional learning context as a known critical element (Wilson, 2009). We find that the technological investment, social communication, and active information flow constitute a beneficial firm environment to enable creative professionals to learn to collaborate with GAI.



propositions

Figure 1.1 GAI learning cross the firm

Paper 2: Exploring The Impacts of Generative AI on Artistic Innovation Routines

Question: How does GenAI impact the routine dynamics of artistic creation?

This paper makes empirical contributions of elaborating GenAI, as both a working tool and a communication facilitator. The collective application of GenAI as the working medium led to the ostensive sequence change of routines as simultaneous exploration of problems and solutions for creativity and innovation. We provide two main theoretical implications. First, individual and collective application of GenAI as both digital working tool and medium in artistic creation can improve productivity of creation and iteration. Second, such human-AI collaboration results in the routine adaptation of ostensive aspect by changing the path and interface of routine clusters and mixtures the sequential routines within creation with local events rather than systematically transforming routines.

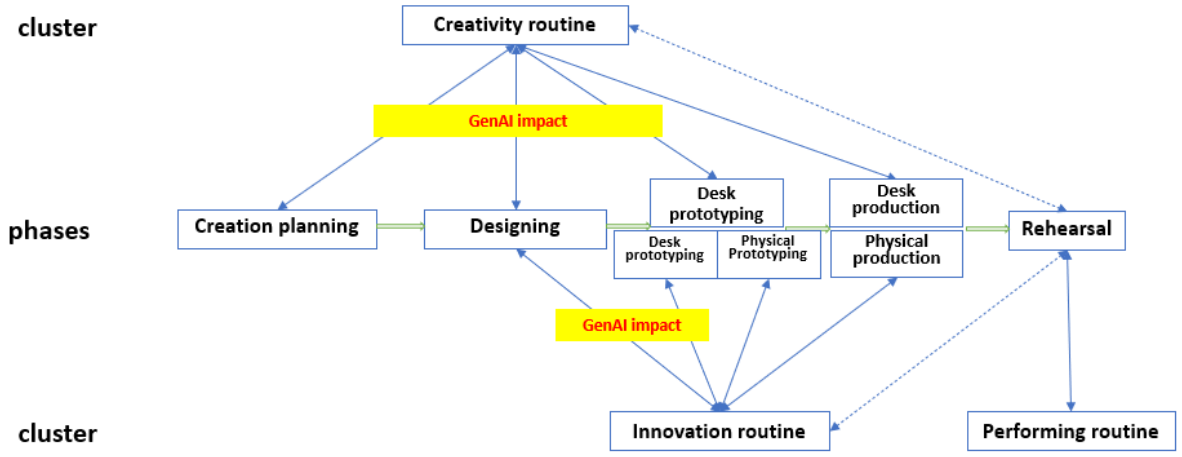


Figure 1.2 Artistic creation routine clusters

Paper 3: Exploring Creative Incumbent's Managerial Hybrid Ambidexterity for Artistic Innovation

Question: How does an established creative firm manage the threat of technological disruption by innovation ambidexterity?

The paper joins the discourse on ambidexterity as an approach for incumbents responding to digital disruption. The first contribution is to complement the extant academic discussion of structural or contextual ambidexterity for disruption by presenting the process and outcomes of hybrid ambidexterity. Second, we complement the ambidexterity literature by evaluating the interactions and collective contributions of multiple levels of actors. As a practical contribution, we explain the hybrid ambidexterity approach as a response to digital disruption.

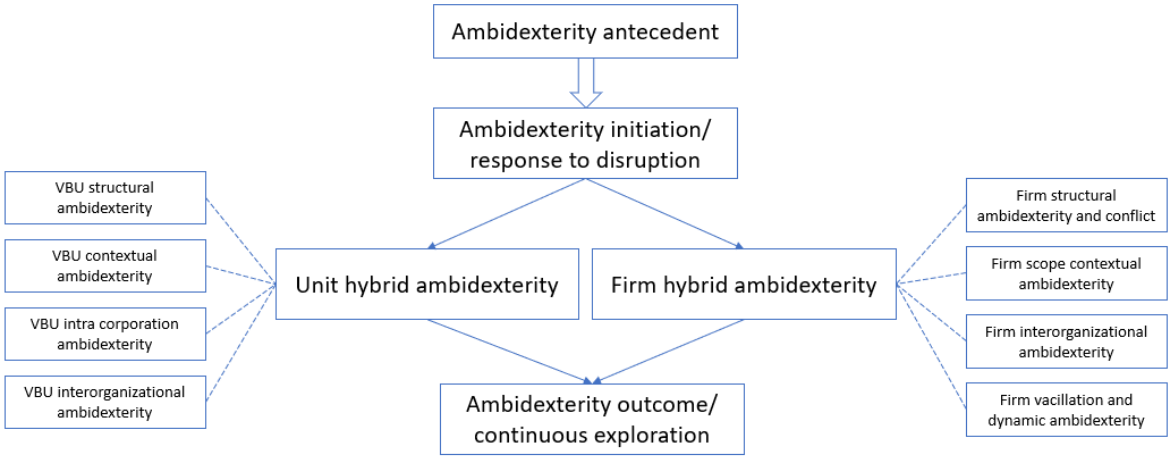


Figure 1.3 Hybrid ambidexterity process

1.4 Methodology

1.4.1 Research method and data

The papers within the thesis are empirical case study. An in-depth qualitative method was adopted in order to develop a deep understanding of the contextual human experience (Myers, 2020; Silverman, 2021) within one case firm (Yin, 2018), as a micro-level research. Qualitative approach can effectively catch what happened during business practice. It gathers rich and deep events and activities data for interrogation about what, when, why, how in temporal and spatial context (Myers, 2020). It serve good for micro level management study of artistic innovations and emerging technology deployment. The empirical information of the three papers comes from one set of data collection from a single case firm with over 40 individual participants directly engaged for interviews and shadowing. Qualitative study recognize, identify and understand underpinning factors (Eisenhardt and Graebner, 2007) in managing process (Langley *et al.*, 2013). To explore our "how" question, qualitative approach help revealing micro level events and activities occurred in complex structure for us to interpret participants' subjective experience social interactions (Graebner, Martin and Roundy, 2012). Yin (2018) has suggested that single case is a suitable method for revelatory empirical study.

A single case can be enough convincing for theory development when the object is extraordinary (Eisenhardt, 1989; Siggelkow, 2007). Creative industries are partitioned indicating few dominant and powerful corporations (Jia, Lewis and Negro, 2023). The case firm TF is such a dominant creative firm with prestigious reputation for successful delivery of high-quality shows over decades. Large data sample in impossible here as well. Nnovel technologies such as GenAI and AR/VR, are relatively new that these technologies are evolving and professionals are still learning (Larsen and Narayan, 2023). The total population of applying these digital gadgets for creative work with consistent working styles is less likely to be significant yet.

Compare to input-output style of quantitative research (Lee, 1999), qualitative studies recognize, identify and understand the underpinning factors (Eisenhardt and Graebner, 2007), which are emerged in managing processes and are significant for change (Langley et al., 2013). In this phenomenon-based (Graebner et al., 2023) study, the systematic combining approach has been adopted for data collection and analysis (Dubois and Gadde, 2002). Systematic combining is the parallel process of data collection, research problem and theory searching to finally illustrate the variety of interdependencies and coordination mechanisms within organizational activities, matching theory and reality abductively (Dubois and Gadde, 2002).

Against the main frame of systematic combining, the inductive (Gioia, Corley and Hamilton, 2013; Blaikie and Priest, 2019) inquiry is deployed to explore theoretical explanations of emerging practices (Goffin et al., 2019). Also, abductive theorising (Langley, 1999; Randhawa *et al.*, 2021) has been applied when necessary for data process and analysis. Systematic combing offered a non-linear process for theory development from back-and-forth case data interrogations, confronting theory with the empirical practice (Dubois and Gadde, 2002). Hence, primary theoretical concepts, frames and structures were the foundation for data understanding and process, then grounded theory is the adopted when I tried to drive new theoretical constructs from data coding and analysis. Grounded theory highlights the importance of interplay between analysis and data (Corbin, Strauss and Strauss, 2015). Grounded approach is particular suitable for developing contextual and processual phenomenon (Myers, 2020) with potential to emerge rigorous findings from real life problem (Eriksson and Kovalainen, 2016). The research design and analytic procedures are discussed with the process of data collection.

A number of data collection methods were employed including documents provided by the case firm, primary data collection including non-participant (Eriksson and Kovalainen, 2016; Felin and Foss, 2023) observations and shadow (Karunakaran, 2022) observations to gain knowledge from real-time events, and semi-structured interviews (Myers, 2020) for developing generative themes (Gioia et al., 1994) and identifying mechanisms based on process phases (Langley, 1999). In-depth talk to people during semi-structured interviews helps understanding internal thoughts result in actions and decisions. Table 1.2 provides an overview of the data collected.

Table 1.2 Data collected and relating contribution

data collected	count	contribution
Secondary files (March 2023)	264	Understand the firm and business
Non-participant management meeting observation (March-November 2023)	14	Understand what is happening in real-time of management issues and project productions
Phase I interviews (March-July 2023)	11	Understand the firm, business, production and digital transformation, including GenAI application fact check
On-site interview (October 2023)	1	Understand impact of emerging technology on production and on firm innovation
On-site desk work shadow observation (October 2023)	3	Follow professional daily computer work of detail tasks
On-site rehearsal shadow observation (October 2023)	1	Understand show production in-depth

data collected	count	contribution
Phase II interviews (November 2023)	22	Focused interviews targeting research questions

Initially, secondary data sources were reviewed including archived documents relating to several past projects, the last four years' company annual reports, and the archived management meeting memos from the past two years. Context helps explain the reason of people saying and doing. To acquire peripheral knowledge of production, I also read media coverage about the firm, the shows that they produced, and media interviews with their producers, directors, and designers.

Next, from March 2023 to July 2023, I carried out the first phase one-to-one semi-structured interviews through virtual conference calls to understand the show production process. In this stage, I engaged 10 participants (nine males, one female; professional experience ranged from seven to 28 years), the board, and management to middle-level managers, including producers, directors, and designers from different types and size of shows produced by the firm. Through these interviews, I also confirmed the wide application of different types of GenAI in multiple functions. In addition, the researcher also independently sourced an external expert (male with professional experience of around 20 years, who has worked as chief director of technicians on many shows in another major show firm.

In October 2023, I conducted on-site data collection, visited TF's office to observe the work of three professionals (two males, one female; professional experience ranged from 6 to 14 years) in order to understand the use of GenAI and VR/AR in their creation. At the office, I had some causal chats with the head of Human Resources and other colleagues from supporting departments as well to learn more about the firm and business. In addition, I travelled to one of TF's in-production shows to conduct a face-to-face interview with the chief producer (professional experience of around 30 years) regarding the use of GenAI and VR/AR deployment in that show. To triangulate the core creators' work, I independently sourced another show in-production, other than the work of TF. Bechky (2006) has used ethnography when she studied film production, as a research strategy, it is immersion and embedding (Lewis and Russell, 2011). Although the entirely study is not based on ethnography, as an approach, it has been deployed during shadow observations.

I shadowed the director team (three males, two females; professional experience ranged from 4 to 22 years) of this show for their on-site rehearsal. During the process of shadowing, I also had many extra chats with colleagues from multiple functions in their on-site production team, especially technicians, to better understand the show production context.

With accumulated knowledge and a refined interview protocol to address GenAI, I conducted a second phase of one-to-one online interviews in November 2023. This phase included a purposive sample of 22 participants (14 males, 7 females; professional experience ranged from 5 to 31 years)— i.e., intense users of GenAI in their day job, including senior and middle-level managers, and designers.

For the entire primary data collection from March to November 2023, through a virtual conference system, I observed 14 real-time management meetings. The management meeting is a critical and strategic occasion for the firm, participated in by executives and managers, and the heads of each producing functions. Thus, not only are managerial issues addressed but the significant show projects during production are also discussed.

The coding structure is built upon an initial understanding of the situation primarily from data, then we analyse data meaning and interpret data relevance with process view of ambidexterity and contribution for addressing disruption to arrive our timeline summary of results. Visual mapping, often as a timeline, presents information as processes (Langley, 1999) and allows paralleled presentation bottom-up and top-down dynamics, technological change, participants efforts and contextual variations (Papachristos, Papadonikolaki and Morgan, 2024).

The quality of data collection and analysis is align with the interpretive paradigm, the criteria referred here is trustworthiness and authenticity (Guba and Lincoln, 1994;2005) that request researcher make careful choice of beliefs, concept, models and theory to drive balance between quality of rigour and relevance (Myers, 2020). From the outset, before study, I have prepared my knowledge both for relevant academic theory and research method to implement a trustworthy and authentic research (Cassell et al., 2009).

Rigorous qualitative research should reach plausible and believable argument that is supported by data (Becker, 2017) and adequate amount of instances with critical analysis of both supporting and contrary cases (Silverman, 2020). My codes extraction from data will be executed in line with framework, logic and procedure of Gioia approach (Gioia, Corley and Hamilton, 2013), and carefully carry out analysis follow the phases and framework of Gioia approach could intrinsically ensure systematically rigorous as what the method designed for (Gehman et al., 2018).

Trustworthiness is the set of core values of this research. Besides of means and steps discussed for data collection and analysis to reach a high standard of the findings, I will build theory with credibility, transferability, dependability and confirmability (Halldorsson and Aastrup, 2003). I will also make transparent of “the specific steps, decisions, and judgment calls made during” (Aguinis, Ramani and Alabduljader, 2018, p. 83) the research regarding

theory choice, method design, data analysis, and reporting of results and reflect it on the written up paper to increase credibility and trustworthiness.

Being consistent with Straussian grounding levels of abstraction for theory (Apramian et al., 2017), I mainly adopted Gioia framework to do systematic coding and analysis. And for grounded theory, my data collection and analysis are interrelated process and analysis will start with the collection (Corbin and Strauss, 1990).

The transparence of "the specific steps, decisions, and judgment calls made during" (Aguinis, Ramani and Alabduljader, 2018, p. 83) the research regarding theory choice, method design, data analysis, and reporting of results and reflect it on the written up paper to increase credibility and trustworthiness.

In data phase I data as the pilot study to raise the quality case-study, as suggested by Goffin *et al.* (2019), and in combination with literature (Goffin et al., 2019) enable me profoundly understand creative and artistic innovation in extant theory and Gen-AI application in my empirical setting before collecting strictly question-driven phase II data. Interpretations of data are explanation the behaviours and discourses of study participants (Corbin and Strauss, 1990) and moving recursively between data collection and analysis (Myers, 1997).

Coding is important part of qualitative analysis reasoning of data, that makes links cyclically and recursively between data and concepts, construct and potential theory (Saldaña, 2013). The adopted Gioia method (Gioia, Corley and Hamilton, 2013) is systematic coding and analysis approach to obtain qualitative rigor for new theory developing, in consistent with this study's paradigm of interpretivism. Hatch (2002) have suggested patterns to be look for during the coding and try to justify the pattern (Bernard, 1994). The first order of codes will be participants perspective with full credit and integrity, constructing comprehensive compendium terms (Gioia, Corley and Hamilton, 2013) that reflect their views in their shoes. Simultaneously to the first order of coding, when I encounter the codes that can have instant connection with current concept or theory, I will make analytic memos (Esterberg, 2002) to record such connection that can be triangulates with second or abstract coding later. Researcher perspective second order themes will be built through first order terms and subsequently aggregating appropriately into theoretical dimensions and propositions as the final interpretive output of the whole analysis is illustrative data structure (Gioia, Corley and Hamilton, 2013). Reflecting analysis is carry out by recursive phases from codes to orders of categories through inclusive rules. Transferring particular categories of word code to sentence of general concepts and themes is toward the establishment of theory (Saldaña, 2013). In consistent with Gioia approach, intended theory in this study will be statement of concepts about how creative firm's innovation capability is changed (Corley and Gioia, 2011) by Gen-AI. I will reflect what and why the knowledge is

transferable to wider domain of other creative industries and innovation studies (Gehman et al., 2018).

It is less likely regional bias would appear for choosing a Chinese firm. The context descriptions from papers regarding Broadway (Uzzi and Spiro, 2005), Hollywood (Cattani and Ferriani, 2008), music (Deshmane and Martínez-de-Albéniz, 2023) and billboard (Anand and Peterson, 2000), TV series of BBC and ABC (Clegg and Burdon, 2021) etc, reveal creative industries are similar cross sectors all over the world.

I've done pilot study as high quality case-study strategy suggested (Goffin et al., 2019) that in combination with literature (Goffin et al., 2019) enable me profoundly understand creative and artistic innovation in extant theory and Gen-AI application in my empirical setting before walking into data.

In July 2024, I went back to the research firm and stay with the firm for several days to discuss with multiple participants in various functions and levels to validate the codes and analysis of the data. Before the trip, the preliminary elements of practical implications from the research started to shape, so I took the chance to discuss these ideas with participants as well.

In October and November 2024 approaching finalised findings, I travelled back to research firm to discuss the key findings in-person with key creators and senior management. We received positive feedback confirming our results and the participants agreed with our analytic outputs about professional learning of GenAI, creation routine changes brought by GenAI and simultaneous explorative and exploitative innovations. As promised given back for the appreciation to the firm as the case for PhD study, I also discussed the approaching finalised practical implications as management suggests for the firm and creative professionals.

As the conclusion of this section, below table summarizes the variations across studies.

Table 1.3 Method variations of studies

	Specific consideration of design and procedures and theoretical constructs for the analysis of the research	Critical data
Paper of Chapter 2	Professional learning is leading theory framework, additionally, exploitative and exploratory learning are identified during the data analysis.	Phase I interviews, On-site desk work shadow observation, Phase II interviews
Paper of Chapter 3	Routine dynamics is leading theory concept. Besides of driving from data, artistic and creative production process in extant literature help the build-up of the creation routine in the analysis.	Phase I interviews, On-site desk work shadow observation, Phase II interviews, On-site rehearsal shadow observation
Paper of Chapter 4	Organisational ambidexterity emerged as a potentially appropriate theoretical direction during the initial reading of secondary documents and pilot phase I interviews. With further literature review of relevant academic papers, I considered hybrid ambidexterity to be suitable. As obvious processual variations of the VR/AR application for artistic innovation over time has been identified, the process-oriented Langley (Gehman et al., 2018; Garud et al., 2020) qualitative analysis approach is deployed by this paper.	Secondary files, Non-participant management meeting observation, Phase I interviews, On-site interview

1.4.2 Language and Nvivo deployment for coding

The original data collection by the observations, interviews and shadowing are implemented in Chinese environment. I have adopted similar language addressing process to Ameen *et al.* (2024b),which is a standard translation and a back-to-back translation. I have done the standard translation of the identified first order codes of Chinese into English and then translate these converting English codes back Chinese to compare and revise the translation to ensure the meaning of original quotes has been reflected with reasonable accuracy.

Interviews and management meeting observations were audio-recorded and fully transcribed in Chinese, the original language, no later than two days after the interviewing and observing. To enhance study transparency, Nvivo is applied for coding, files including reports, transcripts, notes, and memos were uploaded into it. NVivo can organize and export complete code sets when needed to demonstrate the coding process. It can also help data managing, reviewing and re-coding dynamically (Shankar and Clausen, 2020) to improve overall quality of data analysis. Interpretation of meaning is critical for qualitative research and subtle meaning may loss during the translation of non-English data into English potentially, which may reduce research trustworthiness (Yunus *et al.*, 2022). Extracting first-order codes from transcriptions in original language may reflect participants' view better than from translated transcriptions. To avoid missing important information and to reduce the potential for translation errors, we started coding from Chinese data, following the Gioia method (Gioia, Corley and Hamilton, 2013). The coding structure and representative quotes were then translated into English, which is tagged as unique memo to this code within Nvivo.

The first two papers of GenAI share one Nvivo file with 93 uploaded documents and an exported code book. The third paper ambidexterity has an independent Nvivo file with 92 uploaded documents and an exported code book, as the analysis focus is completely different from GenAI paper and important documents are not identical as well. Moreover, both codebooks have been complemented through the multiple revisions of initial data during the revision process in addition to original codes from Nvivo exports.

1.4.3 Research ethics

I have carried out data collection according to what ERGO (original No. 67979 and amended with No. 79351.A1) has approved prior to the field study. The main ethic concern from participants is the business sensitivity and confidentiality of data, I will check the anonymous and omission of sensitivity in the data before I import into Nvivo and recheck their sayings being quoted in the papers.

I always acted with honesty (Payne and Payne, 2004) during whole research process to implement a rigorous study with a comprehend design and reasonable interview protocol, collecting and analysing data until stagnation achieved to summarize findings and developing theory. I would treat participants like how I want a researcher treat me if I am a participant (Maylor and Blackmon, 2005). I will respect (Payne and Payne, 2004) care and empathy the participants of the interview.

1.5 Outline of the Thesis

The rest of the thesis is structured as follows: Chapter 2 presents Paper 1, Chapter 3 presents Paper 2, and Chapter 4 presents Paper 3. The overall reflection is provided in Chapter 5.

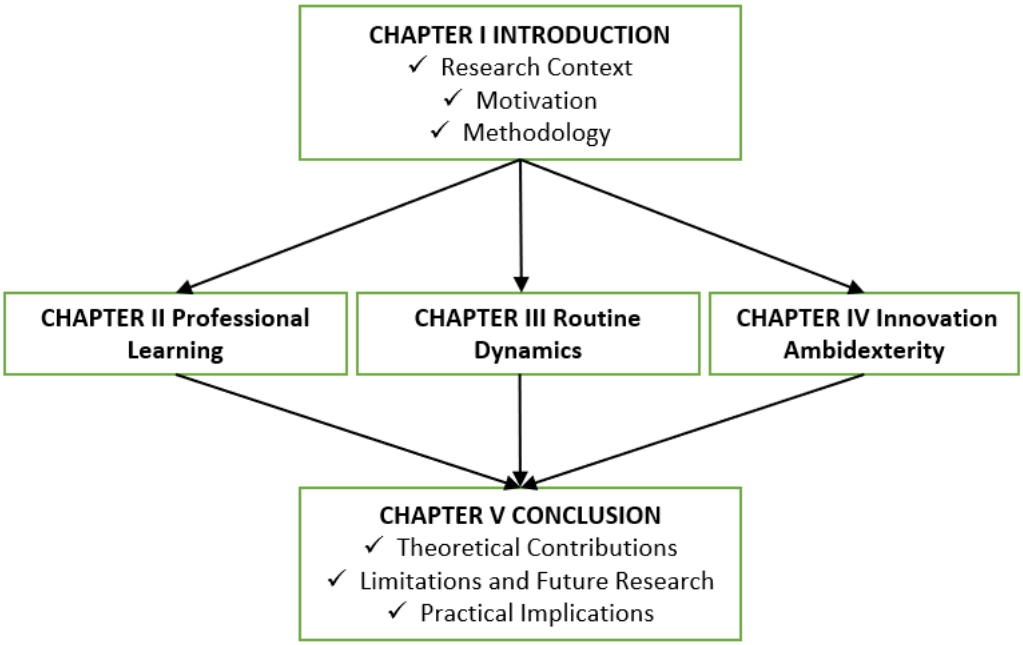


Figure 1.4 Thesis structure

Chapter 2 Exploring Creative Professionals' Learning for Human-GAI Collaboration

2.1 Introduction

Professionals are workers with expertise, who provide knowledge-intensive, complex and customized services (Frey and Osborne, 2017). Novel technology deployment may weaken professional competence and existing knowledge if they can't adapt, equally may enhance and expand professional competence if they could learn new skills and integrate into extant expertise (Pemer and Werr, 2023). Generative artificial intelligence (hereafter, GAI) is an emerging AI technology that can inform human thinking and actions by its production of a variety of new content including text, software code, images, audio and video (Rana et al., 2024; Singh, Chatterjee and Mariani, 2024), attracting various utilisation in workplace (Dwivedi et al., 2023). Through learning, professionals could actively exploit and explore the opportunities brought by AI, expand their knowledge and improve the competitiveness of professional services in a process of competence renewal (Chowdhury, Budhwar and Wood, 2024). Where machine learning technology can perform complex analytical tasks (Brynjolfsson and Mitchell, 2017), GAI can reconfigure professional activities (Faulconbridge, Sarwar and Spring, 2023) and.

Currently, there is a lack of adequate empirical studies of GAI to explore the pertinent and novel phenomenon for management theorizing (Brown et al., 2024). The characteristics of GAI giving open-ended outputs of a qualitative nature require human judgement and modification in a process of value co-creation (Berg, Raj and Seamans, 2023b; Ritala, Ruokonen and Ramaul, 2023), but there is little understanding (Makarius et al., 2020; Chowdhury et al., 2022) of this new phenomenon of human-AI collaboration (Raisch and Fomina, 2024). Extant empirical studies of GAI are mainly quantitative at the firm level (eg. Lee et al., 2022; Singh, Chatterjee and Mariani, 2024), and so new qualitative research is needed to understand the mechanisms of human-AI ensembling (Choudhary et al., 2023) in order to develop comprehensive understanding of how professionals are exercising and interpreting novel collaboration with GAI (Alavi and Leidner, 2001; Anthony, Bechky and Fayard, 2023b).

Extant academic research regarding professionals' adoption of AI has mainly been conducted in auditing or legal firms (eg.Armour and Sako, 2020; Faulconbridge, Sarwar and Spring, 2023; Goto, 2023). GAI has also shown potential for creativity. For example, GAI supports organisational creativity for product and service development (Ameen et al., 2024b) by producing novel ideas and outputs (Amabile, 2020). GAI has even shown off its capacity to

challenge human creative and intuitive intellect by generating scripts, lyrics and melodies (Buning, 2018; Chowdhury et al., 2022). Creative professionals of artistic innovations (Hellbrun, 1993; Castañer and Campos, 2002; Gohoungodji and Amara, 2022) are also known to be early adopters of GAI (Chen et al., 2019), and so further studies of the creative industries are required.

To address these gaps in our understanding of how GAI impacts professionals, we implemented an in-depth qualitative study of a top Chinese show production firm TF (pseudonym name). TF was aware of the emergence of GAI and encouraged its professionals to use GAI in artistic innovation since March of 2023. We have investigated this phenomenon in TF with the question: *How could creative professionals learn to collaborate with GAI*?

With a rich empirical study of creative professionals' various learning activities for human-GAI collaboration, our contributions are four-fold. First, we show how professional competence reconfiguration varies depending on the level of professional competence. Both junior and senior professionals learn by doing, in a collaborative process. Upon new technology application, senior experts may enjoy senior advantage (Jia et al., 2023), or may maintain authority and seniority by interactive practice of seeking, stalling, leveraging, and confronting (Beane and Anthony, 2024). In contrast, we found senior creative professionals are enhancing their disciplinary leadership through experiential learning of human-GAI collaboration, in combination with interactive coordination with junior professionals to renew their competence and enhance outcomes artistic innovations by GAI leverage. As professional leaders, core artists learn through vicarious learning during creation with both senior and junior professionals. Second, we show how the existing professional competence is critical for professionals to reconfigure their knowledge (Verona and Ravasi, 2003; Cepeda and Vera, 2007). For human-GAI collaboration of artistic innovation, senior creative professionals, compared to junior professionals and profession leaders, are the main users of GAI, integrating novel knowledge of GAI with artistic innovation. Third, we confirm the findings that GAI contributes to creativity (Ameen et al., 2024b) even for creative professionals. Rather than being doubtful about the output credibility of GAI due to their seniority (Wang, Gao and Agarwal, 2024), they learn from and are inspired by GAI outputs, which we term as human-GAI creativity (Jiang et al., 2023). Fourth, we identify the importance of learning context. To generate competitive innovation, creative firms must support professional learning context as a known critical element (Wilson, 2009). We find that the technological investment, social communication, and active information flow constitute a beneficial firm environment to enable creative professionals to learn to collaborate with GAI.

The next section reviews existing literature on human-GAI collaboration in the creative industries. The methodology section explains the qualitative approach for this study. The

section thereafter presents the findings. The discussion section presents a series of propositions, culminating in a conceptual model of how creative professionals learn to collaborate with GAI. Finally, we present the limitations of this study and the practical implications.

2.2 Theoretical Background

2.2.1 GAI in the creative professions

Organisations in creative industries are organised around professionalism (Gohoungodji and Amara, 2022), creating artistic innovations by professionals (Mietzner and Kamprath, 2013; Khlystova, Kalyuzhnova and Belitski, 2022). Artistic innovations are developed in a process of collective creativity, or dynamic group creative exploration (Mannix and Neale, 2005; DeFlillippf, Grabher and Jones, 2007; Koch et al., 2023). Artistic distinctiveness is guided through directorial instruction from core creators (Paris and Ben Mahmoud-Jouini, 2019), who are great talent and gifted minds with prominent personal knowledge, intelligence, and expertise (Kaufman and Sternberg, 2015). Core creators provide creative vision, skills, cognitions, resources and networks to balance artistic pursuits, market conditions, and conventions to consolidate an artistic innovation (Becker, 1982; Becker, 2008; Distel, 2019; Chen and Tseng, 2021).

GAI, including tools such as ChatGPT and Midjourney, are the fastest growing digital applications in history (Wu et al., 2023). GAI is rapidly improving in cognitive skills and creativity (Ritala, Ruokonen and Ramaul, 2023), and GAI can now generate a range of creative outputs including articles, music, and software code in response to a natural language text request (Singh, Chatterjee and Mariani, 2024). Collaborating with GAI changes the creative process, whereby creative professionals write input prompts, and then iteratively select, interpret and modify the GAI outputs until they are deployable (Lingo, 2023; Ritala, Ruokonen and Ramaul, 2023). Effectively integrating GAI is now becoming a critical issue for creative firms, especially in competitive sectors such as advertising (Ameen et al., 2024b).

Creative outputs represent the creators' contextualized interaction with existing knowledge and resources in networks of relational activities (Feldman et al., 2016) that include dynamic and complex social interactions (Jeong and Shin, 2019), which may contain contextual know-how and collaborative intelligence that GAI lacks. Meanwhile, creators continually renew their knowledge to produce novel artistic works and boost future performance (Wijngaarden, Hitters and Bhansing, 2019; Deshmane and Martínez-de-Albéniz, 2023). The collaborative and social

nature of creative work indicates that the learning of human-GAI collaboration (Chowdhury et al., 2022) may also rely on interaction and social processes. Creative professionals' learning context may also include repertoire and utilization of talent, knowledge and skills for actualized creativity with business rationality (Wilson, 2009).

2.2.2 Professionals' learning for human-GAI collaboration

Adopting GAI as Human-GAI collaboration applies computer intelligence to both substitute and complement human intelligence (Raisch and Krakowski, 2021; Krakowski, Luger and Raisch, 2023). This collaboration is contingent on the actors' behaviours (Raisch and Fomina, 2024) to facilitate complex cognitive tasks (Malone, Rus and Laubacher, 2020). Human-GAI collaboration could both automate and augment professional work for process improvement and output extension by avoiding professional waste their labor in repetitive tasks and low-value activities, enabling professionals to spend more time on high-value professional tasks (Spring, Faulconbridge and Sarwar, 2022). For professional learn to collaborate with workers in other domains and professional work reconfiguration, AI technology is embedded in interactions of relationally generated, applied and recognised expertise and utilised by professionals who possess these expertise to deploy AI technology in domain work (Pakarinen and Huising, 2023). Such collaboration also demands professionals consistently reskill and upskill to work with AI (Zirar, Ali and Islam, 2023).

Professionals are not only the creators, but also the authority for applying standards and judgement criteria to work within their specialized domain (Scott, 2008) and for effective innovation (Mitchell and Boyle, 2021). Frontline professionals are involved in everyday tasks by deploying their knowledge and skills to construct complex solutions (Malhotra, Smets and Morris, 2016) for customised problems of varied clients (Pemer, 2021). Such expertise defines and defends their professional identity (Chen and Reay, 2021). GAI adoption by professionals is a sweeping phenomena, including accounting, legal and education (Dwivedi et al., 2023). AI can support professionals to improve productivity (Wang, Gao and Agarwal, 2024). AI technology and corresponding skills to deploy it could augment professional tasks execution, replace some professional tasks and create AI deploying relevant tasks, which is new for professionals (Sako, Qian and Attolini, 2022).

Deliberate learning entails the absorption, flow, processing, accumulation and socialisation of knowledge (Joseph, Rhee and Wilson, 2023), which dynamically renews existing knowledge and creates new knowledge (Crossan, Lane and White, 1999). Learning by doing, is experimentation and repetition to improve performance (Teece, Pisano and Shuen, 1997; Zollo and Winter, 2002; Easterby-Smith and Prieto, 2008; Ambrosini, Bowman and Collier, 2009). For professionals,

such learning activities could help integrate new knowledge with existing competence (Ambrosini, Bowman and Collier, 2009; Denford, 2013; Arend, 2014) to address issues with past experience and new knowledge (Zollo, Minoja and Coda, 2018). Experiential learning translates experience into knowledge that alters subsequent practice, whereas vicarious learning is learning through observation of others' experiences and external information (Joseph, Rhee and Wilson, 2023). Exploitative learning is acquiring new knowledge that builds on existing knowledge, and exploratory learning is acquiring new knowledge that challenges and modifies existing knowledge to explore future opportunities (Usman et al., 2024). Learning AI knowledge for codification and sharing are critical for effectively achieving human-GAI collaborative intelligence and capabilities (Chowdhury et al., 2022). Through the process of learning new technology with the adoption experience accumulated, the novel know-how competence could be gained (Macher and Mowery, 2009).

Technological learning, the process of a firm gaining particular technological capabilities over time, is dynamically demanding and nonlinear, and embedded within the firm context of knowledge management and decision-making (Kale, 2010). Deploying AI technology in firms providing professional services demands investments in technological assets and requires multidisciplinary knowledge and skills, hence some centralized management is necessary (Armour and Sako, 2020). The social interactions among professionals during the process serve to combine extant expertise with new digital skills, reshaping professional work (Pemer and Werr, 2023). When professionals are exposed to peers' experiences and interact with one another, such vicarious learning can improve their capacity to apply new knowledge (Myers, 2018).

As reviewed, there are multiple learning activities such as exploratory, vicarious and exploitative learning etc., however, we don't know which kind of learning activities would be effective and fit for creative professionals' grasping of human-GAI collaborations. This intended empirical study will focus on such exploration.

2.3 Methodology

2.3.1 Research strategy and design

GAI is a prominent domain for phenomenon-based management theorizing (von Krogh, 2018). We conduct a phenomenon-based (Bamberger, 2018; Graebner et al., 2023) study of creative professionals' learning for human-GAI collaboration through an in-depth qualitative data

collection to understand contextual human experience (Myers, 2020; Silverman, 2021) within one case firm (Yin, 2018). Since the application of AI for creativity and innovation is significantly different from traditional management (Haefner et al., 2021), constraining the plausibility of deductive reasoning, we implemented inductive (Gioia, Corley and Hamilton, 2013; Blaikie and Priest, 2019) inquiry to explore theoretical explanations of emerging practices (Goffin et al., 2019). Inductive reasoning can be useful to demonstrate generalisable management practice (Bamberger, 2018). Single case studies can also be valuable for theory development (Yin, 2018). To implement the research, we collect both primary data and secondary data. Interviews were conducted in two phases, first to collect data on the learning process of GAI use, and second to study human-GAI collaboration in more depth.

2.3.2 Research context and data collection

Performing art aims to produce impressive and novel shows that is led by creative concept and design and implemented by collaborative interdisciplinary innovation. As well as other creative business, creativity and innovation are essential for the competitiveness of performing art (Gray and Heilbrun, 2001). Our case firm TF is medium size with 300 in-house professionals. Per successful early GAI adoption by some frontline professionals with exceptional performance, TF announced firm level application in March of 2023.

Responding to the call of reflecting the rigour of qualitative research and pay attention to method innovation (Christofi et al., 2024), we deployed multiple primary data collection methods includes non-participant (Eriksson and Kovalainen, 2016; Felin and Foss, 2023) and shadow (Karunakaran, 2022) observation for information from real-time events and interview (Myers, 2020) for retrospective descriptions. During data collection, we prioritize the positive feeling for participation of the research to be able to extract most rich research relevant data from interviews. We were always caring about the participants, guarding their individual boundaries set for their professional integrity and business sensitivity information revealing to avoid negative reservation (Lehtonen, 2024). For example, we would always stress the freedom to answer or not, and to anonymise people and project names etc. In addition, we notice learning GAI and human-GAI collaboration are dynamic, hence, we pay attention to the assemblages data, coding and analysis embrace the knowledge contingency and relational to understand the complexity and merge theory along with our analyse (Benozzo, Distinto and Priola, 2024). When we can, we frequently engaged the learning and deploying of GAI ourselves after interviews or observations to reflect key opinions obtained from data.

From March 2023 to July 2023, we carried out first phase one-to-one interviews through virtual conference, engaging 10 participants including core artists, senior and junior professionals.

Through these interviews, we obtained information of early learning of different types of GAI in multiple functions. In October 2023, we conducted on-site data collection. We visited TF's office to observe the work of 3 professionals using GAI in their computer. In addition, we travelled to one of TF's in-production shows site to conduct a face-to-face interview with the chief director regarding his familiarizing and applying of GAI. With accumulated knowledge and a refined interview protocol addressing GAI, we conducted a second phase of one-to-one online interviews in November 2023. This phase included a purposive sample of 22 participants (7 females) including senior and middle level managers, and designers. A summary of the data sources is provided in table 3.1. Also, we observed 14 online management meetings, from where we observed the entire management-wide GAI training by an experienced internal professional and later some discussions regarding professional works of human-GAI collaboration.

Interviews and management meetings observations were audio-recorded and fully transcribed in the original language Chinese no later than 2 days after the interviewing and observing.

As background understanding and complementary knowledge, we have read through the firm's archived documents relating to several past projects, the last four company annual reports, and 24 archived management meeting memos from the past two years and some media coverage about the firm, the shows they produced, and media interviews with their artists and senior professionals.

Table 2.1 Data sources

Source type	**Data type**	**files**	**file pages**
Secondary	historical project files	207	
	media coverage of firm	28	
	annual reports	4	734
	historical management meeting memos	24	319
	firm structure documents	1	2

Primary interview		**individual participants**	**minutes in total**	**transcript #**	**pages**
	phase I interview	senior professionals (SI.1-4)	297	4	43
	phase I interview	professionals (PI.1-6)	367	6	72
	phase II interview	artists (AII.1-2)	104	2	13
	phase II interview	senior professionals (SII.1-7)	282	7	41
	phase II interview	senior professionals (PII.1-13)	344	13	57
	on-site interview	Artist (OA.1)	80	1	7
	Total interview participants	33			
Primary observation		**meetings in total**	**minutes in total**	**transcript #**	**pages**
	management meeting observation	meetings (OB.1-14)	2338	14	335
Primary observation (on-site)		**individual participants**	**minutes/days**	**notes**	**pages**
	on-site desk work observation	Senior professional (OS.1)	280	1	2
	on-site desk work observation	professionals (OP.1-2)	380	2	5
	Total on-site participants	3			

2.3.3 Data analysis

To execute systematic coding, excepting media coverage, firm structure and historical files that are not suitable for text extracting, 93 files of reports, transcripts, notes and memos have been uploaded into NVivo. We implemented hybrid coding of these qualitative data (Gibbs, 2007; Ghosh et al., 2022). As its process is not the everyday term used in business running, to facilitate the extraction of relevant data from huge amount of preliminary information, we start the data review with pre-set codes such as “Exploratory/exploitative learning”, which are terms not used in professional practice but are developed from our literature review to guide data categorizing. For example, almost every interviewee talked about learning to use GAI, but they pointed to very different things. Some were describing how they use the tool for fun trials or for work, others were discussing the materials of professional education, yet the learning could also be communication with colleagues about the utilisation experience. For the construction of knowledge, we not only consider theories in management and innovation literature, but also creativity research in the domains of sociology and social psychology (eg.Uzzi and Spiro, 2005; Godart, Seong and Phillips, 2020; Garcia, 2024).

We have adopted a similar language addressing method to Ameen et al. (2024b), a standard translation followed by back-to-back translate. We firstly did a standard translation of the identified first order codes of Chinese into English and then translated these converting English codes into Chinese to compare and revise the translation to ensure the meaning of original quotes has been reflected with reasonable accuracy.

Before finalizing the propositions, we arranged two rounds in-person meetings, in August and November of 2024 respectively, with TF to present our findings of human-GAI adoption as outcomes of professional learning.

2.4 Findings

The artistic production of show is bespoke creation whenever a new show project is initiated in TF and decomposing into a series of activities leading by core creators of chief director and chief producers with various creation functions, each containing senior professionals and junior professionals. The core creators determine the central ideas for the show after extensive telling, discussion, listening and debates with professionals from varied functions by meetings. Then the senior professionals develop such abstract inspirations into lines of stories and stage scenes with the assistance of junior professionals on computers.

Core artists and senior professionals are learning and accumulating their specialised knowledge and experience by producing various shows, which are ready to be deployed in the future.

Technological learning for knowing and understanding GAI

The general technological learning for knowing of GAI are dispersed autonomous activities across the entire scope of professionals in early period of GAI adoption, including both deliberate learning for new knowledge and learning by doing as early experience accumulation. The new knowledge includes explicit character of GAI of what it is and how to use it as a tool in general. The experience accumulated has been focus on the to get familiar with it in general about input prompting and output modification for artistic innovations. As frontline professionals learn by themselves, senior professionals were organising learning groups and top artists had been noticed when working with these professionals. Table 2.2 is the representative quotes of participants recalls.

Table 2.2 Representative quotes

professionals by seniority	Representative quotes
Junior professionals	we have long started to use GAI before firm announcement, just at that time, not in work directly, but use our personal computer to try and see how much it may help our work. but officially for work, we also need some official support from firm to adopt in work as not every GAI is free to use (PII.13)
	GenAI won't replace people, it only replaces people who don't use it… I will be outdated without learning new tools (PII.2)
Senior professionals	Everyone, top to bottom, are amazed by the astonishing disruptive productivity brought by GAI that all levels of professionals can't ignore this (SII.3)" "I have known Gen-AI for a while, and have played around to get familiar with it before we know to use it or not, we have to update our knowledge of latest technologies (SII.1)

professionals by seniority	Representative quotes
	before our firm ask everyone to learn AI, we, our design team already started to use it in our own time at home, as designers work at top firms of creative industries, such as our company, we must be sensitive to market information of any new tools (SII.2)
	my team has our private social media group that every novel digital tool, no matter Gen-AI or 3D engine, emerged in the market, we would discuss and then everyone try it and then more detailed discussions of pros and cons etc. then someone may start to use it for work. Such trials won't hurt as when we submit outputs of work, how we do it by old software or next generation app won't be asked by leaders normally, they give us freedom to work with highest performance in our discretion of our own preferred way and tools(SII.3)
Core artists	the brilliant of GAI is from how the speed and variety of works submitted to me for grand show Y1234 from W's team, I know you some other functions started to use as well with your wide discussion (OB.2)

A interviewees stressed:

The competition of shows is still based on the reputation of director and resources of producer (AII.1)... When people hear a new show, audience come for a new show, they would ask, this artwork of who? How to respond that? Mr. AI with no soul? You think people love that? (SII.2)

It demonstrate the assessment of its relevance for artistic innovation and noticed the creative novelty and originality still comes from people, in particular art taste and power from key creators.

contextual supporting for creative Human-GAI collaboration

During management meeting in March 2023, the chief artistic director of the board invited "*Senior designer L, who is good at GAI application, to teach … what GAI is and the basics of its adoption… (OB.2)"*

As contextual support, this announcement followed by the firm level investment in GAI learning material and official licenses were purchased where needed. The firm paid training is particularly relevant for improving professionals' input prompting techniques, as we were told:

"After the management meeting announcement, everyone has an account for the GAI that is facilitated by our firm, for purchasing licences and learning materials etc. It supports our using of those GAI with complete versions for our applications in working tasks with confidence, otherwise, we may concern about bugs etc, (PII.7)"

Beyond deliberate learning, professionals' learning by doing as GAI application now is publicly encouraged and required where appropriate. The learning by doing of GAI in show production was benefited from the character of artistic innovation as group activities that during the intense cocreation and communication among professionals and information free flow of most professionals and key artists. For example, we were told by one function head that "*members in [her] team learn from other functions that applied a bit earlier. Some of those early adopters are proficient and good at prompting, what they can get from same GAI are really different from what we can popping out in the beginning*" (PII.11). "*we are super busy in work by we are learning, through multiple functions working together, learning from each other to expand our knowledge… that is how our learning of GAI applications have such amazing results in such short time, we learn by practically applying it and fix any found out unknown immediately in real case (SII.5)"* The continuously recursive discussion about GAI learning among professionals both vertically and horizontally gradually and addictively improving professionals' collaboration with GAI.

GenAI are highly praised by participants as "*suddenly having a group of useful assistants who work super-fast with acceptable quality*" *(SII.5). "In my view, with adequate prompting, GenAI can be as helpful as an undergraduate intern" (PII.7)*

It is the highlight the outcome of deploying GAI with processual learning half year after firm announcement, the professionals' competence in artistic innovation is improved as they are gradually proficient in human-GAI collaboration.

Learning for creative Human-GAI collaboration-input prompting

The learning of the input prompting as participants realized the generation quality, relevance and usefulness depends on the specification of input. some GenAI such as ChatGPT and Midjourney does not require very professional knowledge to prompt input. For effective GenAI application, it appears, prompting input demand lower professional background knowledge than outputs modification. For example, idea inspiration can be executed with literacy knowledge of text input as now director team can do the initial check by themselves as some GAI such as ChatGPT may producing short stories by a simple idea. For example, one participant from director team told us about professional knowledge, "*we want to use music GenAI by ourselves initially, but we just can't as we found out that without theoretical knowledge of music, we have little idea of how to describe our themes to GenAI"(PII.8)*. As one professional talked about prompting and programming skill, "*initially, we have little clue what input should be prompted into GAI to get what we want. but after a few months, our team are much better at prompting, their output image generated from AI are much better(PII.11)*

It means background expertise is still necessary to prompt effective inputs to generate outputs as intended.

Learning for output curation with rounds of inputs prompting creative Human-GAI collaboration-

For human-GAI professional competence reconfiguration, further learning by doing of GAI occurred naturally along with other digital software to carry out daily computer based professional works. Although GAI input prompting demands background knowledge and techniques of artistic innovation, learning GAI prompting appears to be more important than the profoundness of professional competence. However, curation and deploying outputs requires qualified professionals to identify and modify with professional software that existing artistic innovation competence dwarfs the usefulness of GAI skills. Hence, human-GAI collaboration for high quality artistic outcomes by continuingly refine GAI output with rounds of input prompting determined by the quality of existing professional knowledge and experience, as "*Making shows is kind of fighting a battle with military competency… use GAI … to match our working outcome for projects… is the synthesis of experience and knowledge…paying for a top GAI training graduate with profound knowledge in books and from education is far from enough for real production, real experience of both how to fight and as a team member to cooperate has top value… GAI is kind of a new weapon, strategy for how to fight may be adjusted accordingly, but it doesn't mean a freshman who can manipulate a new weapon can immediately become a new battlefield leader or even can't acting as a competent soldier either" (SII.1) and "GenAI is generating random outputs that actually the quality of works still depend on the designers not the GenAI. For instance, 100 images generated by GenAI that one designer may think all are*

rubbish, but another designer may choose some ideas from some image to integrate into their own works or during the modification, the designer may ask GenAI for some effects that they can get referencing inspiration for detail enhancing" (SII.3)

We were told*, "Our prompts demand expertise, for show design, the capability is integration of artistic expressions and computational programming expression, at first organise expression of extreme details of such as light and texture, then translate into GenAI system readable demands, we work as team as different levels of seniority members has personal advantages and further development in particular expertise." (SII.5)*

It depicts learning for human-GAI collaboration is coordination between senior and junior professionals as rounds of input prompting and output curation.

Learning from Human-GAI collaboration-extending professional knowledge and resource

Professionals' learning interests are indeed very important as similar comments from multiple participants "*in my view, human, his professional competence and positive attitude for the application, is crucial for the optimal gaining from GenAI*" (PII.10). With more learning, GAI started to become exploration tool for inspiration and accumulated knowledge could also be utilized in the future as new creative stocking. For example, "*GenAI is powerful tool, especially during the creative part, but sometimes when we do technique sketches, we may get something from GenAI outputs as well, such as previews, such as rough feeling of positions and spaces arrangements for a big picture and overall structure* (SII.3) *"We can use GAI to learn many new things quick, in addition, some novel design or structure of space generated by AI are we really haven't imagined or seen anywhere else (SII.4)*

To conclude, the learning of GAI is reflected by professionals' grasp of input prompting and output utilization of GAI for artistic innovation. Both senior and junior professionals are learning GAI by experiential doing, include both exploitative and explorative.

And GAI input prompting mainly relies on continuous and various exploratory learning by competent professionals, and output curation mainly depends on previous professional competence. The representative quotes and relevant learning have been presented in table 2.3.

Table 2.3 Representative quotes of learning

professionals by seniority	Learning goals	Learning practices	Representative quotes
Junior professionals	relatively simple GAI input prompting	deliberate learning, learn by doing, exploitative learning	stage design is very special design that sometimes G-AI can't generate very logic and realistic image, after a period of utilisation, we gradually understand how to modify inputs of specific questions with detailed requirements (PII.13)
Senior professionals	outputs curation	exploitative learning	we have to tell GAI what we want with designing professional consideration and translating to GAI understandable language, then we have to use our experience and aesthetic judgement to choose useful ideas (SII.3)
	relative complicated GAI combining rounds of input prompting target expected outputs	deliberate learning, learn by doing, exploitative learning, vicarious learning, exploratory learning	we used GenAI for the suggestions of creation in sequence, for show W, we got some ideas from ChatGPT, then we transfer these text as prompting inputs for Midjourney that we can got conceptual image as foundations for dynamic visual, at end of day, visual is just consecutive images (SII.7) previously, for example, we have strictly sequences for simple line drawing, 2D image and 3D model by consecutive teams with considerable working period each to handle...with GAI, we may have a meeting of all three teams for a brainstorming talk and simple line drawings designers and 2D image designers can work nearly simultaneously during discussion with GAI to visualize(SII.2)
	try various human-GAI collaboration to enrich	exploitative learning	I have tried to feed our current design figure or character into GAI, to let GAI change appearance for them, or put them into different scenes to perform different activities, it won't be perfect, but satisfiable for us to understand the general feeling and effects, that's all we need. If we do such things by our labour, would be risk expense without

professionals by seniority	Learning goals	Learning practices	Representative quotes
	creative stocks		no reward that we might not do it due to the cost. Such low-cost experimentations by GAI may inspire the exploitation of our dormant IP for new applications. (SII.2)
		exploratory learning	Since I got familiar with GAI utilisation, I would use it for other experimental play around, not directly for particular productions, just when I have some novel ideas, I would deploy GAI to visualize what I am thinking, sometime I can get interesting stuff that I would not immediately use in any on hand projects or tasks, but I will develop the outputs with GAI to refine that idea into something that I can save for the future when I need a fresh inspiration (SII.1)
	learn from GAI	learn by doing, deliberate doing, exploratory learning	Latest version of Midjourney has much advanced its details presenting that each image generated could be very insightful in colour, background, lights, ambiance and stages. For such generation, we can use these images to inspire art design, light design, visual design, even for us as designers to understand how cameramen might shoot on-site during the show presenting (SII.2)
Core artists	understand GAI and human-GAI collaboration	vicarious learning	outputs quality of team stage design for project YY is improving since they started to use GAI, they discussed this novel tool with me and showed me how they are working with GAI
	learn from GAI	deliberate learning	In show YY, we had got over thousand theme music submitted from crowdsourcing that we narrow down to 50 to 20, we are still unsatisfied. At that moment, we thought maybe we can try music GenAI to get something new (AII.1)

2.5 Discussion

Professional work relies on distinct body of knowledge and expertise, providing service with high levels of autonomy and discretion (Freidson, 2001). Multidiscipline expertise and knowledge are required for professionals to adopt novel technology, and they may choose to collaborate with experts in other domains (Armour and Sako, 2020; Sako, Qian and Attolini, 2022). Human-GAI collaboration could be contextual specific by functions and forms of AI, types of work AI is engaged by human and human perceptions of business condition (Ameen et al., 2024a). For artistic innovations, creative professionals' learning of collaboration is their deployment of GAI with professional expertise to enhance productivity. We present the creative professionals' knowledge and experience is critical for input prompting and output modification of human-GAI collaborations that professionals chose to learn the GAI skill rather than learn to collaborate with experts of AI or programmers.

Our investigation of professional learning of creative human-GAI collaboration distinguishes mechanism variations learning for GAI input prompting and output curation and modification as varied importance of existing professional knowledge, competence and human creativity for effective human-GAI collaborative artistic innovation. Exploratory learning of advanced GAI input prompting skills and exploitative learning of GAI output evaluation and adoption. Both learnings involved deliberate learning of technic elements of GAI and learning by doing for experience accumulation. Continuous learning contributes to the in-depth understanding and gradually proficient GAI application through excising in artistic innovation projects.

Individual professionals have varied preference for learning human-GAI collaboration toward their best performance, subject to their competitive competence artistic innovation. As junior professionals have less comprehensive but enough industry and creativity knowledge and experience, they could focus more on deliberate and exploratory learning of GAI knowledge for input prompting to support senior professionals in team working of human-GAI collaboration. In contrast, senior professionals have profound tactic knowledge and expertise for artistic innovations, they could be more productive by human-GAI application through exploitative learning for in-depth GAI output curation and modification and vicarious learning from and instructing junior professionals prompting. Various learning is intertwined as well. Senior professionals continuously play around with GAI and actively extend the utilisation of GAI outputs as creativity resource stocks with exploratory and exploitative learning for future artistic innovation. Human-GAI collaboration is continuous accumulation, integration, implementation and communication among multiple-level professionals when they work together to learn from one another.

Proposition 1 For overall professional productivity and outcome enhancement by human-GAI collaboration, junior professionals with adequate professional knowledge should focus on deliberate and exploratory learning by doing for GAI skills of input prompting to obtain higher quality GAI raw outputs.

Proposition 2 For overall professional productivity and outcome enhancement by human-GAI collaboration, senior professionals could work on exploitative learning by doing to integrate their profound expertise and knowledge for optimal output curation and modification outcomes to be extracted from GAI utilisation.

Proposition 3 During collective work of rounds of GAI input prompting and selecting with junior professionals, senior professionals could catch up and get more understanding of GAI by vicarious learning of input prompting.

Professionals have authentic power from disciplinary knowledge and expertise (Hungnes, Hoholm and Clegg, 2024). As professionals are credited by existing knowledge and expertise, learning the application of GAI to advance special knowledge trajectory and adapting to expertise evolution (Brown *et al.*, 2024), may recreate professional creativity boundaries with their authority of expertise, skill and legitimacy (Suddaby and Viale, 2011). Creativity and art in sociology are intentional combination of aesthetic inspiration and material foundations (Godart, Seong and Phillips, 2020). Although metaphors for abstract thinking, analogical reasoning, and idea generation are crucial in human creativity (DiStefano, Patterson and Beaty, 2024), the fine-tuned large language model, which is the base programming of GAI (Brown *et al.*, 2024), can be effectively trained to evaluate creative metaphors like humans (DiStefano, Patterson and Beaty, 2024). Human are prone to co-create with AI (Makarius *et al.*, 2020), though artistic creation with GAI is controversial due to the undermining of human as the unique attribute for creativity (Jiang *et al.*, 2023).

Although it is contended that experienced professionals could be more sensitive to the weaknesses of AI (Wang, Gao and Agarwal, 2024), we found that by their output selection and curation, senior creative professionals have little concern about the efficacy of GAI creativity and the challenge of creative authenticity and originality. On the contrary, human-GAI creativity handled by senior professionals' active learning from GAI outputs demonstrates human and AI systems continuously learn from each other to combine complementary strengths and multiple integrated capabilities (Raisch and Krakowski, 2021). Moreover, human-GAI creativity could be the groundwork of artistic evolution in the digital age and enhance artistic production (Garcia, 2024). Human-GAI collaboration may enrich human creativity by divergent thinking inspired by GAI to contest traditional creativity exploration and transform artistic innovations.

Unique by human at the moment are senior professionals or artists' aesthetic taste for human curation for selecting GAI outputs and the modification of GAI outputs into creative production tasks. Agrawal, Gans and Goldfarb (2017) suggested, aesthetic taste is central to the competitiveness of creative work and artistic innovation as design-driven innovation have strong emotional and symbolic meaning (Verganti, 2008). Lack of understanding of context may also be an issue for creativity outputs. Creativity practice is domain-specific, creativity should be understood within a specific setting to understand and evaluate the phenomenon (Baer, 2012). The emergence of GAI has not change extant creativity literature in finding that center creator is critical to creativity (Kaufman and Sternberg, 2015; Amabile and Pratt, 2016), and that role differences are important in the nature of creativity required (Madjar, Greenberg and Chen, 2011). Although Ritala, Ruokonen and Ramaul (2023) anticipate human creativity being replaced by GAI is the enthusiasm raised by extant literature, they also acknowledge current limitation of GAI in contextual and creative work. Not only the quality of GAI outputs depends on the quality of user's inputs (Rana et al., 2024), GAI output is immature that GAI output demand professional to modify. Hence, the quality of outputs demands professional distinguishment and modification, in particular art taste and power from key creators.

Proposition 4 Senior professionals could do experiential exploratory learning of GAI prompting and curation to renew their creative stock of expertise and knowledge for future work.

*Proposition 5 Core artists of artistic innovation could e*xpand their insights, *renew their creative talents* and enrich their artistic style *from their vicarious learning of human-GAI collaboration*.

Horizontal firm-level beneficial context is the pushing and supportive forces for GAI explicit knowledge obtaining, whereas professionals' cross-function communication facilitates tactic GAI knowledge articulation and internalisation as artistic innovation competence development with individual preference. Horizontally, professional expertise is produced, applied, and recognized within and institutionalized through interactions among actors and objects with recipients, and embedded within systems of interdependent other expertise (Brown et al., 2024). Professionals' cross function learning, AI tools function as digital assistants (Bankins et al., 2023), it is claimed instigating firm-wide familiarity of how to use it effectively to general high-quality outputs is more critical than encouraging a positive altitude of utilization among employees (Kim et al., 2022). We have found two factors working collectively within firm particular context. For organisational capability leveraging AI, knowledge codification and sharing are critical for effectively achieving Human-GAI collaborative intelligence and capabilities (Chowdhury et al., 2022). Meanwhile, such collaboration facilitates employees to consistently reskilling and upskilling to work with AI (Zirar, Ali and Islam, 2023). Our study

results reflected such demand both by individual volunteering learning improvement and forced by GAI constant updating.

Contradicting some extant views of top-down approach as firm level decision (eg.Chaturvedi, Hsu and Prescott, 2024) for exerting and imposing technological changes, which may challenge professional values for firm managing and supporting for semi-autonomous professionals (Anteby, Chan and DiBenigno, 2016), with the overlook of possible and beneficial synergies between professional expertise and technological potentials (Pemer and Werr, 2023). By our findings, the initial autonomous learning by frontline bottom professionals provided solid beneficial evidence for the organizational decisions to encourage full application of GAI by all professionals. We found professionals' positive attitude toward new tools is the precondition of firm-wide supporting and training to familiarize and adopt GAI. However, technological learning incur costs and investment, including firm investment for training, licences and grants are less possible or economic by individual professionals, which is in consistent with conclusions from Armour and Sako (2020) regarding increased firm centrality of professional firms for technological adaptation. Technological learning, whereas the encouraging context include vertical beneficial learning context during the phase is the professionals' technical elements of GAI and the encouraging attitudes from firm management for GAI application in professional work. Hence, professional firms take part in the human-GAI collaboration learning by providing the firm-wide learning context of encouraging GAI learning for application and technological investment, such as training or other available educational materials.

Such horizontal and vertical integrated practices and the inseparable relations between vertical and horizontal context indicating learning could be inimitability and unobservability (Zollo, Minoja and Coda, 2018), demonstrating the significance of organizational supportive learning contexts for human-GAI collaboration. The. Also, professional learning demands contextual support from management leading to potential changing requirements from traditional approach.

In the end, a beneficial learning context is necessary for human-GAI due to the characteristic of GAI. As versions and applications of GAI are continuously upgrading (Huang and Rust, 2021; Bouschery, Blazevic and Piller, 2023; Ritala, Ruokonen and Ramaul, 2023) regarding scope and sophistication (Berg, Raj and Seamans, 2023b), continuous learning for knowledge renewal, skill building and competence development are suggested for leveraging GAI advantages (Berg, Raj and Seamans, 2023b; Chowdhury, Budhwar and Wood, 2024). Hence, creative professionals' learning would be a gradually improving and evolving process for individuals supported by prolonged firm investments.

Proposition 6 For professionals' technological learning, moderate increased central control from firm management is beneficial, which could stimulate technological investments and create an encouraging context for professional learning to facilitate explicit GAI knowledge obtaining and human-GAI collaboration know-how grasping.

Proposition 7 Given professionals' widespread learning for human-GAI collaboration is enabled and enhanced by both vertical and horizontal social communication during work, such processes could initiate and enhance autonomous learning for GAI by professionals and hence smooth technological changes for professional firms.

Figure 2.1 Relationship of propositions

Practical implications

The weakness of AI in know-how and contextual knowledge has been noted in many previous studies (Lebovitz, Levina and Lifshitz-Assaf, 2021; Balasubramanian, Ye and Xu, 2022). The capability of AI is trained through feeding information that is presentable to its training and programming (von Krogh, 2018), which may indicates people still grasp the power of tactic knowledge that involve large amount of contextual discretion that reason and materialize AI output for final outcome of tasks (Hadjimichael and Tsoukas, 2019).

As human try to renew skills that are difficult for AI to perform for the time being, but may eventually catch up (Zirar, Ali and Islam, 2023), and working with AI demand professionals with complement skills to AI (Tang et al., 2022). Hence, lower-level designers may focus more on prompting input GenAI, whereas the higher-level and creative talent designers who can apply expert creativity judgment. This is not entirely consistent with Jia et al. (2023) who found that AI-human collaboration 'advantage' enjoyed by higher-skilled employees and reduce value of lower-skilled sales as AI can do repetitive and codified conversation, whereas favour higher-skilled sales enabling them to focus on creatively addressing complex issues to generate orders. As case of professionals working with GAI, our professional participants learnt to program to prompt GAI input rather than learning to collaborate with non-creative professional coders. GAI has no human cognitive overload and biases in summarising and synthesising data to expand question pool, rapidly provide solutions for complex problems much productive than human labour and intelligence reasoning and adapt outputs (Garbuio and Lin, 2021). With deliberate learning and learning by doing by professionals, organizational creation of both creativity and innovation are improved with integrating GAI for work. The creativity have been enhanced by designers' post-exploratory learning to stock novel outputs from GAI as future inspirations. Such accumulation is meaningful in the creative industries as creative workers would stockpiling their used and unused creative ideas from projects to formulate symbolic portfolios, which could be retrieved for ideas in future opportunities and construct dynamic artistic symbolic characters that evolves with the artistic identity renewal (Ananth and Harvey, 2023).

For creative industry in the end, local details of what is going on, how actors interact and collectively improvise is critical for the creative innovation outcomes (Meziani and Cabantous, 2020; Audretsch et al., 2023). Collective application of GenAI by grouping actors from previously different functions, may, in this sense bring diverse Human-GAI collaborations with new potential of better creation outcomes.

Limitation and future research

This study focusses on learning behaviours, with limited cover of cognitive evolutionary (Helfat and Peteraf, 2015). Cognition management is a critical issue for GAI applications due to the importance of AI trust (Glikson and Woolley, 2020) discussed in extant literature. Sensing external change has been categorized as top lead cognitive reasoning in papers of such as new technology has to be integrated by the management (Pentland et al., 2012). In extant literature,

the managerial cognitive capability raise the importance of mental capacity held by senior executives (Helfat and Peteraf, 2015) in particular digital transformation of traditional firms for strategic change (Ghosh et al., 2022).

Also, the impact of new technology on innovation is a heterogeneous phenomenon, contingent on institution and temporal context (Denicolai and Previtali, 2023). Our empirical setting of creative industries indicates effective learning by individual professionals the crucial factor for human-GAI collaboration may not be generalisable for professionals in other sectors or contexts.

Chapter 3 Exploring the Impacts of Generative AI on Artistic Innovation Routines

3.1 Introduction

Humans can collaborate with AI to enhance organizational productivity (Plastino and Purdy, 2018; Mariani et al., 2023; Raisch and Fomina, 2024) as it can aggregate knowledge, process information, search for solutions, and make predictions (Agrawal, Gans and Goldfarb, 2017; Csaszar and Steinberger, 2022; Verma and Singh, 2022). GenAI is a type of AI that can create new content (Wahid, Mero and Ritala, 2023; Ramaul, Ritala and Ruokonen, 2024) such as text, images, music, video, software code, and others. It has the potential to be applied in nearly every workplace (Ritala, Ruokonen and Ramaul, 2024) and its application has spurred increasing academic interest (Cordasco et al., 2021; Singh, Chatterjee and Mariani, 2024). However, two problematic gaps exist in the extant literature.

First, many management studies of GenAI applications are based on education, hospitality, finance, and professional services (Berg, Raj and Seamans, 2023a; Dwivedi et al., 2023). However, creative industries are often heavy users and early adopters of emerging technology including AI (Landoni et al., 2020). For example, GenAI tools have been applied to creative ideations (Chen et al., 2019). In addition, creative industries are a considerable economic sector, larger than the telecoms or automotive sectors in many economies (OECD, 2021), and have a significant impact on the innovation and dynamism of a region (Boix et al., 2016; Burlina, Casadei and Crociata, 2023). Hence, the scant research into GenAI applications in the creative industries is an important gap.

Second, extant literature mainly discuss the impacts of GenAI applications as aggregate outcomes or academic predictions. For example, AI is an emerging technological artifact with profound influences on task execution (Iansiti and Lakhani, 2020), decision making (Lindebaum, Vesa and Hond, 2020; Glaser, Valadao and Hannigan, 2021), and worker activities (Kellogg, Valentine and Christin, 2020). GenAI adoption can improve human efficiency, aid product development, and enhance organizational performance (Rana et al., 2024). Since the impacts of human–AI collaboration are contingent (Raisch and Fomina, 2024), the lack of micro-level research could be problematic.

The two gaps can be bridged by exploring the impact of GenAI on the routine of artistic creation. Creative industries produce artistic innovation (Castañer and Campos, 2002; Stoneman, 2009) as projects (Clegg and Burdon, 2021; Bizzi and Miller, 2022). Such novelty is generated by

routines of complex and flexible group iterations with diverse actors participating interdependently (Bechky, 2006; DeFillippi, 2015; Hatcher et al., 2018; Paris and Ben Mahmoud-Jouini, 2019). The innovation process in the creative industries has been summarized by Paris and Ben Mahmoud-Jouini (2019) as four iterative activities of inspiration, framing, prototyping, and validation. The routine dynamics approach, which stresses the importance of situated routine actions (Feldman and Pentland, 2003; Feldman et al., 2016; Feldman et al., 2021), could be adopted to study the micro-level impact of GenAI on the creative industries.

Hence, this study is led by the research question: *How does GenAI impact artistic creation routines*?

A single in-depth case study was conducted to address the research question. The case firm, a Chinese show production corporation, hereafter referred to as TF (pseudonym name), started a firm-wide application of GenAI in March of 2023. Performing arts, as with other creative businesses, is competing with creativity and radical innovation (Gray and Heilbrun, 2001; Bergamini et al., 2018). The Chinese performing arts business is a considerable market by global comparison. England's theaters reported a total earned income of GBP303 million in the 2022/23 fiscal year (Statista, 2023a). For Broadway shows in New York, the total attendance reached 12.3 million in 2022/2023, contributing gross sales of USD1.6 billion (Statista, 2023b). According to data collected by the China Association of Performing Arts, the whole sector had a total attendance of over 170 million in 2023 with a turnover of RMB 74 billion, roughly USD10billion, including 11% from box-office takings of theater plays, 27% from box-office takings of commercial events such as concerts, and 22% from box-office takings of tourism plays (Paper, 2024).

This paper makes empirical contributions of elaborating GenAI, as both a working tool and a communication facilitator. The collective application of GenAI as the working medium led to the ostensive sequence change of routines as simultaneous exploration of problems and solutions for creativity and innovation. We provide two main theoretical implications. First, individual and collective application of GenAI as both digital working tool and medium in artistic creation can improve productivity of creation and iteration. Second, such human-AI collaboration results in the routine adaptation of ostensive aspect by changing the path and interface of routine clusters and mixtures the sequential routines within creation with local events rather than systematically transforming routines.

The rest of the paper is structured as follows. The next section reviews the extant literature on artistic innovation from the perspective of routine dynamics and discusses AI as a new artifact for creative routines. The methodology section follows the literature review. The section thereafter presents the findings and analysis. The final section, the discussion, includes

subsections on theoretical implications, practical implications, limitations and future research, and a conclusion.:

3.2 Theoretical Background

3.2.1 Artistic innovation

Artistic creation requires both creativity and innovation (Khaire and Hall, 2016; Bharadwaj et al., 2017; Lehtonen, Ainamo and Harviainen, 2020; Slavich et al., 2020; Berg, 2022). A diverse range of actors with varied skills (DeFillippi, 2015) must collaborate in an interdependent way to create artistic innovation. For example, Uzzi and Spiro (2005) studied Broadway shows and concluded that show production relies on collective brainstorming, idea sharing, and joint problem solving. Several representative processes of creativity and innovation are summarized in Table 3.1.

Table 3.1 Phases and processes of creation

Literature	Routine phases	Process and practice
Gohoungodji and Amara (2022)	Creativity	Idea generation
	Innovation	Idea exploitation
Anderson, Potocnik and Zhou (2014)	Creativity	Idea generation
	Innovation	Idea implementation
Amabile and Pratt (2016)	Creativity	Task presentation Preparation Idea generation Idea validation Outcome assessment
	Innovation	Agenda setting Stage setting Idea production Ideas testing Idea implementing Outcome assessment
Perry-Smith and Mannucci (2017)	Creativity	Idea generation Idea elaboration Idea champion Idea implementation
Paris and Ben Mahmoud-Jouini (2019)	Creativity	Inspiration Framing Prototyping Validation

Literature	Routine phases	Process and practice
Mumford and Todd (2020)	Creativity	Defining the problem Gathering information Selecting and combining concepts Idea generating Idea evaluation Planning Implementation Adaptive monitoring

Previous studies of Hollywood productions also highlight the importance of group work (Cattani and Ferriani, 2008) in the creative process. Creativity as the output of group cognition demands collaborative divergence as ideas and constraints co-evolve (Hatcher et al., 2018). Group interactions in the creative process are therefore recursive loops of reflections producing collective energy, attention, and understanding that transform individual inputs into creative outcomes (Harvey, 2014; Harvey et al., 2023). These iterations can be conceptualised as a snake-shape progression (Paris and Ben Mahmoud-Jouini, 2019), frequent revision loops with testing (Goh and Pentland, 2019), continuous revisions and contextual repositioning (Håkonsen Coldevin et al., 2019), or rounds of ongoing experimenting, evaluation, and legitimating (Clegg and Burdon, 2021).

3.2.2 Routine dynamics

Routines are the way by which organizational work gets done, as recognizable and interdependent actions and interactions in logical sequences (Pentland *et al.*, 2012) by multiple actors, artifacts, and agencies (Feldman and Pentland, 2003; Orlikowski and Scott, 2008; D'Adderio, 2011). Organizational routines can provide a sense of order and efficiency (Aroles and McLean, 2016). Routines have both ostensive and performative aspects. The ostensive pattern (Feldman *et al.*, 2021) defines generalized and abstract principles of a routine. The performative pattern is the situated performance of routines as specific actions by specific actors situated in particular places and times (Feldman and Pentland, 2003). Rather than mindless or straightforward repetition (Deken *et al.*, 2016), actors must engage in effortful accomplishments for routine performance (Feldman *et al.*, 2021). Hence, routines performance are subject to the behaviors of particular actors and their contexts (Deken *et al.*, 2016). *Routine dynamics* is the study of routine change, including repairing, expanding, and striving, that result in change over time (Feldman, 2000; Feldman and Pentland, 2003). *Routine clusters* are groups of multiple interdependent and coordinated routines, each contributing partially to the

accomplishment of a collective output (Kremser and Schreyögg, 2016; Kremser, Pentland and Brunswicker, 2019). The performative variation of routine clusters may also arise from both effortful and emergent accomplishments of single routines (Kremser, Pentland and Brunswicker, 2019). Cluster flexibility could also come from the changing interactions of interdependence and coordination among various routines (Sailer, Loscher and Kaiser, 2024).

Reflecting on artistic innovation, the phases and processes in Table 1 represent ostensive principles that could guide creative organizations to coordinate their activities (Bapuji *et al.*, 2019). Moreover, the interdependent collaboration for creativity (Uzzi and Spiro, 2005; Harvey, 2014) indicates that artistic innovation relies on routine clusters, and that the cluster variations could be more profound due to the recursive and iterative characteristics of artistic innovation (Håkonsen Coldevin *et al.*, 2019).

3.2.3 GenAI as a technological artifact in organizational routines

Routines are not only abstract relations as shared understandings and rules (Feldman, 2004), representing ostensive guidance on what to do (Murray, Rhymer and Sirmon, 2021), but are also generative (Howard-Grenville and Rerup, 2017) and dynamic. Artifacts play an instrumental role (Cohen *et al.*, 1996), impacting the emergence and persistence of routines by supporting or preventing actions and coordination (D'Adderio, 2011). Complex socio-material assemblages between actors and artifacts drive varied forms of routine performance (D'Adderio and Pollock, 2020), creating heterogenous organizational outcomes for the execution of routines (Aroles and McLean, 2016). Technological artifacts are critical for routine execution and change with local discretion and adaptation by actors (Berente *et al.*, 2016). Routines may contain intrinsic flexibility to adapt to emerging technologies (Murray, Rhymer and Sirmon, 2021). Adding new digital artifacts may generated new paths(Pentland *et al.*, 2020a). Applications of technology artifacts could be modified by individual actors with personalization, customization, and inventions for flexibility, adaptivity, and exaptability, respectively (Desouza, Awazu and Ramaprasad, 2007). The ostensive aspect of routines can be changed by technology artifacts. Pentland *et al.* (2020a) established a simulation model for process change and routine dynamics in the digital environment that unanticipated bursts of complexity followed by relative inertia and the system settled into a new regime after self-organizing.

As a novel artifact, AI tools may improve productivity. GenAI can complete repetitive tasks, enhancing the efficiency and effectiveness of organizational process (Ooi *et al.*, 2024). The innovation process involves intensive creative activities of discovering, generating, developing, and exploiting various ideas, opportunities, and solutions (Kijkuit and Van Den Ende, 2007;

Martin and Wilson, 2016). As humans are constrained by mental capacity and knowledge scope that limits their innovation search within particular domains (Posen *et al.*, 2018), AI entails superior information-processing capabilities and non-local searching scope that can promote organizational problem solving and reduce innovation cost and risk (Haefner *et al.*, 2021). By exploring unconventional pathways for problem solving and supporting decision making (Peres *et al.*, 2023), GenAI can generate distinct impacts on creativity and innovation (Singh, Chatterjee and Mariani, 2024).

The creative industries are good at integrating new technologies (Wijngaarden, Hitters and Bhansing, 2019). Digitalization has been adopted to enhance audience experience (Alshawaaf and Lee, 2021). Music companies responded to digital platforms such as iTunes and Spotify by gradually replacing physical CDs and re-inventing solutions or developing new solutions for innovative music offerings (Trabucchi *et al.*, 2017). Technology advancement has also led the evolution of the gaming industry (Ozalp, Eggers and Malerba, 2023). Hence, there is potential for GenAI, as a new technological artifact, to be absorbed (Berente *et al.*, 2016) into routines of artistic innovation. However, both GenAI application in organizational practice and novel digital tool applications in the literature of creative industries are rarely discussed in terms of the process activities, or the routine variations. Such omission is problematic as new technological artifacts could have a profound impact on organizational routines. For example, digital technology-induced information overload impacts the practices and behaviors of creative actors (Lingo, 2023). Likewise, digital platforms can replace the need for physical co-location in the creation process (Schiemer, Schüssler and Theel, 2023). In addition, since artistic creation routines appear to be routine clusters with interwoven and interdependent routines (Sailer, Loscher and Kaiser, 2024), local adoptions of GenAI may have widespread effects beyond any single routine. With little previous research investigating this phenomenon, this empirical investigation seeks to explore the impact of GenAI on artistic creation routines.

3.3 Methodology

3.3.1 Research strategy and design

To understand how the utilization of GenAI impacts artistic creation routines, an in-depth qualitative method was adopted in order to develop a deep understanding of the contextual human experience (Myers, 2020; Silverman, 2021) within one case firm (TF) (Yin, 2018), as a

micro-level study of routine dynamics. In this phenomenon-based study (Graebner et al., 2023), we implemented inductive (Gioia, Corley and Hamilton, 2013; Blaikie and Priest, 2019) inquiry to explore theoretical explanations of emerging practices (Goffin et al., 2019). A single case can be sufficiently convincing for theory development when the object is extraordinary (Eisenhardt, 1989; Siggelkow, 2007). To implement the research, a number of data collection methods were employed including documents provided by the case firm, primary data collection including non-participant (Eriksson and Kovalainen, 2016; Felin and Foss, 2023) and shadow (Karunakaran, 2022) observations to gain knowledge from real-time events, and semi-structured interviews (Myers, 2020). Table 3.2 provides an overview of the research strategy.

Table 3.2 Data collected and contribution

Data collected	Count	Contribution
Secondary files (March 2023)	264	Understand show production routines in depth.
Non-participant management meeting observation (March-November 2023)	14	Understand what is happening, in real-time, with the iterative and recursive dynamics within creativity and innovation.
Phase I interviews (March-July 2023)	11	Understand show production routines in depth and early experience of GenAI utilization.
On-site interview (October 2023)	1	Understand GenAI as digital change and its impact on overall artistic creation routine as a whole from the participant's view.
On-site desk work shadow observation (October 2023)	3	Understand GenAI utilization.
On-site rehearsal shadow observation (October 2023)	1	Understand show production routines' recursive iteration in depth.
Phase II interviews (November 2023)	22	Understand the GenAI utilization for creativity and innovation; in-depth details of GenAI use.

3.3.2 Case background and data collection

The case firm, TF, a top Chinese show production corporation, has over 300 in-house professionals aiming to produce impressive shows with creative concepts and interdisciplinary innovations. The first author studied this firm as her PhD project. During the observation of a management meeting in March of 2023, TF announced the firm-level decision to use GenAI. This was following the use of GenAI applications by some of TF's designers, which showed convincing benefits. The data collection is summarized in tables with accompanying explanations.

Secondary data sources were reviewed including archived documents relating to several past projects, the last four years' company annual reports, and the archived management meeting memos from the past two years. To acquire peripheral knowledge of production, we also read media coverage about the firm, the shows that they produced, and media interviews with their producers, directors, and designers.

Table 3.3 Detailed breakdown of secondary data sources

Source type	**Data**	**Files in total**	**File pages**	**Files upload to NVivo**
Secondary	Historical project materials	207		13
	Media coverage of the firm	28		0
	Annual report	4	734	4
	Historical management meeting memo	24	319	24
	Firm structure	1	2	0
Total		264		41

Next, from March 2023 to July 2023, the first author carried out the first phase one-to-one semi-structured interviews through virtual conference calls to understand the show production process. In this stage, she engaged 10 participants (nine males, one female; professional experience ranged from seven to 28 years), the board, and management to middle-level managers, including producers, directors, and designers from different types and size of shows produced by the firm. Through these interviews, she also confirmed the wide application of different types of GenAI in multiple functions. In addition, the researcher also independently sourced an external expert (male with professional experience of around 20 years, who has worked as chief director of technicians on many shows in another major show firm.

Table 3.4 Primary data sources: Phase I interviews

Source type	**Data**	**Participants' function and code name**	**Minutes in total**	**Transcript pages (font 11, single space)**	**Files uploaded to NVivo**
Primary interview	Phase I interview	Key creators: KI.1, KI.2, KI.3, KI.4	297	43	4
	Phase I interview	Creativity group: CI.1, CI.2	170	21	2
	Phase I interview	Innovation group: NI.1, NI.2, NI.3, NI.4	197	51	4
	Phase I interview	Industry technician expert: EI.1	84	14	1
Total		11			11

In October 2023, the first author conducted on-site data collection. She visited TF's office to observe the work of three professionals (two males, one female; professional experience ranged from 6 to 14 years) in order to understand the use of GenAI in their work. At the office, she had some causal chats with the head of Human Resources and other colleagues from supporting departments as well to learn more about the firm and business. In addition, she traveled to one of TF's in-production shows to conduct a face-to-face interview with the chief producer (professional experience of around 30 years) regarding the use of GenAI in that show. To triangulate the core creators' work, she independently sourced another show in-production, other than the work of TF. She shadowed the director team (three males, two females; professional experience ranged from 4 to 22 years) of this show for their on-site rehearsal. During the process of shadowing, she also had many extra chats with colleagues from multiple functions in their on-site production team, especially technicians, to better understand the show production context.

Table 3.5 Primary data sources: On-site observation and interviews

Source type	**Data**	**Participants' function and code name**	**Minutes / days**	**Transcript pages (font 11, single space)**	**Files uploaded to NVivo**
Primary- on-site observation and interviews	Desk work shadow observation	In-house director: SK.1	280	2	1
	Desk work shadow observation	Creativity group: SC.1	240	2	1
	Desk work shadow observation	Innovation group: SN.1	140	3	1
	Rehearsal shadow observation	Top director team: EII.1, EII.2, EII.3, EII.4, EII.5	2-day	5	1
	On-site face-to-face interview	In-house producer: OC.1	80	7	1
Total		9			5

With accumulated knowledge and a refined interview protocol to address GenAI, the first author conducted a second phase of one-to-one online interviews in November 2023. This phase included a purposive sample of 22 participants (14 males, 7 females; professional experience ranged from 5 to 31 years)— i.e., intense users of GenAI in their day job, including senior and middle-level managers, and designers. The data sources are summarized in Table 3.6.

Table 3.6 Primary data sources: Phase II interviews

Source type	**Data**	**Participants' function and code name**	**Minutes in total**	**Transcript pages (font 11, single space)**	**Files uploaded to NVivo**
Primary interviews	Phase II interviews	Key creators: KII.1, KII.2	104	13	2
	Phase II interviews	Creativity group: CII.1, CII.2, CII.3. CII.4, CII.5, CII.6, CII.7	282	41	7
	Phase II interviews	Innovation group: NII.1, NII.2, NII.3, NII.4, NII.5, NII.6, NII.7, NII.8, NII.9, NII.10, NII.11, NII.12, NII.13	529	68	13
Total		22			22

For the entire primary data collection from March to November 2023, through a virtual conference system, the first author observed 14 real-time management meetings with codes allocated for each meeting in Table 3.7. The management meeting is a critical and strategic occasion for the firm, participated in by executives and managers, and the heads of each producing functions. Thus, not only are managerial issues addressed but the significant show projects during production are also discussed.

Table 3.7 Primary data sources: Non-participant observation

Source type	Data	Meeting counts and code name	Minutes in total	Transcript pages (font 11, single space)	Files uploaded to NVivo
Primary-non-participant observation	Management meeting observation	14 meetings: OB.1, OB.2, OB.3, OB.4, OB.5, OB.6, OB.7, OB.8, OB.9, OB.10, OB.11, OB.12, OB.13, OB.14	2338	335	14

3.3.3 Data analysis

Interviews and management meeting observations were audio-recorded and fully transcribed in Chinese, the original language, no later than two days after the interviewing and observing.

To execute systematic coding, 93 files including reports, transcripts, notes, and memos were uploaded into NVivo. To avoid missing important information and to reduce the potential for translation errors, we started coding from Chinese data, following the Gioia method (Gioia, Corley and Hamilton, 2013). The coding structure and representative quotes were then translated into English. The final coding structure is presented in Figure 3.1.

In October 2024, we got back to TF to discuss the key findings in-person with key creators and senior management, including KI.4, SK.1, OC.1 and CII.5 etc. We received positive feedback confirming our results and the participants agreed with our analytic distinguishment of creativity routine and innovation as they acknowledged each have interrelated but relative independent problems and solutions. Also, the participants agree with our conclusion that with GenAI, both creativity and innovation problems and solutions could be searched and discussed during one meeting now, which had been in strict sequence as set steps without mixture previously without

GenAI.

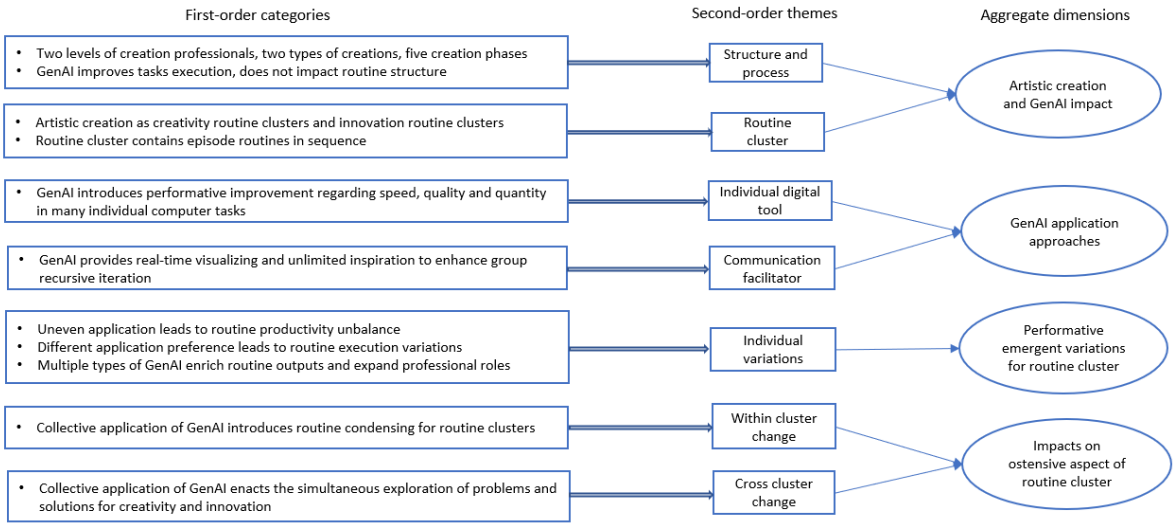


Figure 3.1 Coding structure

3.4 Findings and Analysis

3.4.1 Artistic creation routines in TF, GenAI impact

The study revealed a detailed description of the artistic creation process in TF, and this is outlined in Fig. 2. The organizational units, artistic creation phases, and the decision-making authority are all indicated. The diagram also indicates the phases in which GenAI is applied (planning, designing, and prototyping).

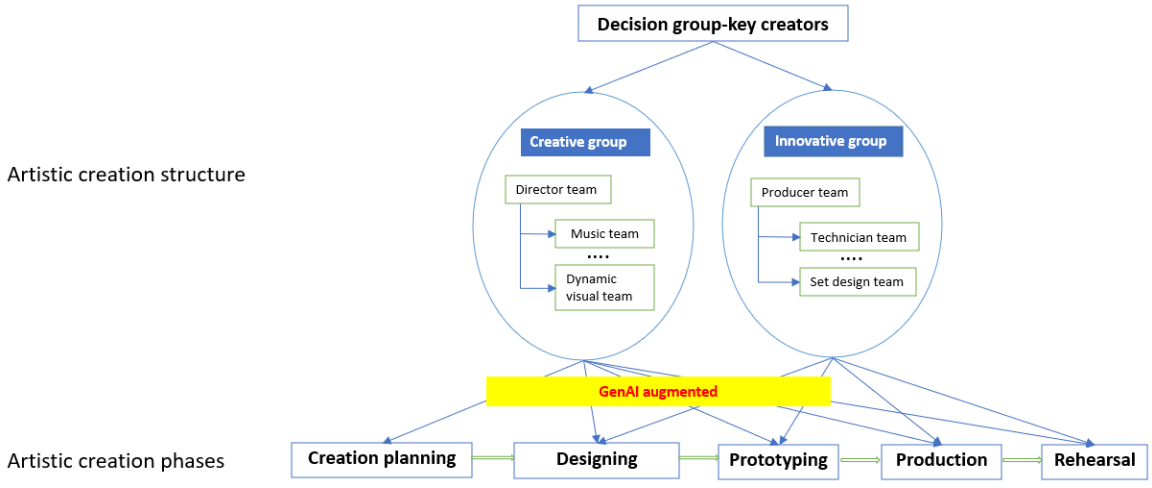


Figure 3.2 Artistic creation routines in TF

Each show production is a complex group collaboration with a two-level structure. The upper level is the decision group, leading throughout all phases. Key creators include the chief

director, the chief producer, the chief designer, and the chief technicians. The lower-level implementation groups are creative and innovative, each composed of several diverse functions and teams. The director team leads creative functions, such as music team, and dynamic visual team. The producer team leads the innovation functions, such as set design team and technician team. The artistic creation phases include creation planning, designing, prototyping, production, and rehearsal. Consistent with the literature, we found abundant recursive iterations in the creative process.

Creation planning, as the first phase, develops the performance goals of a show against the show's investment budget, investors' expectations, location culture, and history. The phase is concluded when the conceptual development has achieved a general set of creative insights, as exemplified by KI.2:

> *In those early meetings, we would not discuss how to create or do artistic innovation, but all the key creators have discussed inspiration thoroughly to shape what theme we want to express*.

Design is executed for a significant period with interactive and iterative activities to construct, interpret, and visualize the abstract concept of the entire show. It is a key creation period of continuously searching a wide variety of creative concepts, developing various concepts into visual images for comparison and evaluation, then deciding workable concepts and abstract interpretations to move on to prototyping or developing additional concepts to go over again. By the end of this phase, the stories to be performed and the major technological means are temporarily shaped for prototyping. One executive director reported in a management meeting on the design progress of one show:

> *The [design] is led by the chief director, the scriptwriter, and the key designers. Their work outputs, including versions reflecting original thinking and improvements, are prepared by stage art and dynamic visual teams as in the report. The technician team will receive instruction for their screening of feasible technology schemes shortly* (OB.11).

Next, prototyping includes both computer-based desk prototyping and on-site experimentation as physical prototyping. The prototyping routine includes many integrated efforts that involve designers carrying laptops to work on-site with technicians to discuss, iterate, and build the physical artifacts. The interview participant of NI.3 shared the experience of an interactive show G, located in the lobby of the top floors of a skyscraper, which was an unprecedented creation with a significant period of iteration between computer programming and physical prototyping:

> *The space has a 360-degree viewing… over two months, after seven versions of schemes to finish the prototyping… There is interdependent coordination from physical data*

> *collection transiting to the computer for programming, then from computer output of music and lights to physical medium… demands a high quality of the device harmonizing and program debugging… there is no room for any error.*

The production, similar to prototyping, includes both computer-based and physical production. Physical production includes the materialization of, among others, stage, scene, and props. There are also various computer-based productions including dynamic visual content that will be played on various media such as air, wall, and stage floor. A dynamic visual manager explained desk production in the interview:

> *For us, the production is on our computer where we finalize the static image in one set of software and change into another set of software to make them dynamic. Then finally we made the complete streaming episodes for the show; this is our production. (CI.2)*

Finally, rehearsal includes both performer rehearsal and technological rehearsal. Performing is relatively independent, and so is not discussed in this paper, but technological rehearsal is closely connected with previous routines. Along with the on-site performing, the key creators will observe, evaluate, and raise demands for adjustment and may require change for design, prototyping, and production.

Reflecting on the creation process we investigated that after the general artistic direction pointed as the guidance for both routines of creativity and innovation, the follow-on processes are better viewed as addressing problems with solutions designed, experimented and validated respectively, less likely to be idea generation and implementation. Hence, borrowing the commonly adopted phases splitting of creativity and innovation in literature of Table 1 and problem-solving processes from Table 1 of relevant activities for our setting, we analytically and conceptually unpacked creativity and innovation cluster routines into routine episodes (Deken et al., 2016) in Table 3.8.

Table 3.8 Artistic creation routine activities

	Creativity cluster routines	Innovation cluster routines
Episode routines in sequence	General problem defining	
	Problem searching	Problem searching
	Problem framing	Problem framing
	Solution searching	Solution searching
	Solution desk iteration	Solution desk quantifying and validating
	Solution desk finalizing	Solution physical experimentation
		Solution physical finalizing

Considering artistic innovation as episodes of problem-solving activities, we analyze it as below:

Creative problem searching and problem framing was recalled by interview participant CI.1 about their experience as the vice director of Project X:

> *Once the theme decided, we started to work on the content and structure by teams of script writers and visual designers with numerous designing drafts... The overall aesthetic of the stage is on our responsibility.*

They also shared tasks of creativity solution searching, solution desk iteration, and finalizing:

> *Once we have determined the story, the dynamic visual function split their people into 2D, 3D, and dynamic streaming teams.*

Interview participant NI.1 shared his experience as executive producer of Project Y. We consider their experience as innovation solution searching, solution desk quantifying, and validating:

> *The technical functions of the show include stage, mechanics and wire work...for each possible solution, we are not just brainstorming and analyzing feasibility, we have to search market information and do real calculation to check the respective initial investment cost and long-term maintenance expense before we proceed...*

Creativity represents the whole concept generation for the show, but also develops some final artefacts including music and dynamic visuals. The innovation group creates and delivers the physical creation including stage, set, and scenes for the show. Creativity and innovation professionals work together to formulate and resolve problems and solutions, with

consideration of each other's expertise. Hence, we can understand these artistic routines as clusters (Kremser and Schreyögg, 2016) of creativity and innovation, as shown in Fig.3.

Rehearsal has an independent routine of performing, in addition to creativity and innovation routines. This paper does not discuss performing as the focus is GenAI application, which did not occur in performing in our case. However, during rehearsal, the re-equipment of modification and adjustment by redesigning and reproduction of creativity and innovation may emerge. In the circumstances, the respective creativity and innovation routines will be implemented as usual, as they are part of the rehearsal, but not the performing. Thus, there are two dash lines connecting phase rehearsal with cluster routines of creativity and innovation.

Figure 3.3 Artistic creation routine-adapted

3.4.2 GenAI application approaches

GenAI as a digital tool improves individual productivity

In March 2023, TF announced that GenAI can be used widely in the artistic creation process as "GenAI can write rhythm, it can make design pictures very quickly with acceptable usefulness" (OB.2). Smaller scale trials had already taken place, and a number of useful applications for GenAI had already been seen to help professionals in various tasks. "For art design, GenAI may provide ideas of whole ambiance. For lighting design, GenAI can give suggestions of lights setting and lighting design. Even the equipment structure and design, AI2 can also generate inspirations" (OB.2). GenAI was later used in a wide variety of tasks including creation planning, designing, and desk prototyping for individual performance enhancement including productivity. Set designers mainly use image GenAI for conceptual inspiration and 2D visualizations of the stage. Dynamic visual designers use GenAI for visual concept designs and desk prototyping. The director team uses GenAI in developing ideas for the initial theme of the show.

There were a number of positive comments from the interview participants about the value of GenAI in artistic creation. As one executive producer reported:

[2] The study participants use the terms "GenAI" and "AI" interchangeably in their interviews and our observed meetings, and they do not use particular AI other than market-available GenAI. So, we record this first referred-to "AI" here, but to avoid confusion, all other "AI" in the representative quotes of this paper have been revised to "GenAI".

> *GenAI improves productivity by around 50% for the desk-relevant tasks in show production, which includes greater efficiency in early stages of production, including creative concepts, set design, dynamic visual design, some desk prototyping, and iterative adjustments of redesigning. They are speeding up task handling and submission incredibly, from days or weeks to hours… from a complete show production perspective, 50% is a moderate estimation of benefits from GenAI* (BII.2).

GenAI can produce "multiple versions of one conceptual idea with many genres in seconds, which previously several designers had to work for weeks visualizing up to five drafts" (CII.4). Creators can then compare and select from this larger set. GenAI might also produce higher quality results in some situations: "GenAI has no feelings, won't get tired, but people will. When we are tired, we might produce inferior output unintentionally. This is creative work, not making widgets mechanically, when we are bored or annoyed, we can't be creative" (CII.1). A number of examples are presented in Table 5, with indications of whether GenAI influenced the quality, quantity, or speed.

Table 3.9 Representative quotes of productivity improvement by GenAI application

Representative quotes	Quality	Quantity	Speed
GenAI can do repetitive and tedious tasks (such as experimenting with presenting effects of creative design ideas) for us, it does improve my work efficiency at least 50%. And surely the more trials comparison, the higher outcomes, assuming we are not spoiled by too many choices leading to an indecisive mind. (CII.4)	✓		✓
The usefulness of GenAI is determined by the types of GenAI and phases of our design. When we write our story of the visual, we use ChatGPT, which improves productivity by 10%. When we make creative concept images, Midjourney and Stable Diffusion can be a good creator to improve productivity by 70%. Then, with the streaming visual producing, GenAI is reduced to 5% improvement. (CII.3)			✓

Representative quotes	Quality	Quantity	Speed
In my view, GenAI improved function productivity in the creation phase around 10-fold. I feel like I suddenly have 10 additional line managers. We are looking forward to the fact that some GenAI can improve or develop 3D model capability. Maybe we can improve another 10-fold productivity or even exponentially. (KII.2)		✓	✓
I feel that GenAI improved my work by 30–40% for completion of tasks, in aspects of idea quality, space relation of scale proportion, and color choices patterning. (NII.11)	✓		
Previously, if we got a general concept from the director or director team, we would at most try three to five different conceptual image series to visualize their thinking by our half guessing to let them choose what they want to further develop. We can't do much, as these works were demanding; we have to put in considerable labor and spend several weeks on something that may be dumped right after finish. Now, with GenAI, we might get 100 series of conceptual images in a couple of days as alternatives. (CII.1)	✓	✓	✓

GenAI as a communication facilitator for collective iteration

In this section, we explore the role of GenAI as a communication facilitator in group work. As individual use of GenAI developed and improved, it began to be applied as a communication facilitator in a live collaborative setting. For example, in one management meeting, during the discussion of an emerging concept, a participant said, "*let's use GenAI to have a few prompts of […], that some of you may have better ideas of"* (OB.10) or, in another meeting, "*let's check GenAI now for our discussion of […]"* (OB.13). During these meetings, participants also presented collections of pre-recorded GenAI outputs on-screen for review, discussion, and selection, but also conducted further real-time prompting. GenAI was able to develop, visualize, and interpret ideas to support this real-time communication. Collective GenAI application not

only takes place during management meetings, but also during working meetings between creative actors. Table 6 presents further representative quotations.

3.4.3 GenAI adoption introduced performative emergent variations for routine cluster

The individual use of GenAI applications produced a number of variations to creativity and innovation routine clusters.

First, GenAI brought performative improvement regarding speed, quality, and quantity in many, but not all, tasks. At present, GenAI adoption is largely restricted to the creation planning and designing phases. Set designers must produce accurate, dimensioned drawings for stage construction, and "*this 2D-to-3D works is still manually carried out currently"* (NII.7). They had tried market-available 3D models of GenAI and were not satisfied. For dynamic visual designers, there were also no currently available GenAI models that would produce high-quality streaming outputs. For these applications, an interview participant contended: "*There may be some GenAI in the market claiming to be useful, but either the quality of GenAI is low, or the extra effort in adjusting the output is more than when they create from zero"* (CII.1). The uneven advantages were generating routine productivity imbalance.

Second, for routine clusters, GenAI applications by individual creators, such as designers, screenwriters and musicians, use one or more GenAI tools to augment their individual creative process, often in different ways. For example, "*I like to feed random ideas to GenAI to help me clear my thoughts, but I know others may have a clear direction first before prompting on GenAI"* (CII.3). Creative actors also use different tools depending on the needs of their role and their individual preferences: "*Someone may like Stable Diffusion more than Midjourney, but I don't, it depends on working customs"* (CII.5). Moreover, CII 4 stated:

> *Previously, without GenAI… we would surf online or in databases for a long time to get ideas and inspirations of character, color, scene space, etc.; its time consuming… But with GenAI, we start from coding inputs. But there have been occasions that GenAI didn't understand what we wanted or maybe hadn't been trained or its training datasets had no specific type of pictures we wanted. So, we work by mixing the traditional way and the GenAI way.*

Furthermore, where multiple GenAI tools are used, the working inputs for outputs generation are enriched. For example, professionals for streaming production may use text GenAI and image GenAI, although they intend to create dynamic visuals.

> *For what stories to tell, I use but don't rely too much on ChatGPT as we have our concept creation of stories by ourselves. For the element of video, I can use some ideas from AI*

> *images as static elements. No AI can produce final output; it is always step by step.* (CII.3).

In addition, GenAI can expand professional role and capability beyond their previous expertise, as illustrated in the following quote from designer CII.7:

> *We have tried some slides making GenAI for the initial concept presentation going to potential pitching deals, as we don't want to invest too much labor and time for a vague possibility. We have checked the slides page by page. It's logically consistent, although we surely have to make significant improvements, but the basic quality is not bad.*

Previously, the designer worked on creating visual concepts, handing over the images to other colleagues who then added the images to slides for discussion in meetings. He was often not completely happy with how the slide colleague organized the images that he handled, but it was complicated to communicate and sometimes not possible to meet and discuss these issues. Now, besides utilizing image GenAI to enhance his visual work, by also using PowerPoint GenAI, he can produce an initial version of the slides including his images and in better alignment with his creative vision, rather than sending his images to the professional slides colleague to further work on. Through the use of GenAI, the role of the designer has expanded to include some of the work usually carried out in a separate phase, in addition to producing the images faster and sometimes with improved quality.

Hence, individual application of GenAI in single routine change may lead to cluster variations, including routine pattern interface change, path discrepancy, and outputs expansion resulting in path overlapping. Moreover, managers in our study are considering the effect on the overall process. For example:

> *The structural adjustments might be necessary when the efficiency introduced by GenAI is significant enough.* (CII.1)

> *Of course, I am thinking of the function reorganization, labor cost and efficiency, but I won't say anything as, at the moment, it also depends on the advancement of GenAI, so we wait and see.* (CII.3)

Table 3.10 Comparison of GenAI as a working tool or communication facilitator

Representative quotes	Individual or collective work
We used GenAI for the suggestions of creation in sequence, for show H, we got some ideas from ChatGPT, then we transferred this text as prompting inputs for Midjourney for conceptual images as the foundations for dynamic visuals. At the end of the day, visual is just consecutive images. (CII.9)	Individual & collective
Previously, we had a whole day meeting to discuss how to present one piece of concept. We talk and, at best, we prepare in advance some examples from the database or use real-time googling examples in the shared screen of the virtual meeting or conference room TV screens... it's slow. But now, if we want to do any variations, we do it in real-time with GenAI. The outputs are immediately available, then further discussion, further inputs, further develop rounds of rounds. Those one-day-meeting results may be equivalent to several weeks' outputs in this respect. (CII.2)	Collective
Previously, when the director, producer, or other major creators wanted us to work on some novel creativity in planning, the designers had to make notes and do these testing drawings and modeling after meeting for a couple of days or weeks and, when we finished, the big guys may forget it all or have changed their minds already. What a waste, you know, right? But now, we open GenAI on the computer, what they say, we do the inputs, they see the outputs, pass or retain or further prompting a few rounds, modify and decide, any ideas discussed, we got the decision right then right there. (CII.6)	Collective
From what is generated by AI, we can further finetune it by AI follow-on work. For example, we can ask GenAI to generate follow on sentence or ideas by more prompts. In this background view image from poem, we can ask GenAI to add a girl into it. Then we request some change for the details of character of the girl's face. With the initial prompt, the overall theme harmony in each detail of the outcome is satisfactory. (CII.5)	Individual & collective

Representative quotes	Individual or collective work
Application of GenAI for our designing and production is a very interactive and iterative process in that it is not one input for one output and done; we have to continually do small adjustments and modifications according to what GenAI gave and what we wanted until we feel it is right. We do this by ourselves when we design independently, or sometimes we want to discuss with each other, so we do the trial prompting together. (NII.8)	Individual & collective

During group meetings, the collective application of multiple GenAI still generates outputs for sequential follow-on routines for further work by different actors, but the level of output is enhanced. The characteristic of GenAI to produce outputs of a sufficient quality at a rapid rate, coupled with the expertise of the design and innovation actors to produce suitable prompts and to evaluate the outputs, has changed the way routines are carried out (the performative routines), as well as their outputs.

The next two sections elaborate on the dynamic impacts that GenAI introduced to the artistic creation routines.

3.4.4 GenAI adoption impacts on the ostensive aspect of the artistic creation routine cluster

The collective use of GenAI applications produced variations to routines' feedback loops. These interactions occur within and between the creativity and innovation clusters.

GenAI enables simultaneous idea inspiration, problem searching, and solution searching, transforming the ostensive aspect of routines. For example the director team have changed from "*previously sitting, talking, making notes, and after meeting handle some ideas to visual team to draw simple line picture"* to the director, the musician, scriptwriters, and visual designers *"talking, prompting GenAI, screening, deleting and saving potential ideas and respective images for further work"* (CII.5). In this example, the creative routines are not only related to the overall project concept, but also to very specific creative artefacts such as stories, images, and songs, each of which can be developed prompted from multiple types of GenAI.

We found similar integration for innovation as well. The producer team will now invite the technician team to attend their design meeting for a first-round screening of solutions, where they can provide immediate feedback:

> *They would not let us attend previously as those discussions were prolonged and we would have little clue after a one-day meeting, but now, with GenAI produced images, we have an immediate view of what they are thinking. If it is unrealistic by our experience, we can point it out directly.* (NII.9)

In this example, problem searching, solution searching, and preliminary validating for innovations occurred in a single real-time event. The ostensive change to a collective working scenario means that previously sequential activities can now be implemented simultaneously.

Moreover, we found possible cross-iterations between creativity and innovation by analyzing the notes taken during observation OB.11:

> *The executive director presented a [GenAI] concept drawing of the stage, including an artificial pond with a water depth of 5cm… The executive director commented that, since there would be a pond on stage, then there was less possibility for a floor LED for video content. When the designer said the stage should be able to rotate to explain their preference for a round stage, the chief technician joined the discussion about the speed of the rotation and electricity arrangements as there would be water on the stage. There was nothing determined as they rushed into other meetings, but the designer saved GenAI outputs' images*.

In this example, the executive producer and chief technicians, based on their observations of the GenAI images, embarked on a discussion of innovation problems, such as whether the stage will rotate, and solutions, such as cost and maintenance, from their knowledge and experience. Such real-time discussion is again different from the previous sequential flow of innovation solutions search. In short, the application of GenAI as a working tool and communication facilitator not only mixes activities within clusters of creativity and innovation but also enables multiple activities of creativity and innovation to occur in one local event with the expanded actor group. The mixing up of cluster routine activities is summarized in Table 3.11. In this table, the left and right columns are the creativity and innovation clusters with necessary episodes as it always is. In the middle column, the two blue lines delineate the scope of the mixture of routine episodes. Now in one meeting event, the sequential episodes of generation problem defining, problem searching, framing, solution searching and desk iteration of creativity routine cluster and the sequential episodes of problem searching, framing and solution searching of innovation routine cluster can occur as iterative loops within moments.

Table 3.11 Artistic creation episode routines with GenAI

Creativity routines in sequence	Routine sequence mixing enabled by GenAI	Innovation routines in sequence
General problem defining	Now these routines can take place in one local event by collective application of GenAI for communication and working	
Problem searching		Problem searching
Problem framing		Problem framing
Solution searching		Solution searching
Solution desk iteration		Solution desk quantifying and validating
Solution desk finalizing		Solution physical experimentation
		Solution physical finalizing

To conclude this analysis of the ostensive aspect of artistic creation routines, it is clear that they have been changed by the collective applications of GenAI, resulting in a much increased scope for the simultaneous exploration of ideas, problems, and solutions in both the creativity and innovation phases.

3.5 Discussion

The benefits of AI, such as improved operations and higher productivity, have previously been observed in the manufacturing context (Mariani et al., 2023). However, AI can also indirectly enhance the innovative behaviors of employees by assuming the repetitive mundane tasks, enabling the human to focus on innovation (Verma and Singh, 2022). Better outcomes in idea generation were supported by the significant information-processing capabilities and the non-local searching scope of the GenAI tools (Haefner et al., 2021). In this study, we investigated the impact of GenAI on artistic creation routines and for the individual application of GenAI, we also observed higher quality, greater efficiency, and better innovations.

Our empirical contribution aligns with extant academic discourse in that GenAI have been adopted by individual creative professionals. Their effortful accomplishments and emergent accomplishments (Feldman *et al.*, 2021) of GenAI application led to increased level of efficiency and quality, allowing them to execute individual routines more productively and expanding their capability to additional areas. Such applications and impacts are aligning with the extant GenAI studies of productivity enhancement by exceeding human limitation of searching, exploring and

inspiration (Posen *et al.*, 2018; Haefner *et al.*, 2021; Singh, Chatterjee and Mariani, 2024), rather than replacing repetitive work in some of the extant literature (eg. Ooi *et al.*, 2024). The individual actors and contexts (Deken *et al.*, 2016) relevance of new artifact application in routine dynamics reflected in the varied extent of productivity enhancement and uneven extent and incomplete application scope of the entire routine.

We complement extant literature by our empirical contribution presenting that the group iteration convention of artistic creation demands and enacts the collective application of GenAI communication facilitator that enables real-time feedback and rapid iterations. In such circumstance, GenAI acts as both working tool and medium and the previously sequentially interdependent routine activities of problem searching and solution searching occurred in one local event. It challenges the academic knowledge of routine transformation with new digital artifacts as novel tool may induce change of routine interfaces (Pentland et al., 2020a) or paths (Pentland et al., 2020b).

3.5.1 Theoretical implications

Artistic creation relies on professionals' sequential and iterative contribution, which can be considered as routine clusters (Kremser and Schreyögg, 2016) of interdependent, coordinated (Sailer, Loscher and Kaiser, 2024), and cascading episodes (Deken *et al.*, 2016). We identify its impacts on innovation routines, first by individuals as a tool for desk ideation and iterations, and second in collective applications as a medium for group evaluation and iteration. The routine cluster perspective helped us to view GenAI as an artifact for interdependent and interactive patterns (Goh and Pentland, 2019) in a web of interactions (Pakarinen and Huising, 2023).

Our study found significant change in these routine clusters with the application of GenAI, which can be seen as an emergent accomplishment (Feldman et al., 2021). Deken et al. (2016) discussed actors flexing, stretching, and inventing routine outputs. In our study, the individual use of multiple GenAI tools extends routine outputs, changes the relationship with the follow-on routines. In this regard, we complement the extant literature of coordinated cluster dynamics which can come from effortful accomplishments (Sailer, Loscher and Kaiser, 2024), as we find that these individual emergent accomplishments also change the pattern of routine clusters, changing the routine interfaces and resulting in path divergence (Goh and Pentland, 2019). That is, the deliberate application of GenAI changed the nature of the routines, and so changed the routine dynamics.

For the collective application of GenAI in group work within routine clusters, the impacts can be seen as changing the sequence of problem and solution searching and pairing. Extant papers discussing GenAI stress its capacity to expand the problem and solution pool (e.g.Bouschery, Blazevic and Piller, 2023) and to offer improvements in problem and solution searching (Singh, Chatterjee and Mariani, 2024). In this study, we observed GenAI as a digital working medium (Anthony, Bechky and Fayard, 2023a) for real-time coworking and communication, where it enables simultaneous problem and solution searching and debating. This presents a novel finding with respect to the effect of GenAI on artistic innovation as routine clusters, changing the design and logical progression of activities alongside the outputs of those activities. Hence, the collective application of GenAI as an interpretive working and communication tool changed the ostensive element of artistic creation by combining the phases of search, problem framing of and solution finding, and increasing the scope for cross-cluster mixture of creativity and innovation in one local event.

Our investigation of widespread GenAI adoption in artistic innovation is aligned with predictions by Pakarinen and Huising (2023) that AI benefits are embedded in professional networks of interactions. Compared to the extant comparative and empirical discussion of varied AI impacts on individual levels (Bankins et al., 2024) in single tasks (Jia et al., 2023), this study shows that human–AI collaboration can also influence group working and routine clusters. GenAI enables participants to jointly engage in exploration of ideas, problems, and solutions simultaneously for artistic innovation. Hence, adopting routine dynamics—in particular, the cluster perspective—to study GenAI applications, we provide strong empirical evidence for the prediction of AI triggering the change of the innovation process (Haefner et al., 2021). We also extend the static system view of AI adoption and human–AI collaboration (Anthony, Bechky and Fayard, 2023a) by analyzing the processual impact of GenAI on routine clusters in artistic creation. It is clear that the scope of human-AI collaboration must expand to include group discussions and collective problem solving. For routine dynamics theories, we share an empirical possibility of GenAI leading to a significant ostensive routine change, which in our case study followed a series of local modifications rather than a top-down system transformation. This pattern of routine dynamics might apply beyond the creative industries, but of course to test that idea, more research is needed.

For routine transformation, the firm-level application of a new artifact could be an explicit tipping point of an avalanche on the entire system, leading to other changes and incremental reconfiguration for discontinuous change (Girod and Whittington, 2015). For example, Pentland *et al.* (2020a) discussed how a system settled into a new regime after self-organizing. In contrast to this previous literature, routine dynamics in ostensive modification in our case benefited from the collective use of multiple GenAI tools. Our study presents a significant change of both the

performative and ostensive aspects of routines without a deliberate, systematic transformation. In this study, the firm-level application of GenAI has been realized both by individual behaviors and by group collective behaviors, and both introduce routine modifications. Routine modification and recreation with simultaneous persistence and emergence are an outcome of emergent modifying and complex assemblages of socio-material practices (D'Adderio and Pollock, 2020), which is a difficult process that often fails (Glaser, 2017). In this research, rather than introducing systematic drifting and significant process and structural changes into new routines (Pentland *et al.*, 2020a), the firm-level GenAI application brought routine modifications with the ostensive change driven by actors' emergent accomplishments, where they discovered that the collective application of GenAI could combine multiple activities in one local event, thus changing the ostensive sequence of routines.

Meanwhile, as firm level transformation analysis from this study is in consistent with literature stressing the importance of actors. The application of GenAI started from a few dispersed routines by autonomous activities of actors in those routines to improve productivity and generate additional outputs. Actors are critical for routine change. For instance, Bapuji et al. (2019) contended that the importance of the individual participant's understanding of the routine change and their action and interactions with respective artifacts impact the outcome of routine implementation. Technology as an artifact adopted by human workers could function as a tool, supporting task implementations, and as a medium, building common ground to enable collaborations among different human groups (Anthony, Bechky and Fayard, 2023a). It has been reviewed and concluded that, for the application of AI outputs, medium-level employees with moderate expertise may benefit most from AI application whereas senior professionals with higher expertise may trust AI outcomes less although they are better to incorporate human knowledge with AI outputs, and lower workers are weaker in evaluating and effectively utilizing AI outputs to assist them in their work. GenAI, however, introduces the most gains to the productivity of skilled workers in simple tasks (Bankins et al., 2024). In this study, we present integratively. Lower- and medium-level professionals utilize GenAI as a working tool in their daily work tasks because they work with computers on their desk, whereas higher-level artists are not using GenAI hands-on, but they understand and leverage on GenAI during real-time group work of discussions and meetings to participate in rounds of input–output loops with instructive orders.

3.5.2 Practical implications

The effect of GenAI on artistic innovation was observed in our creative industries setting, through local adaptations and variations (Berente *et al.*, 2016), organizational context of artistic innovation routine clusters allow for the absorption of GenAI as an external technological artifact. Individual applications of GenAI can offer higher productivity and improved outputs by generating a large volume of output at an acceptable quality level for the conceptual design stages (Murray, Rhymer and Sirmon, 2021), reducing the need for time-consuming manual iterations. Similarly, GenAI can also be applied in a collective work setting, allowing real-time review and iteration, shortening the time required to produce a feasible solution that meets the design concept requirements.

Interaction and collective improvisation are critical for the creative innovation outcomes (Meziani and Cabantous, 2020; Audretsch et al., 2023). Collective group work is a long-recognised phenomenon in artistic creation (Hatcher et al., 2018). Iterative dynamics are also key to artistic creation routines, whereby repeated recursive refinement is a key element in the creative process (Clegg and Burdon, 2021), which ensures the potential to introduce new and different adaptations and variations (Berente et al., 2016). Artistic creation routines contain inherent dynamics of situated performing variations of recursive group iterations (Hatcher et al., 2018; Paris and Ben Mahmoud-Jouini, 2019). When artistic creation routines embrace GenAI, a live group creation setting allows the designers to evaluate the visual, aesthetic, and graphical appeal and, at the same time, the technicians can evaluate the practical considerations of the new idea and reveal constraints or suggest changes or alternatives based on their experience and initial impressions. Here, GenAI is applied as a collective work tool and communication facilitator with extended participants, from independent and nonsequential activities, who were previously unable to join the talk and discuss effectively. Hence, the situated performing (Goh and Pentland, 2019) of GenAI by creative professionals can be used both individually and collectively, and we would encourage creative firms to explore its use in both settings.

Innovation management involves complex decision systems that require resources, administrative governance, and creative control, especially where GenAI is being applied in unfamiliar areas (Haefner *et al.*, 2021). The potential for automation depends on whether the human components and intervention are indispensable (Fleming, 2019), and in our case study there were two critical areas where human intervention was essential. First, design expertise was essential in creating suitable prompts and in evaluating the quality and suitability of the outputs. Second, the GenAI tools were not ready to be used in the physical production (innovation) elements. Hence, the decision on whether to adopt GenAI should not rest on how well it can replace people, but on how much it can support human labor to complete their work

faster and better. Further, when encouraging professionals to apply GenAI, organizations must also consider the requirement for developing new skills to better understand and deploy AI technology (Pakarinen and Huising, 2023).

3.5.3 Limitations and future research

The main limitation of this research is that we only studied show production in one country as a representative case for creative industries. Although we have justified the generalisation value of our case in the introduction and the main characters of recursive iterations in the creative industries are reflected in our data and analysis, future studies in different cultures and in other sectors may reveal different findings. For example, music production would be very different from show production and the GenAI potentially involved would be less likely to heavily rely on image GenAI. Hence, future research of music GenAI by independent musicians and major labels would be interesting. In addition, GenAI adoption is a new phenomenon with rapidly improving quality. GenAI tools including text, 3D models, voice, image, and video are particularly relevant to artistic creation. At the moment, some GenAI tools are not sufficiently well-developed, such as those for video and 3D model, whilst others are working with relative higher quality. The future progression of GenAI may change the scope of GenAI in the creative industries and beyond. Relevant to these advancements, we suggest future studies in other regions and in sectors, such as film production and digital gaming production in Western countries.

The second limitation is the generalisation of GenAI impacts as collective application. Incorporating AI-human interaction as an interdependent collaboration (Lichtenthaler, 2018) may influence job, task design, and business routines (Bankins et al., 2024). GenAI enabled different professionals to communicate, triggering change in the ostensive aspect of artistic creation routine, rather than as a systematic redesign of the routines. Group working is a common topic in creativity and innovation (Amabile and Pratt, 2016; Harvey and Berry, 2023), whereas human–AI collaboration with groups of humans in one local event is not sufficiently investigated in other managerial studies. Further research is needed on whether the group-AI interactions are also taking place in other settings.

Chapter 4 Digital Disruption: Exploring Managerial Hybrid Ambidexterity in Artistic Innovations

4.1 Introduction

Creative industries are both a significant part of advanced economies and a crucial component of regional innovation and strategy (Chaston and Sadler-Smith, 2012). The cultural and creative industries "generate annual revenues of USD 2.25 trillion and account for 29.5 million jobs globally (more than the telecoms or automotive sector in many economies)" (OECD, 2021, 4) and introduce numerous innovations (Jones, Lorenzen and Sapsed, 2015). In recent years, digital and emerging technologies have changed consumer expectations (Verhoef *et al.*, 2021) and disrupted creative industries (Franklin *et al.*, 2013; Benner and Waldfogel, 2023), changing the methods of production and the basis of competition (Gattringer *et al.*, 2021; Stanko and Rindfleisch, 2023). For example, music supply has transitioned from selling physical albums to personalized online services (Adner, Puranam and Zhu, 2019) and from linear content production to an ecosystem value loop (Tan *et al.*, 2020). Digitalization is disruptive and challenging for established firms (Schneider and Kokshagina, 2021). This digital disruption is a multilevel and multifactor phenomenon involving individuals, organisations, and contextual environment (Hopp *et al.*, 2018b). However, literature discussing digitalization in the creative industries tends to examine firm-level outcomes and performance (e.g.Tan *et al.*, 2020; Benner and Waldfogel, 2023), with little discussion about the micro-level practices and processes. This gap is problematic as innovation to address digital disruption is a complex process and a significant challenge for incumbents to maintain competitiveness (Smith and Beretta, 2021; Andersen, Aagaard and Magnusson, 2022; Klos *et al.*, 2023).

To bridge this gap, we examined the ambidexterity micro-level processes of ambidexterity through a detailed case study including interviews, observation and historical documents. The case study was conducted with a Chinese show production corporation TF (pseudonym). Over two decades, TF has produced numerous shows, including dozens of grand shows with international, regional and national influence. TF constantly pursues digital novelty and has successfully applied AR and VR in physical shows for several years. Since the 2020 lockdowns of COVID-19, TF started to explore virtual shows, enabled by the deployment of gaming engines, such as Unreal Engine, and internet hype of Web 3.0, for the creation of interactive virtual shows. This exploratory innovation was managed in a virtual business unit (VBU), a distinct entity with independent budget and decision system and different business model from the corporation and other business unit (BU)s. TF simultaneously strengthened its dominance in

physical shows with exploitative innovation. In other words, the adoption of digital tools allowed TF to simultaneously explore and exploit, adapting to disruption through organisational ambidexterity. Ambidexterity, simultaneous exploration and exploitation (O'Reilly and Tushman, 2008; O'Reilly and Tushman, 2016), has been proposed for incumbents as a path and solution to adapt to disruption. In an uncertain environment with disruptive technology (O'Reilly and Tushman, 2021), ambidextrous firms change effectively (O'Reilly and Tushman, 2008). For example, Smith and Beretta (2021) have investigated "dynamic ambidextrous organizing" (p. 185) with both separation and integration structure. Ko and Liu (2019) have demonstrated the usefulness of contextual ambidexterity for manufacturing SMEs to address disruption. However, creative industries often rely on external collaboration, and whether interorganisational ambidexterity could be effective for digital disruption has little discussion. Ambidexterity is an arduous process because exploiting current knowledge and exploring potential opportunity operate with competing logics, generating conflicts of resource allocation and process design (Gupta, Smith and Shalley, 2006; Raisch and Birkinshaw, 2008). In particular, creative industries are human centric (DeFlillippf, Grabher and Jones, 2007; Chaston and Sadler-Smith, 2012), and whilst top-down managerial actions can be critical, there is a lack of discussion of the wider participants in the process of ambidexterity (Zimmermann, Raisch and Birkinshaw, 2015; Raisch and Tushman, 2016).

Through an in-depth qualitative case study, we seek to answer the question:

How does an established creative firm manage the threat of digital disruption by organisational ambidexterity?

Our case study analysis joins the discourse on ambidexterity as an approach for incumbents responding to digital disruption. The first contribution is to complement the extant academic discussion of structural or contextual ambidexterity for disruption by presenting the process and outcomes of hybrid ambidexterity. Second, we complement the ambidexterity literature by evaluating the interactions and collective contributions of multiple levels of actors. As a practical contribution, we explain the hybrid ambidexterity approach as a response to digital disruption.

The remainder of this paper is organised as follows. The next section briefly reviews digital disruption and the various ambidexterity approaches. The methodology and empirical findings follow. Finally, the discussion section includes theoretical and practical implications.

4.2 Theoretical Background

4.2.1 Digital disruption raises challenges for incumbents

Disruptive technologies and innovations, which may be brought by existing firms or new players, require extensive adaptation to product offerings and organisational design if incumbent firms are to survive (Schuelke-Leech, 2018). Digital disruption relates to digital innovations that gradually alter resource bundles and value creation and capture (Skog, Wimelius and Sandberg, 2018). The resulting technology and market turbulence require flexibility, learning and market-engaging (Pena Haufler *et al.*, 2021; Schneider and Kokshagina, 2021).

Confronting novel technologies and destructive innovations brought by new entrants (Schuelke-Leech, 2018), incumbents may innovate to target new markets and future users (Christensen, 1997; Christensen, Raynor and McDonald, 2015). However, the organisational response to disruption is dynamic, nonlinear and unpredictable (Christensen *et al.*, 2018; Kumaraswamy, Garud and Ansari, 2018). Organisations are constrained by embedded organisational routines and cognitive framing, and a reluctance to cannibalise existing assets to serve new markets with new technologies (Christensen, 1997; Henderson, 2006; Tellis, 2006).

Digital innovations also bring novel challenges such as amalgamating physical and digital competences, and accounting for discrepant knowledge, cognition and resources (Moschko, Blazevic and Piller, 2023). As such, digital disruption demands organisational responses with an entire business logic reiteration (Nambisan *et al.*, 2017) through adapting structure (Appio *et al.*, 2021) and internal context (Vial, 2019; Leonardi and Treem, 2020), changing product, process (Marion and Fixson, 2021) and business models (Hess *et al.*, 2016) within an unfamiliar environmental context (Nagaraj *et al.*, 2020).

Beneficial in-house resources that can provide advantages for incumbents to survive radical technological change include technological knowledge and market know-how (Roy and Sarkar, 2016). The organisational structure and process is also important in addressing digital changes (Pesch, Endres and Bouncken, 2021). Major firms may revolutionize the organizational structure from within (Farjoun, 2019) current framework (Hess *et al.*, 2016). For example, the exploration can be implemented by creating semi-structure (Brown and Eisenhardt, 1997). Digital adaption and systematic shift can also be obtained by the malleability of designs to avoid chaos (Hanelt *et al.*, 2021).

4.2.2 Ambidexterity mechanisms and appearance in disruption literature

Organisational ambidexterity, simultaneous exploration and exploitation (O'Reilly and Tushman, 2008; O'Reilly and Tushman, 2016), has been proposed for incumbents as a path and solution to adapt to digital disruption. Enabled through the firm capability of simultaneous exploration and exploitation for both radical innovation and incremental innovation (Smith and Tushman, 2005; Birkinshaw and Gupta, 2013; O'Reilly and Tushman, 2013), ambidextrous organisations can be both efficient and adaptive to change (Raisch and Birkinshaw, 2008) with competitive performance for long-term survival (Gibson and Birkinshaw, 2004). There are structural, contextual, sequential, interorganisational and hybrid approaches to ambidexterity and the choice is usually contingent both on the external environment and internal conditions (Jansen, Van den Bosch and Volberda, 2006; O'Reilly and Tushman, 2013).

The widely studied mainstream approach is structural ambidexterity, which is setting up new business units within organisations to work on exploratory innovation (Tushman and O'Reilly, 1996; Benner and Tushman, 2003; Smith and Beretta, 2021). The new business unit has a distinct structure, process, culture and is loosely coupled with the parent organisation (Benner and Tushman, 2003). By setting up separate exploratory innovation units, firms can improve overall exploration and exploitation (Blindenbach-Driessen and van den Ende, 2014). The main challenge of structural ambidexterity is the coordination cost for reintegrating separated units at firm level (Adler, Goldoftas and Levine, 1999).

Contextual ambidexterity has been raised by Gibson and Birkinshaw (2004), suggesting that an organisational context with a supportive culture of stretch, discipline, orientation, and trust can enable individuals to pursue both exploration and exploitation autonomously, delivering conventional value and responding to change. Contextual ambidexterity stresses the behavioural capability of individuals enabled by an organisational culture of informality, trust, stretch and autonomy (Gibson and Birkinshaw, 2004; Jansen et al., 2009). Benner and Tushman (2015) have questioned the sufficiency of structural ambidexterity and Jansen et al. (2009) suggested the benefits from structural ambidexterity required a supporting contextual mechanism. Personal ambidextrous cognition is required to embrace the paradoxical tension between exploratory and exploitative activities (Andriopoulos and Lewis, 2009; Tempelaar and Rosenkranz, 2019).

Sequential ambidexterity, shifting priority between innovativeness and efficiency in sequence, was proposed by Duncan (1976). The sequential transition must be subtle and delicately managed. Sudden jumps between exclusive exploration and exploitation should be avoided (Kang and Kim, 2020). Brown and Eisenhardt (1997) have presented time-paced transitions among multiple innovations, enabled by flexible organisational structures and lean trials.

Boumgarden, Nickerson and Zenger (2012) have discussed vacillation, temporally alternating between polar organisational structure of centralization or decentralization overtime to navigate the extent of exploration and exploitation to optimize long term performance.

Interorganisational ambidexterity is another approach to achieving both exploration and exploitation (Lavie and Rosenkopf, 2006; Lavie, Stettner and Tushman, 2010). Interorganisational collaboration and acquisitions can enable incumbents to survive disruption (Sandström, Magnusson and Jörnmark, 2009). For example, Cozzolino, Verona and Rothaermel (2018) showed how a traditional media corporation adapted their business model fundamentally from publisher to multiple platform issuer, following a process of external collaboration and acquisitions. Firms may enhance performance if they explore through external collaboration while they internally exploit (Stettner and Lavie, 2014), or they might engage in separate external exploratory alliances and exploitative alliances (Rothaermel and Deeds, 2004). Interorganisational ambidexterity also encourages organisational learning with ambidextrous cognitive frames to integrate internal and external knowledge for innovation (Sherman, Berkowitz and Souder, 2005; Lin and McDonough, 2014).

There are also academic investigations of hybrid ambidexterity (Ossenbrink, Hoppmann and Hoffmann, 2019), where multiple approaches are applied. Ossenbrink, Hoppmann and Hoffmann (2019) demonstrated that environmental dynamics, in combination with management cognition, perception and sensemaking, determine multiple applications or shifting between structural and contextual approaches as hybrid ambidexterity for extraordinary innovation performance. Foss and Kirkegaard (2020) have presented a successful organisation operating with co-presence of structural and contextual ambidexterity. Kauppila (2010) has studied structural separation and ambidextrous context for complex interorganisational partnerships by an industrial manufacturer. Agostini, Nosella and Filippini (2016) also presented quantitative evidence that the structural and contextual approaches reinforce each other, and that adopting both can improve innovation and performance.

Ambidexterity has gained momentum in the digital disruption literature. Kaulio, Thorén and Rohrbeck (2017) discussed how a telecoms operator firm responded to disruption by experimenting and pioneering activities, formulating a matrix portfolio of exploration and exploitation in both technology and business models. Ko and Liu (2019) have demonstrated how information technology assimilation enables contextual ambidexterity and promotes both exploratory and exploitative innovation. Del Giudice et al. (2021) also found ambidexterity can boost innovation in a digital technology environment.

Ambidextrous organisations with dimensions of structure, behaviour, cognition and knowledge transferring can simultaneously pursue exploratory and exploitative innovation to survive

(Scuotto et al., 2020). The structural separation is a classical response (O'Reilly and Tushman, 2008) to avoid organisational inertia (Gilbert (2005). Structural ambidexterity in the digital realm, creating separate units for exploring digital technology (Svahn, Mathiassen and Lindgren, 2017), could be preferred approach for established firms (Lindsay and Hopkins, 2010; Crockett, McGee and Payne, 2013). However, since existing competence could be an advantage for incumbents (Hopp et al., 2018a), contextual ambidexterity (Ko and Liu (2019) might enable incumbents to benefit from their existing capabilities. However, we do not know whether the mutual reinforcement between structural and contextual ambidexterity (Jansen et al., 2009; Agostini, Nosella and Filippini, 2016) is present in digital disruption.

Moreover, other approaches have limited exposure in disruption literature. Interorganisational collaboration and acquisition have been suggested for incumbents to survive disruption (Sandström, Magnusson and Jörnmark, 2009). Creative industries are often close clusters of interorganisational collaboration (Uzzi and Spiro, 2005; Lin and McDonough, 2014; DeFillippi, 2015). As such, incumbent creative firms facing digital disruption could be distinct from other industries. For example, Digitalization in manufacturing is often pursuing industry 4.0 (Meindl et al., 2021), which is very different from digital disruption by creative firms for enhancing and innovating audience experience with social media (Scuotto et al., 2020).

4.3 Methodology

4.3.1 Research design

Our study is single case qualitative research. Compare to input-output style of quantitative research (Lee, 1999), qualitative study recognize, identify and understand underpinning factors (Eisenhardt and Graebner, 2007) in managing process (Langley *et al.*, 2013). To explore our "how" question, qualitative approach help revealing micro level events and activities occurred in complex structure for us to interpret participants' subjective experience social interactions (Graebner, Martin and Roundy, 2012). Yin (2018) has suggested that single case is a suitable method for revelatory empirical study. Single-case studies are also common in qualitative ambidexterity research (Aoki and Wilhelm, 2017; Randhawa *et al.*, 2021; Smith and Beretta, 2021). We maintain our interest in the process view (Gehman *et al.*, 2018; Kouamé and Langley, 2018) during this research.

We ground theory through inductive inquiry. Our selected case study has been addressing digital disruption by innovate in several directions. Also, ambidexterity is not a term that

practitioners are using and aware. We have moved back and forth between data and ambidexterity literature, making recursive connection, cross referencing and systematic combining between empirical world and theoretical framework to advance our understanding of case and develop new academic knowledge (Dubois and Gadde, 2002).

4.3.2 Empirical setting and case description

Performing arts and show production are renowned for their integrating novel multimedia experiences (Tompkins, 2016) through a variety of digital technologies (Mokrynski, 2020) in recent years. Our case firm TF is in the frontline of digital disruption for its dominance in world-class huge budget show deals in Chinese market. TF hires top producers and directors inhouse but also holds list of collaborative components and complementors. Collaboration is common practice for show production, as exemplified by longstanding practice on Broadway (Uzzi and Spiro, 2005). Involving external collaborators is of importance for digital disruption for TF in both exploitation and exploration, which will be present in section 4.

TF has several independent BUs with distinct aims, which we would not cover except VBU. Digital technology utilized in our case are for disruption of both process and product (Verhoef *et al.*, 2021; Gradillas and Thomas, 2023). VBU monitors and experiments emerging digital technology, explore virtual entertainment with collaborative partnerships. It radically explores digital disruption and collaborates with internal units for corporation exploitation. Interesting, corporation also has its own exploration carried out separately. More details will be presented in later section. Figure 4.1 is TF managing structure in our view for theoretical discussion.

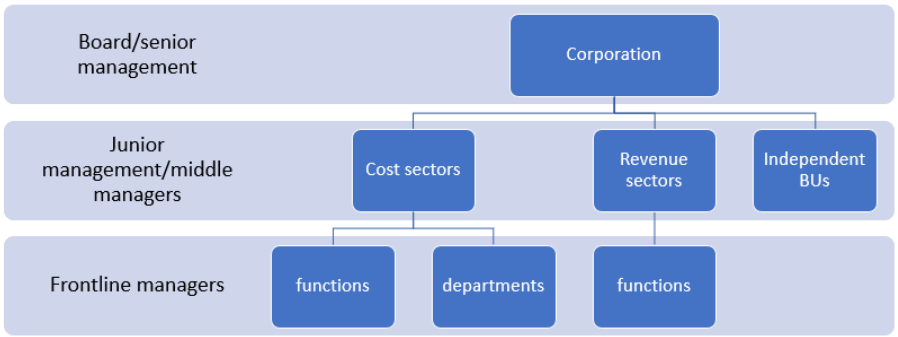


Figure 4.1 Governance structure

The board and senior management are not responsible for any particular line(s) or BU(s). In the middle are cost sectors and revenue sectors, leading by either junior management or middle managers. Cost sectors include all the functions and departments that work on production. BU has some independence from corporation that we define the head of BU as junior management. Further below is functions and departments, led by frontline managers. VBU, as well as other

BUs, it has its own middle managers and frontline managers, that we follow their convention for our case description in section 4.

4.3.3 Data collection

Our research was approved by the board of TF Corporation and they apported board secretary as designated contacting informant to facilitate the whole data collection process. We first received and read through the firm's archived documents, especially past annual reports and archived management meeting memos to understand strategies described publicly and discussed internally. As peripheral knowledge of the firm and industry, we also read through past production documents and media coverage about the firm, the shows they produced, and media interviews of their producers, directors and designers. Independently, we also contacted a show industry expert with over 10 years as chief technician to understand digital trends of show production and confirm TF's market leading status in the industry.

From March 2023 to November 2023, we extensively interviewed employees of all levels, including chair of board, management, middle level managers, frontline managers, shopfloor designers on desk and handy workers of technicians. Wide scope data gave us in-depth insights of mutual impacts between macro-level strategic decisions and micro-level events. The interviews also provided the opportunity to triangulate past phenomenon to ensure the quality of retrospective data (Howard-Grenville *et al.*, 2021). We not only obtain subjective interpretation from difference stance and levels, but also to verify individuals' memories in critical time points or facts.

Parallel to interviews, we observed 14 management meetings. Management meeting is a strategic occasion for the firm, and includes most managers from all levels, in addition to members of the executive board. Junior management, middle and frontline managers report, argue and discuss issues in their respective charge. Executives and senior management usually listen, address conflicts, instruct decisions, and release initiatives. We obtained first-hand information regarding conflicts and tensions of ambidexterity through our observations of these intense communications.

In addition, we carried out on-site data collection in October 2023. During the visit to office, we primarily observed the independence of VBU from the corporation, including the location separation, employees firewall and distinct office culture. We also went to VBU's experiment lab to view different daily trials of iterations and experimentations for innovation and understand how the XR shooting is executed with real-time rendering effects enabled by Unreal Engine and other software.

Table 4.1 is a summary of data collected.

Table 4.1 Data list

Source type	**data**			**file**	**pages#**
Secondary	historical project materials			207	
	media coverage of firm			28	
	annual report			4	734
	historical management meeting memo			24	319
	firm structure			1	2
Source type	**data**	**individual participants**	**minutes in total**	**transcript**	**pages #**
Primary-interview	board member	B.1, B.2	164	2	25
	management	MG.1, MG.2, MG.3	242	3	32
	middle managers (Non-VBU)	MM.1, MM.2, MM.3, MM.4	231	4	31
	frontline managers (Non-VBU)	FM.1, FM.2, FM.3, FM.4, FM.5, FM.6, FM.7, FM.8	268	8	47
	VBU GM	HV.1	103	1	12
	VBU middle managers	MV.1, MV.2, MV.3, MV.4	274	4	36
	VBU frontline managers	FV.1, FV.2	78	2	15
	frontline professionals	CG.1, CG.2, CG.3, CG.4, CG.5, CG.6, CG.7	219	7	39
	industry expert	E.1	84	1	14
	on-site CEO	OC.1	80	1	7
	on-site VBU middle manager	OV.1	40	1	5
	total participants	34	1783		263

Source type	data	meetings observed	minutes in total	transcript	pages #
Primary-observation	management meeting observation	OB.1, OB.2, OB.3, OB.4, OB.5, OB.6, OB.7, OB.8, OB.9, OB.10, OB.11, OB.12, OB.13, OB-14	2338	14	335

4.3.4 Data analysis

We imported all 92 files, including all transcripts, notes, historical memos, annul reports and other suitable firm documents, into NVivo to do our systematic coding with the Langley method (Langley, 1999), to understand the process interactions and dynamics. To avoid data distortion due to expression and translation, coding was conducted in the original Chinese language. Once the coding was complete, first order codes and the representative quotes were translated into English. The coding structure is led by our interest of time dynamic to identify key events, activities and choices (Langley, 1999) and to analyse how and why they are emerging, developing, and interacting across levels (Langley et al., 2013) to shape the process of ambidexterity.

We build an initial understanding of the situation primarily from data, then we analyse data meaning and interpret data relevance with process view of ambidexterity and contribution for addressing disruption to arrive our timeline summary of results. Visual mapping, often as a timeline, presents information as processes (Langley, 1999) and allows paralleled presentation bottom-up and top-down dynamics, technological change, participants efforts and contextual variations (Papachristos, Papadonikolaki and Morgan, 2024).

The structure of data and analysis is presented in figure 4.2.

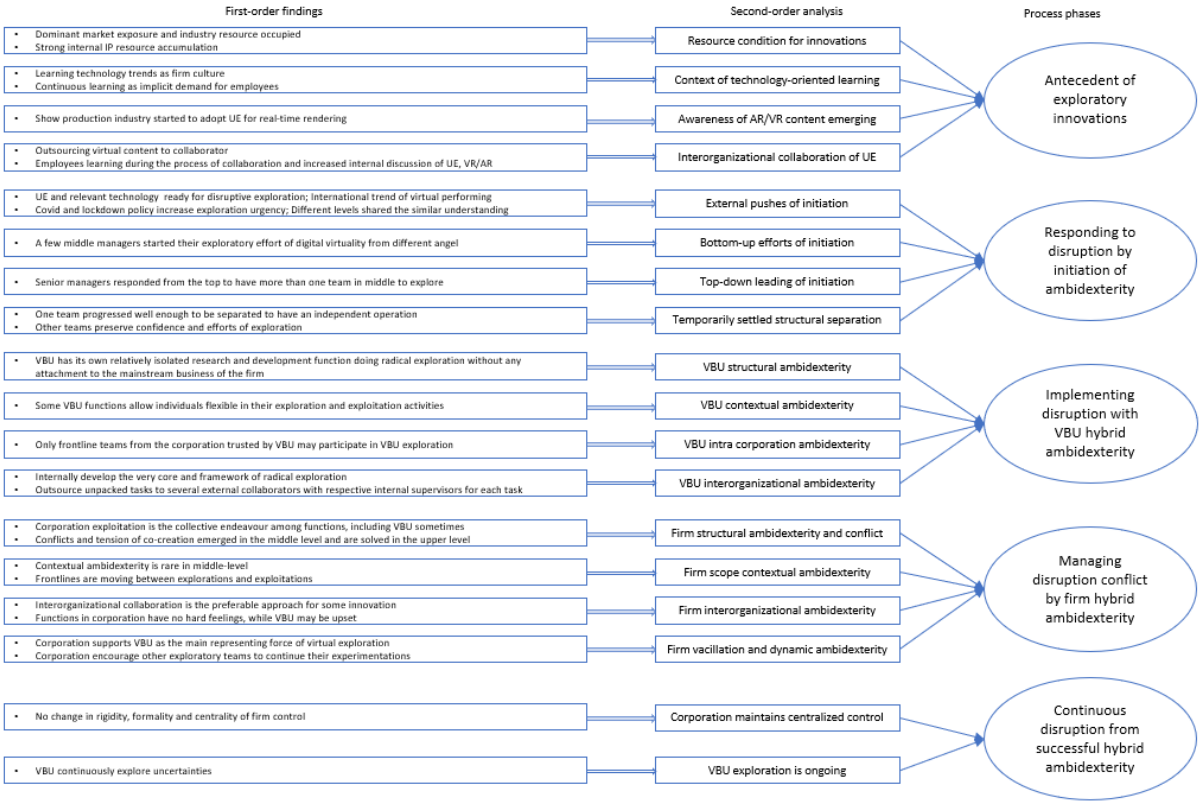


Figure 4.2 Finding summary

Figures 4.3 and 4.4 are the visual mapping of disruption response and the processual view of the hybrid ambidexterity for the continuous advancement of various digital innovations.

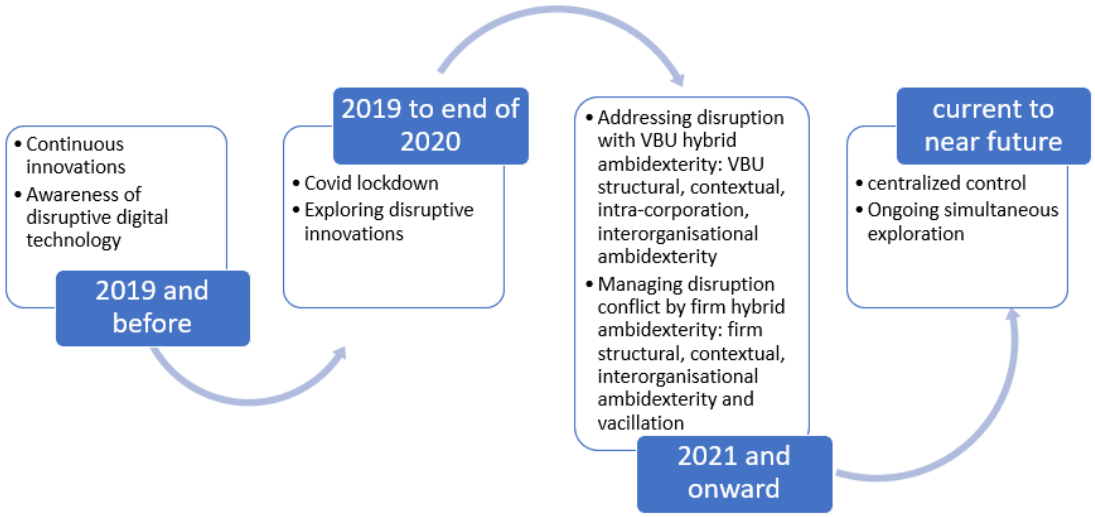


Figure 4.3 Timeline of response to disruption

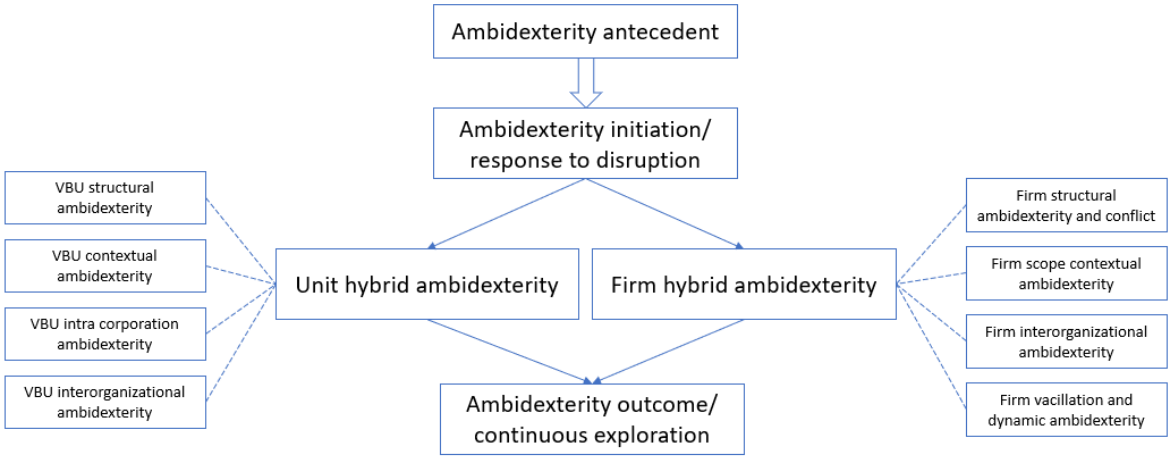


Figure 4.4 Process view of hybrid ambidexterity approaches

4.4 Findings

4.4.1 Antecedent of exploratory innovations (2019 and before)

The antecedent condition of ambidexterity and preparation for disruption is a combination of internal capability and external exposure to the latest technology to carry out disruptive experimentations wherever technological development signed the innovative potential for visual presentation and interactive performance.

Resource condition for innovations

TF has always collaborated globally with reputational artists and technological pioneers to delivery influential shows with remarkable artistic and technological innovations. One executive producer told us "*Our director and producer demand any creative concept in a new show should be unprecedented and we only use it once" (MG.3).* Hence, TF follows closely any new technological advancement potentially applicable to performance presenting, no matter software oriented or hardware based.

For years, TF has accumulated all the technological works from production projects, including the aborted ones. For example, in one management meeting, the artistic chair instructed on the closing of one failed bidding attempt "we *haven't continued the project, but we've done the learning and the technical development, so we have to register this R&D outputs as patent ASAP" (OB.7).*

One middle manager, an over 10 years employee, concluded "*We have our advantage from past years accumulation of resources pool to support and apply bold exploration. Audiences always want novelty and we experiment radically to satisfy them" (MM.2)*.

The assets stock enables TF to innovate with abundant past legacy in addition to its exposure to international experts and cutting-edge resources.

Context of technology-oriented learning

TF has a learning culture, which encourages employees to study all new technology trends, as even seemingly irrelevant new IT technology may be utilised for show presentation or production with an open mind. Middle managers, heads of cost functions and departments, are the leading force of such learning. As explained from the head of set design, "*I would spend 3-4 hours daily, if not on business travel, to study what's new in technology of internet, mobile, software and hardware, and in overseas show market etc. I also pay industry visit to relevant but different sectors to expand my thinking" (MV.3)*.

One operation manager explained "*we may know new and interesting digital widgets during our work or through our internal social media group discussions…. my head would constantly demand me to obtain new skills to apply software such as AI and Unreal Engine" (FM.6)*

It means for lower-level employees, firm culture of knowledge exploration is a welcome pressure for them.

Awareness of AR/VR content emerging

Frontline workers of TF were aware of the new tools, one middle level manager explained,

"UE had its character of real-time interaction that we and our pioneer programmers started to explore the possibilities of integrating it into production" (MV.2).

Technologies of motion capture and real-time rending have been deployed for a while in the entertainment industry, such as the video game Siren and the film Avatar. Several years ago, VR/AR content, produced on similar technologies, started to appear in shows to enrich online viewing experience. Relevant developing software such as Unreal Engine, which used to be exclusive tools for digital game developers, have been learnt and practised by show designers.

Interorganisational collaboration of Unreal Engine

Noticing the capability of Unreal Engine and considering the uncertainty in early stage of application, TF hired external studios, from digital game industry, to carry out Unreal Engine part of AR/VR content.

A board member recall:

For a good while, we already had AR and VR content in our grand shows, by collaborating with external boutique firm or studio in such virtual part of presenting. Since then and before we decide to produce VR and AR content internally, we gradually increased discussions of Unreal Engine and virtual content in our meetings, influencing more employees. Through the experience of these externally collaborated projects, our people of cost sectors learned Unreal Engine and other programming and drawing engines, and knew when is the best occasion to apply which (B.2).

Hence, such interfirm collaboration brought novel innovations, while TF frontline workers observed and learned at low cost.

4.4.2 Responding to disruption by initiation of ambidexterity (2019 to end of 2020)

Although TF has been collaborating extensively in show production as the conventional way to do business, it maintains the strategic view that only internal controlled technological innovation can be valuable firm assets. As VR/AR content increasingly popular in shows and there have been enough employees able to handle Unreal Engine and other similar software, internal development become strategically necessary. With other supporting technological conditions such as infrastructural cloud and Web 3.0, it appeared virtual and interactive entertainment could be attractive experiential products for youngsters. Such offerings can create new revenues without cannibalising existing business of physical shows. Such technological disruption was accelerated by lock-down policy of Covid pandemic. TF responded by their fuzzy initiation of ambidexterity, which is a collective endeavour of middle managers, management and the board.

External pushes of initiation

Besides the advancement of Unreal Engine versions, several technological conditions, such as improvement of infrastructural capacity of mobile broadband, cloud platform, database, graphic computing and non-local rendering, can improve the audience experience of interacting real-time virtual content on mobile terminals more smoothly. Magnified by the meta web 3.0 tide, value proposition of virtual entertainment is widely expanded. Environmental shock of

Covid 19 and consequential lockdown policy had also speed up the exploration of virtual entertaining as physical performance is temporarily banned. As a new way of performing with theoretically unlimited audience capacity, both entertainment producers and consumers are eager for a virtual entertainment of metaverse performing. For example, participated by over 12 million concurrent viewers and 27 million unique viewers, Travis Scott obtained 47 million real-time clicks for his virtual concert in April 2020 (Patel, 2022).

According to our reviews of historic memos during 2020, besides of increasing digital content of physical shows, developing virtual entertainment and other radical exploration have been one of main topics in many management meetings. Different levels of interview participants shared similar understanding of why they must respond seriously to the virtual trend from slightly different angles.

One board member recalled "*changing environment of the Covid and the readiness of the virtual technology co-created the background and led us to start the innovations for virtual performance*." *(B.1)* A senior manager said "*everyone is thinking and discussing how to innovate, and Covid made online show a natural choice, and AR and VR technology is the practical route." (MG.2)*

Quotes from VBU members has more micro level details of technology and market:

With 5G, big data, cloud technology, VR and AR can be applied in multiple scenes of tourism, cultural and creative industries, but because the wave of Web3 and VR glass, that virtual presenting is one important direction of application scene of Web3 (MV.2) .... When I look around, global stars are all doing their virtual shows, personally I like metaverse performance of Ariana Grande most as there were many interactive gaming for fans, far beyond a concert (MV.1)

Bottom-up efforts of initiation

With the knowledge preparation and increasing familiarity with Unreal Engine application by a range of frontline managers and employees, there were a few middle managers of different cost sectors internally take the initiatives to start their exploratory effort of digital virtuality.

Now the head of VBU, then a middle manager, recalled:

At that time of Covid-19, although I am doing [] design, I never constrain myself in tasks within my function. I consider virtual will be the trend and I work with my frontline managers to explore what we can do, and how can we make some interesting applications in online shows to avoid simply broadcasting, that's not attractive, we want to create fun experiences for the internet audience. (HV.1)

Another middle manager told us:

"*After several years utilization, the naked 3D technology started to fade for premiums consumers, we are considering how to interact with audience in real-time and present something more vivid …. we are working on the virtual engine and software for a while as well, our primary interest is merged realities, rather than virtual interactions. (MM.2)*

Not only multiple departments and functions are experimenting and testing, they are promoting and pushing their virtual exploration upside. For example, MM.3 told us that he "*had made an appointment with B.1 after delivering one international mega-production in 2019, to intensely discuss the VR/AR content developed by collaborators and future trend of virtual presenting to demonstrate the necessity for TF to launch serious virtual department as soon as possible to get ahead of the domestic industry*".

Top-down leading of initiation

Senior managers are observing and responding from top to handle the potential and uncertain development of virtual presenting trend. One board recalled: *We had noticed the internal and external situation for some small trials without significant investment at that stage, we simply selected a few leaders, each with several colleagues as their respective team members, to explore a bit separately (B.2)*

The board encouraged more than one team to explore. MM.1 explained "*during lock-down, B.1 have discussed with me privately for the exploration of VR/AR, I guess I won't be the only one being talked to…*". We have heard another instruction from top to middle managers "*Around the middle of 2020, chief art of board had asked me to explore some integrated presenting …to allow audience onsite to experience with wearable hardware" (MM.4).*

A management who is heading some cost functions of production told:

By then, I considered the technology development of AR and peripheral plugs has been enough for exploring disruptive new performing experience with virtual or mix interactions. We had to navigate in the chaos and explore in multiple directions. Me and several of my middle managers are all doing our respective explorations. (MG.2)

Since these VR/AR explorations are mainly based on Unreal Engine and similar engines, the firm had good control of software granting purchasing burden and knowledge training costs. As the response for disruption, TF did multiple lines of exploration with distinct products and business models to increase the success rate, indicating a flexible exploration with manageable expense.

Temporarily settled structural separation

As the exploration and experimentation ongoing to the end of 2020, one virtual trial team obtained a major client willing to order continuously. With the projected cash inflows to support cost and expense, that leader middle manager was promoted to junior management to construct VBU. He recalled:

I talked to [] and we consider not only the budget should be independent but also the business model would be very different with traditional business of corporation. In the end, the corporation set up an independent entity to focus on radical and interactive innovation and I took charge of it (HV.1)

A board triangulated the process during his interview *"gradually, the trial team led by [] has got some orders and made progress in their direction, we are already considering maybe we can make some extra investment of resources in virtual exploration. we considered the market and industry … it won't be a bad idea for us, as a major corporation, to have a serious go with an independent unit" (B.2);* and insights were added by another board "*set up the entity is the signal we release here to the market that we will have radical disruption with brand new business model for new consumers" (B.1).*

One middle manager summarized the progress:

before pausing, I have prepared for nearly a year of virtual presenting and its business model.... I will get back to it once we are set free from the large number of tasks exploded by the reversing of lockdown policy" (MM.4)

It means other teams' progress is less favourable. Those explorations were constrained either by struggling external conditions, such as the cooling down of Web 3.0, or the lack of relevant ecosystem assets such as virtual headsets and supporting applications. They were instructed to prioritise implementing projects on hand rather than radical experimentations. We termed the structural separation as temporary as other teams are not ready to completely give up.

4.4.3 Addressing disruption with VBU hybrid ambidexterity (2021 and onward)

Since structural independence, VBU has been doing both accumulated exploitation and radical exploration in their virtual direction of development. Exploitation is incremental amendments carried around a core demo that constantly developed and advanced since their virtual exploration. In contrast, the exploration of VBU is continuous iteration of "*what kind of business model practically executable and has best chance to monetize" (MV.3).*

VBU has "*human resources both from internally transitioned employees and external recruited talents after independence" (MV.2).* External talents are sourced from computer gaming, Web 3.0, VR headset and other wearable entertainment or mobile technology firms.

VBU structural ambidexterity

VBU has its own R&D function, led by its technological middle manager for the monitoring and exploration of the latest technology. This function is relatively isolated in both working space and product development and this externally recruited manager does not attend the firm's management meeting. Exploring radical digital innovation have been described by this middle manager:

I am in charge and decide all the interactive technology relevant framework and solution for our virtual products. For example, in project [], I designed a platform that other functions can worked on performance part and I did the gaming and interactive part for the audience to interact real-time (MV.3)

We also interviewed middle managers of all the other four functions of VBU, none of them are so distinct. They work on innovations and tasks of VBU and may also work on allocated virtual part of corporation shows. For example, the middle manager who is in charge of performance part of project [] told us they did an "*innovative design of virtual scene for real-time rendering with XR shooting" (MV.1).*

VBU contextual ambidexterity

Except R&D function, individuals VBU are relatively free in choosing their exploration and exploitation activities by their personal interests and function demands. We were told by frontline designers and have heard in a management meeting:

This [] and []'s designer including graphic designers, animators and modelers, some of them are also working for project []1234 and []. Some simultaneously keep working on VBU exploratory project of interactive Unreal Engine streaming and product playing rules (OB.5)

VBU intra-corporation ambidexterity

In general, VBU is independent and maintain its distinction from the corporation as quote from one middle manager during our discussion of virtual business prospects, *"what can I say about them, they have their business secret" (MM.4).* From this, we also get the information that the tension and internal competition, due to the structural separation, may rest mainly at middle and unit level. In contrast, frontline individuals may have more opportunities to engage in both exploitative and exploratory activities.

For exploitative projects or activities, VBU may include corporation collaboration. Some corporation employees, who are trusted by the head of VBU may have chance to participate in VBU projects. One such colleague said "*at the end of the day, we are one firm. between [] design and VBU, the collaboration is open. Sometimes we raise our personal interest that we want to take part in certain project. sometimes we have time to help. It depends. But we always do it pleasantly." (FM. 3)*

VBU interorganisational ambidexterity

VBU may carry out their innovation through interfirm collaboration. For radical exploration that beyond capabilities, they would make their independent decision of external collaborators, without resorting to approvement from corporation. For such external collaboration, they may develop the framework and the core of innovation, then unpack modularized component tasks to several external collaborators, especially those "*internet born new entrants" (HV.1)* to embrace different cognitive frames, who innovate for *"fun, rather than art" (MV.1).* Through such approach, they can acknowledge any emerging technology immediately and construct pools of suppliers.

One middle manager explained *"we can execute some virtual project completely internal, but we would collaborate externally on mega projects with expert UE studios. I design the technology part of project work by a set of skeleton internal staff only for supervise and correlate parts of the project, and we hire multiple external collaborators to fulfil each task separately" (MV.3)* Another middle manager said *"according to the tasks, I would segregate and allocate internally and outsource some. Maybe one or two chapter of a show will be produced by a couple of external studios, if we feel the schedule is too tight for us to carry out completely internal" (MV.4).*

The situation confirms that subject to quality assurance, cost consideration and time control, exploitation may collaborate externally as well.

4.4.4 Managing disruption conflict by firm hybrid ambidexterity (2021 and onward)

For the corporation, the exploitation is the incremental innovations that increasingly digitalize traditional physical play to add more novel viewing experience for audience. Such innovation does not change the business model and the essence of telling a story or celebrating a culture. As introduced by a frontline manager "*For the audience watching online, we use AR technology to seamlessly integrate and present virtual and physical performance in a go" (FM.4).* Corporation invests in exploratory efforts toward disruption as well, defining and solving radical

problem, developing novel product and new business mode. Firm level simultaneous exploitation and exploration are realized through structural, interorganisational, contextual ambidexterity and sequential vacillation.

Firm structural ambidexterity and conflict

Firm innovations are collaborated among functions, sometimes involving VBU as well. Corporation projects inviting VBU are mainly exploitative grand physical shows that demand significant and creative virtual content to improve the novelty. It often raises conflicts and tensions as the middle managers of corporation cost functions want to do show projects without VBU involvement. Such issues are often instructed, decided or clarified in the management meeting as one board said "*management meeting is your best chance to address your complaints, conflicts or demanding resources you need. I would emphasise once more that all our lines should be fully open to internal collaboration, no matter requesting or providing support. Our professionals should not be any idle and they can work on cross projects and cross unit." (OB.11)*

For example, one management with his function managers has been criticised by the board "*you have to collaborate with VBU to leverage on their expertise of virtual content design and creation, I know you too well. How could you produce disruptive creativity by yourself? You definitely can't. If you don't want to share the proceeds of this project with VBU, I warn you, you are risking the whole deal." (OB.9)*

The head of VBU has similar tendency to hide exploratory project internally and being instructed in the management meeting by a board "*let me assure you, if your internal people can do it perfectly well, I won't let corporation function intervene… as long as you have confidence that you won't miss it. However, if you are unsure… corporation function will support you … as a risk buffer*" *(OB. 13).*

However, the internal collaboration under separate structure is not impeccable. One interviewee described a regretful glitch during the execution of one show "*when the AR content appeared in the screen in the formal presenting night, the background of the space above the stage was not clean enough that AR image seems overlap and tap with physical object, VBU was mad" (MM.3)*, we followed the situation ask why it happened, only got technique explanation of "*AR presenting demand lights, projection, equipment, scene and props correlation very early on in design stage…. and to avoid inferior viewing experience such compliance demands not only visual proxy by designing mocking and on-site rehearsal check, could be any miss communication between any functions or absence in any step" (MM.3).*

Firm scope contextual ambidexterity

As presented in last section, the interest and resource conflict are mainly in levels of business unit, junior management and middle managers. In contrast, frontline managers and employees are relatively free to propose, engage in and move between explorations and exploitations as long as the tasks are relevant to their capability and can be implemented with satisfiable outcome by these frontline teams.

For example, one interviewee from the corporation said *"we [] have helped in an exploratory project in the part of a virtual stage design. we have provided our 2D and 3D images and 3D model to VBU. Then they integrated into their overall virtual presentation"(FM.4)*

Firm interorganisational ambidexterity

External collaborators could be engaged in grand projects with complex innovations.

we do [] with structure of four parties. The mobile platform, broadband operator, commercial sponsoring and us as producer. Within this main structure, we have multiple internal functions and external suppliers and collaborators to cocreate the event (MM.2) ... engaging infrastructural provider may sounds strange and not common for us as well, but [] is very exploratory, we have designed complex rule for audience to engage in the event, the intensive online interaction for [] demand very high capability and stability of band width, and we do it for the first time with no prior experience, to ensure our audience have no waiting time, we have to prepare significant redundancy, so we have to engage infrastructure operator as collaborator, not supplier, we can't afford that bill (MM.1)

One board said:

With our firm size, market value and reputation, we must play safe, the []1234 exerts too much pressure on us and especially our young VBU, that we have outsourced the most complex virtual presenting of 1 to [], they are specialized and more advanced in virtual presentative technology for creative concepts, innovative producing and presenting, and our internal team could benefit from what has been handled from them after 1, as we are the IP owner as purchaser of [] creation, to learn and further develop for 234. It is a good deal and appropriate strategy for []1234 as a whole (B.2)

It means deciding external collaboration for radical exploration could benefit firm learning for future exploration and exploitation.

Firm vacillation and dynamic ambidexterity

As presented above, beyond VBU, some teams from functions and departments in cost sector are closely following Unreal Engine and other virtual technology, making their exploration as well. TF acknowledges VBU as the main force for exploratory innovation and managers from VBU enjoy the obvious preference from firm as well "*I can always get wanted resources or investment from the firm. I can feel the support and trust from the management and board" (MV.3)*

In a management meeting, we have heard the downplay talk of VBU "*never been posited as our sole exploration… It is only a new direction …" (OB.8)*

Similar comments may be delivered privately on more occasions as middle manager interviewees are confident in gaining firm support for their explorations:

I know our corporation loves to try different new things, our [] will be the future (MM.4). In my view, the essence of artistic show is content creation… we can innovate and integrate modalized exploitation and exploration to provide creation and novelty… (MM.2)

We consider executives may express high hopes and firm firm-level tolerance, patience and interest for other exploratory teams to continue their experimentation and iterative trials for radical and novel virtual content providing and understanding for ongoing exploration by other functions. Such remarks would be appreciated by other senior and middle managers.

4.4.5 Continuous disruption from successful hybrid ambidexterity (current to near future)

Corporation maintains centralized control

Disruption is a radical evolvement that we are impressed by the firm as its rigidity, formality and centrality of structure and control has not changed at all. For example, although VBU has many autonomies, "*the procurement function in corporation manages whole corporation's purchase for projects production, including VBU" (FM.7)*. Although the suppliers of exploratory innovation are substantially different from traditional productions and actually sourced by VBU, the procurement function has their say on price, payment and other contract terms.

The allocation and participation of exploitative and exploratory innovation are mainly decided by the corporation as we presented the arguments, negotiation and settlements in the management meeting.

VBU exploration is ongoing

VBU, representing TF as one of them, is continuously experimenting and launching to test market:

At the end of day, till now, nobody can be sure about what interactive entertainment should be exactly, online vs offline, physical vs virtual, fun vs aesthetic, leisure experience vs cultural education *(MV.2)*

But I don't think the core value will be art, it must be fun, and the audience must be able to participant with unique experience and individual identity (MV.1).

We continually develop small testing product for the market to see the reaction. we do this every time we have a new idea, that before we invest in that, we try a simple experimental proxy first to validate our idea. we control cost and risk by this (MV.3)

It appears, currently or maybe in near future, virtual entertainment is developing as a thousand blossoms bloom with major media corporations or IT giants crowded with respective advantages.

4.5 Discussion

We have carried out an organisation study (Davis and DeWitt, 2021) of innovation management for addressing digital disruption. Investigation of micro-level process study is rare in the digital disruption literature (Smith and Beretta, 2021), which is problematic. For example, the structural differentiation approach to respond to digital disruption is a struggling process as managers must tolerate and manage the inconsistency between traditional and digital units (Gilbert, 2006). Hence, micro-level process study is called for digital transformation (Nambisan *et al.*, 2017; Vial, 2019; Warner and Wager, 2019) and incumbents' adaptation to disruption (Christensen *et al.*, 2018; Hopp *et al.*, 2018b).

Incumbents simultaneously carrying out disruptive innovation and sustaining innovation create managing conflicts in attention and resource allocation during organisational process (Corso and Pellegrini, 2007). Hence, process study is critical for ambidexterity approach as well. Top down process is common assumption (Zimmermann, Raisch and Birkinshaw, 2015) in ambidexterity research. Ambidextrous organisations are normally generated from top managers' ambidexterity-oriented decisions of balancing adaptability and alignment for innovations (Kortmann, 2015). In contrast, Zimmermann, Raisch and Birkinshaw (2015) have established a bottom-up process in which ambidexterity is initiated by shopfloor managers, who encounter tensions of trust and politics from executives. The process could also be

nonlinear as lower-level participants' responses to structural ambidexterity could trigger management's recursive adjustment to Digitalization (Smith and Beretta, 2021). Besides of these firm perspective process, unit perspective ambidexterity process has been presented by Raisch and Tushman (2016). Our process study reflects these dispersed characters systematically.

We have identified clear antecedents to ambidexterity in TF, which are contexts for the activities and decisions made in the process of disruption responding. Cohen and Tripsas (2018) claimed strong past and current capability and performance are critical levers that helps incumbents innovate in new domains and obtain positive performance. The destructive market situation of Covid lockdown policy accelerated the technological exploration of virtual entertainment and demanded quicker responses for creative industries was particular push. Against the environmental change, we identified volunteered bottom-up efforts by multiple middle and frontline managers in charge of varied functions for creation to research, learn and experiment virtual tools. Meanwhile, the management are pressured for top-down encouraging innovative exploration among various teams and functions that pushed the initiation of ambidexterity. Such fuzzy invitation bred the contextual ambidexterity and firm created incentives for individuals to participate in exploration and the firm to have multiple lines experimenting, increasing the potential of successful continuous disruption. The temporary determination of the main BU for virtual development laid the foundation for later firm-level ambidextrous vacillation.

After initiation, dual hybrid ambidexterity at firm and unit levels is identified. Unit VBU has structural and interorganisational ambidexterity to carry out radical explorations and exploitative innovations. Also, VBU specializes in virtual content and collaborates with other intra-firm units to co-create on-demand by firm projects. The corporation has adopted various approaches to ambidexterity as well. In particular, to maintain potential for responding to unknown and uncertain future digital and virtual disruption, the firm has its vacillation approach of sequential ambidexterity to nurture the next candidate units for radical explorations. Contextual ambidexterity, both firm level and unit level, is mainly executed by frontline employees supported by frontline managers. Structural and interorganisational ambidexterity in firm level is controlled and managed by corporate management whereas in VBU level is determined mainly by the unit head, as junior management in the corporate hierarchy, with comfortable autonomy.

Summarising its accomplishments, with the gradually shaped hybrid ambidexterity matrix at firm and unit level, TF has been proactively responding to digital disruption by firm vacillation, radical firm exploration and VBU exploration accompanied by various exploitations. Del Giudice

et al. (2021) emphasise organisational ambidexterity as adaptability for digital disruption. Our findings of bottom-top integrated efforts and continuous unit and firm hybrid ambidexterity are relatively novel in the discourse of ambidexterity as approach for incumbent addressing digital disruption. In the next section, the presented detailed processual view here will be analysed as multiple level participants contributions to organisational response to digital disruption by hybrid ambidexterity to discuss the theoretical implications.

4.5.1 Theoretical implications

Although multiple levels of participation contribute to the ambidexterity process, this study complements extant literature as it lacks an integrated perspective of the systemic interplay among inclusive participants (Birkinshaw and Gupta, 2013; Zimmermann, Raisch and Cardinal, 2018).

The competing interplay of exploration and exploitation (Gupta, Smith and Shalley, 2006) indicate executives should have paradoxical cognitive frames, sparse external networks and dense internal links to construct a process with a shared vision, contingent rewards, reflexive activity and communication (Smith and Tushman, 2005; Jansen *et al.*, 2008; Rogan and Mors, 2014; Kiss *et al.*, 2020; Knight and Cuganesan, 2020; Maclean *et al.*, 2021; van Neerijnen, Tempelaar and van de Vrande, 2022). During the ambidextrous process, management balances the autonomous extent of lower operation by both instructing and listening firm population (Foss and Kirkegaard, 2020). If the top managers are lack of digital vision or stress the authority of decision-making could be potential hurdle for swift digital exploration (Sund, Bogers and Sahramaa, 2021).

In our study, boards and senior management as representatives of the firm, hold the existing competence, create and maintain learning context, are alert to the market change are enablers of early explorations for preparing disruption. Responding to disruption, executives contribute by top-down encouragement of multiple lines of explorations, temporary determination of VBU to concentrate investment and rewards for exploration, middle-level conflict addressing, constant vacillation to support future disruptive stars and centralised control. Hence, for creative firms, the top is the context provider and driving force of simultaneous exploitation and exploration, but mainly functions internally for decision-making and problem-solving to coordinate resources, capabilities and governance (Svahn, Mathiassen and Lindgren, 2017). Although flexible, malleable and adapting structure (Appio *et al.*, 2021; Hanelt *et al.*, 2021) is often recommended in literature for digital transformation, a tight authority here is necessary and compatible with our observed major tensions in the middle. Such findings support Pesch,

Endres and Bouncken (2021) opinion that formalized structure and process does enhance, rather than impede, fluidity and creativity that demanded by digital transformation. Similarly, the results does not agree with extant claim that large corporations operating business portfolios with complex activities and varied partners have higher competitive advantages, and interdependence among various business models demand centralized decision-making whereas lack of interdependence portfolio required decentralized decision-making (Snihur and Tarzijan, 2018). In TF that centrality is useful in addressing middle level tensions of internal competition due to structural ambidexterity. In addition, a powerful top is necessary for exploration vacillation of multiple betting for continuously disruptive future.

Executive managed firm vacillation is important as well. Raisch and Tushman (2016) have discussed ambidexterity life-cycle with phases of exploratory unit exploration, transition and exploitation from differentiation, graduation and integration. Hence, firm level vacillation to find, support and nurture next exploratory unit(s) is critical for effective addressing evolving digital disruption over time.

In literature, middle managers are often facilitators of operational continuity to support continuous change and labour skill development (Huy, 2002; Raisch and Birkinshaw, 2008). Middle managers' education, social ties and trust are beneficial (Greven *et al.*, 2022) for them to ensure the firm-wide understanding of ambidexterity by sensemaking (Randhawa *et al.*, 2021).

In our investigation, middle managers play more prominent and active roles as critical change enforcers. They were aware the emergence and popular of AR/VR, evaluated the ecosystem and environmental condition, and initiated bottom trials, fiercely promoted the exploration and persist radical exploration continuously along with exploitation. In particular, the head of VBU as a special middle manager is a partial decision-maker within VBU, a semi-autonomy unit. Many literature discussed issues for disruption are addressed by these middle managers. Their volunteering to explore novel business models and value logics (Schiavi and Behr, 2018) for virtual disruptions ensured the avoidance of major problem of present performance cannabis (Raisch and Tushman, 2016; Skog, Wimelius and Sandberg, 2018) for incumbent. Disruptive innovations and consequential disruption come from visionary leadership (Tellis, 2006) and leaders, which could be executives, technical experts or frontline managers, executing visions (Hopp *et al.*, 2018a). By doing various explorations, middle managers in our study are actual vision leaders, knowledge and know-how integrators and work for the business logic reiteration, which are required for digital transformation (Nambisan *et al.*, 2017; Moschko, Blazevic and Piller, 2023).

Rather than peacemakers for disruption, middle managers in our study are troublemakers. As many of them have respective and independent exploration, more or less supported by

executives by firm vacillation, the internal competition among middle level units is fierce. From firm perspective for digital disruption, conflicting explorations are beneficial. However, the situation reflected the concern discussed in ambidexterity about coordination cost (Adler, Goldoftas and Levine, 1999) and the hybrid applications of other approaches of ambidexterity offer no help.

Frontline managers have their reputation of modest, motivated, capable, loyal and accountable, and their paradoxical leadership and vision positively affect ambidexterity for innovate and experiment through daily management of employees (Tushman and O'Reilly, 1996; Zimmermann, Raisch and Cardinal, 2018; Mom *et al.*, 2019; Zhang, Zhang and Law, 2022). We have found larger contribution by frontline employees for hybrid ambidexterity as they are the main actors for contextual and interorganisational ambidexterity. It is by their daily external and interfirm collaborations, the learning of AR/VR software and other novel tools are actualised practically. Also, their implementations of continuous interorganisational explorations ensure the firm exposure to more radical innovations. Meanwhile, as middle managers assume all the pressure of conflicts, contextual ambidexterity by frontline managers and employees facilitates firm level balance of exploration and exploitation. Although exploration and exploitation are distinct technological innovation strategies, incremental exploitative innovation may impel exploration (Piao and Zajac, 2016) and a balanced interaction between exploration and exploitation can add value to each other for corporation level performance of technology innovation (He and Wong, 2004).

4.5.2 Managerial implications

Response tactics for disruptive innovation and disruption are called for advancement (Christensen *et al.*, 2018), and we found hybrid ambidexterity has advantages in addressing digital disruption. Disruptive innovation is creating new market and service non-traditional customers (Christensen *et al.*, 2018; Kumaraswamy, Garud and Ansari, 2018), including change of business model and collaborative approach (Warner and Wager, 2019) and encourages external collaboration at all levels (Schneider and Kokshagina, 2021). In addition, Evolving digital technologies (Bailey *et al.*, 2022) reduce the predictability of new value propositions (Yoo *et al.*, 2012) and require organisations to adapt constantly (Hanelt *et al.*, 2021). For such continuous evolution, organisational ambidexterity, as a balanced strategy to explore radical innovations whilst leveraging existing knowledge and capability to exploit incremental innovations, could be less risky than a singular focus on radical strategy (Gulati and Puranam, 2009). Our results are consistent with hybrid ambidexterity studied by Foss and Kirkegaard

(2020) and Ossenbrink, Hoppmann and Hoffmann (2019) that external environment and internal framework co-determine the choice of approaches. The two levels of ambidexterity with central control can coordinate efforts of dynamically balancing exploration and exploitation (Andersen, Aagaard and Magnusson, 2022) to address current disruption and prepare for future disruption.

Structural ambidexterity is beneficial at firm level and unit level. Lindsay and Hopkins (2010) propose incumbent may apply exploratory intellectual assets in a small proactive team, and our case shows VBU was conducting a series of small iterations and experimentations. As contradictory organisational behaviours, exploitative activities are incremental innovations and innovations for existing customers demand backward-looking experiential learning, whereas exploratory activities are architectural innovations, radical innovations and innovations for emergent customers demand forward-looking experimental cognition, structural separation with highly differentiated units are loosely coupled with one another (Benner and Tushman, 2003). For incumbent corporation to have positive performance from digital unit, shared vision, collective efficacy and unit autonomy are important and can be arranged by unit and corporation (Crockett, McGee and Payne, 2013). Structural separation within organisation can introduce intra-corporation tensions and ineffective integration that request paradoxical and effective leadership to overcome (Es-Sajjade, Pandza and Volberda, 2021). In TF, the management is responsible for managing the conflicts and coordination of units due to the structural separation.

Digital disruption is iterative and adjustive process with various wrinkles and threads by multiple participants (Smith and Watson, 2019) that demand employees' acceptance of digital transition and effective change (Leonardi, 2020) through experimentation and improvisation (Levallet and Chan, 2018). Thus, contextual ambidexterity is critical for organisation adaptation to disruption. In our case, individual contextual ambidexterity is obtained through malleable and flexible arrangements in project production. Frontline level managers and team members can participate in multiple projects, cross circulating among exploitative and exploratory projects, which encourage individual engagement, consequently improving overall firm learning and contributing to firm disruption. Firm competence is gradually advance in the process rather than obsolete or delink old capability to obtain new. Our findings is consistent with project-based and high-technology business. Brady and Davies (2004) have present the exploratory to exploitative learning in project-led business can be a process initiated by opportunity in exploratory projects that project team learn within project then disseminates to whole firm for exploratory and exploitative learning and innovation.

Digital disruption raises change of business model and collaborative approach (Warner and Wager, 2019) and encourages external collaboration at all levels (Schneider and Kokshagina,

2021). Interorganisational frontline work involves abundant knowledge acquisition and exchange that generate the condition and capability for unit ambidexterity (Zimmermann, Raisch and Birkinshaw, 2015). Innovation integrating digital technology into shows has been exploited in our case for a while. However, exploratory innovation requests technology competence delink with current exploitation to develop new competence (Danneels, 2002), hence VBU embarks their extensive cooperation with unfamiliar collaborators to explore radically. as an example of interorganizational ambidexterity and as an important way to overcome incumbent failure that can occur due to a lack of complementary assets (Teece, 1986;2018) or the non-existence of a supportive ecosystem (Adner and Kapoor, 2010).

4.5.3 Limitations and future research

There are a few distinct characters of innovation management in creative industries, namely networking activities of collaboration and technology using, which are most frequently discussed in the literature (Gohoungodji and Amara, 2022) and reflected in our investigation. Networking and collaborative innovations are common practice in creative industries (Jia, Lewis and Negro, 2023) and could be benefited from the utilisation of digital technologies (Schiemer, Schüssler and Theel, 2023). These two factors are critical and intertwined for the initiation of responding to disruption and dynamically hybrid ambidexterity in our empirical context, indicating the potential generalizability of hybrid ambidexterity for addressing disruption in creative industries. However, as we only carried out single case study in one firm, whether other sectors of creative industries could deploy similar approach relies on future research. For example, responding to disruptive technologies, incumbents of industry with complex offerings with innovations matrix of various competences from many different fields, can instigate fierce competition to shake out new entrants if they can evolve existing technologies and obtain required new technologies and resources to develop disruptive innovations (Bergek *et al.*, 2013) that interorganisational ambidexterity could be impossible.

Ambidexterity theory has implicit boundary for an incumbent when its current business model still has potential of sustaining, whereas new-to-market exploratory innovation is distant from current firm exploitative innovation (Ko and Liu, 2019; Ceipek *et al.*, 2021). Such assumption indeed match argument from disruption community that before disruptive exploration become real bread-and-butter, incumbent should not dismantle still well functioned and profitable mainstream business (Christensen, Raynor and McDonald, 2015). Since disruptive technology (O'Reilly and Tushman, 2021) is occurring with ever evolvement and revolution (Tushman and O'Reilly, 1996), we suggest hybrid ambidexterity process with wider scope of individual

participating (Kumaraswamy, Garud and Ansari, 2018) toward firm capability of continuous disruption can be temporal response of digital disruption by incumbent when the emerging future is difficult to anticipate (Bailey *et al.*, 2022). Our argument demands future empirical study to validate.

Chapter 5 Conclusion

By studying the problem of emerging technology impact on creative industries, the empirical data of Gen-AI and VR/AR adoption on the artistic innovations of a show production firm presents a systematic advancement of professional learning, routine dynamics and innovation ambidexterity.

Answering the question of how creative professionals could learn to collaborate with GAI for artistic innovation, the study outcome presents different learning approaches, explorative and/or exploitative, and knowledge reconfiguration for human-GenAI collaboration have been adopted that depend on the seniority and creative competence of professionals. Meanwhile, a firm-wide horizontal and vertical communication is beneficial for prompt and effective learning and integration of emerging technology into professional creation. Further, the managerial factors of the creative firm, such as technological investments and control centrality is necessary environment for such professional learning and human creativity enhancements from emerging technologies.

The second research question, how GenAI impacts the routine dynamics of artistic creation, has explored GenAI, as both a working tool and a working medium of communication, leading to the ostensive sequence change of routines as simultaneous exploration of problems and solutions for creativity and innovation. Such human-AI collaboration also results in routine ostensive adaptation through changing the path and interface of routine clusters and mixing sequential routines.

Probing how an established creative firm manages the threat of technological disruption by innovation ambidexterity. It complements the extant academic discussion by presenting the process and outcomes of structural, contextual and sequential ambidexterity with evaluation of the interactions and collective contributions of multiple levels of actors.

Reflecting these theoretical contributions from each paper, this conclusion section deepens the study outcomes by framing them into relational perspectives of emerging technologies. Responding to the call by Bailey et al. (2022) to adaptively apply the technology relational view (Faraj and Leonardi, 2022) for innovations. This perspective helps distinguish discrepant significance and contributions of firm participants and present various emerging technologies enabled innovations more dynamically.

Relational perspective treats emerging technologies as a set of evolving relations with organisational management in organising, constitutive relations with humans, infrastructure

and routine (Bailey *et al.*, 2022). Relational perspective of multiple level of managerial participants co-evolve with technologies wider participation of exploitation and exploration for absorption of new tech to renew artistic innovations. Innovations are constellations of relations and processes of emerging technologies.

Digital technologies are emerging and crossing developed, blurring the boundaries and lines of organisational action, behaviour and technology artefacts, which expand innovations and invite relational perspective of technology dynamics (Malhotra, Majchrzak and Lyytinen, 2021; Bailey *et al.*, 2022). The relational perspective of emerging technologies stresses connection, interaction and relationships between various technologies and entities as interdependent phenomena that digital innovation could be constellations of entities, each providing distinct functionalities (Bailey *et al.*, 2022). The advancement of technology and involvement of new technology (Bailey *et al.*, 2022) offers dynamics for constellations as the evolution of relations (Leonardi, 2007), functionalities and systems (Jovanovic, Sjodin and Parida, 2022).

Identifying the significance of organisational factor is the critical extension and adaptive findings from relational perspective of emerging technology. We complement relational perspective in this respect. Research of emerging technology enabled innovation stress elements such as organisational characteristics and other intra and inter firm factors that are relevant to impact the innovation as a process of orchestration coordinating relations among entities that the power is orchestrating, nurturing and fostering relations, rather than owning the technology (Faraj and Leonardi, 2022).

5.1 Theoretical Implications

Multidiscipline expertise and knowledge are required for professionals to adopt novel technology, and they may choose to collaborate with experts in other domains (Armour and Sako, 2020; Sako, Qian and Attolini, 2022). Human-GAI collaboration could be contextual specific by functions and forms of AI, types of work AI is engaged by human and human perceptions of business condition (Ameen et al., 2024a). For artistic innovations, creative professionals' learning of collaboration is their deployment of GAI with professional expertise to enhance productivity.

5.1.1 Relational functionalities of relational perspective

Emergent functionalities from the relational view of emerging technologies include relations and functions deepening and extending (Bailey et al., 2022). Creative professionals' knowledge and

experience are critical for input prompting and output modification of human-GAI collaborations. Varied functions emerged and developed between people and technology by exploratory learning for GAI input prompting and exploitative learning of output curation and modification as varied importance of existing professional knowledge, competence and human creativity for effective human-GAI collaborative artistic innovation.

Technology as an artifact adopted by human workers could function as a tool, supporting task implementations, and as a medium, building common ground to enable collaborations among different human groups (Anthony, Bechky and Fayard, 2023a). For other industries, GenAI introduces the most gains to the productivity of skilled workers in simple tasks (Bankins et al., 2024). Creative professionals have authentic power from disciplinary knowledge and expertise (Hungnes, Hoholm and Clegg, 2024). Junior professionals have less comprehensive but enough industry and creativity knowledge and experience, they could focus more on deliberate and exploratory learning of GAI knowledge for input prompting to support senior professionals in team working of human-GAI collaboration. In contrast, senior professionals have profound tactic knowledge and expertise for artistic innovations, they could be more productive by human-GAI application through exploitative learning for in-depth GAI output curation and modification and vicarious learning from and instructing junior professionals prompting. Human-GAI collaboration is continuous accumulation, integration, implementation and communication among multiple-level professionals when they work together to learn from one another.

These learning and resulting human-GAI creativity of collaboration, as outcome, reflected the advancement of functions. As internal relations, artistic creation routine dynamics present the novel relations in addition to functions. Artistic creation relies on professionals' sequential and iterative contribution, which can be considered as routine clusters (Kremser and Schreyögg, 2016) of interdependent, coordinated (Sailer, Loscher and Kaiser, 2024), and cascading episodes (Deken et al., 2016). GenAI as an artifact for interdependent and interactive patterns (Goh and Pentland, 2019) in a web of interactions (Pakarinen and Huising, 2023). From the perspective of relational view of technologies, there are changing relations introduced by the adoption of GenAI.

In particular, the collective application of GenAI in group work within routine clusters, the impacts can be seen as changing the sequence of problem and solution searching and pairing. Extant papers discussing GenAI stress its capacity to expand the problem and solution pool (e.g.Bouschery, Blazevic and Piller, 2023) and to offer improvements in problem and solution searching (Singh, Chatterjee and Mariani, 2024).

Aligned with predictions by Pakarinen and Huising (2023) that AI benefits are embedded in professional networks of interactions. GenAI enables participants to jointly engage in exploration of ideas, problems, and solutions simultaneously for artistic innovation. Hence, adopting routine dynamics—in particular, the cluster perspective—to study GenAI applications, we provide strong empirical evidence for the prediction of AI triggering the change of the innovation process (Haefner et al., 2021). We also extend the static system view of AI adoption and human–AI collaboration (Anthony, Bechky and Fayard, 2023a) by analyzing the processual impact of GenAI on routine clusters in artistic creation.

5.1.2 Relational dynamics

Human-GAI creativity could be the groundwork of artistic evolution in the digital age and enhance artistic production (Garcia, 2024). Although metaphors for abstract thinking, analogical reasoning, and idea generation are crucial in human creativity (DiStefano, Patterson and Beaty, 2024), the fine-tuned large language model, which is the base programming of GAI (Brown et al., 2024), can be effectively trained to evaluate creative metaphors like humans (DiStefano, Patterson and Beaty, 2024). Human-GAI creativity handled by senior professionals' active learning from GAI outputs demonstrates human and AI systems continuously learn from each other to combine complementary strengths and multiple integrated capabilities (Raisch and Krakowski, 2021). Such mutual learning reflected the dynamics of relational functionalities. Relational dynamics

5.1.3 Organisational factor for enabling systemic emergent functionality

The horizontal and vertical integrated practices and the inseparable relations between vertical and horizontal context indicating learning could be inimitability and unobservability (Zollo, Minoja and Coda, 2018), demonstrating the significance of organizational supportive learning contexts for human-GAI collaboration. The. Also, professional learning demands contextual support from management leading to potential changing requirements from traditional approach.

A beneficial learning context is necessary for human-GAI due to the characteristic of GAI. As versions and applications of GAI are continuously upgrading (Huang and Rust, 2021; Bouschery, Blazevic and Piller, 2023; Ritala, Ruokonen and Ramaul, 2023) regarding scope and sophistication (Berg, Raj and Seamans, 2023b), continuous learning for knowledge renewal, skill building and competence development are suggested for leveraging GAI advantages (Berg,

Raj and Seamans, 2023b; Chowdhury, Budhwar and Wood, 2024). Hence, creative professionals' learning would be a gradually improving and evolving process for individuals supported by prolonged firm investments.

The firm-level GenAI application brought routine modifications with the ostensive change driven by actors' emergent accomplishments, where they discovered that the collective application of GenAI could combine multiple activities. Lower- and medium-level professionals utilize GenAI as a working tool in their daily work tasks because they work with computers on their desk, whereas higher-level artists are not using GenAI hands-on, but they understand and leverage on GenAI during real-time group work of discussions and meetings to participate in rounds of input–output loops with instructive orders.

The competing interplay of exploration and exploitation (Gupta, Smith and Shalley, 2006) indicate executives should have paradoxical cognitive frames, sparse external networks and dense internal links to construct a process with a shared vision, contingent rewards, reflexive activity and communication (Smith and Tushman, 2005; Jansen et al., 2008; Rogan and Mors, 2014; Kiss et al., 2020; Knight and Cuganesan, 2020; Maclean et al., 2021; van Neerijnen, Tempelaar and van de Vrande, 2022). During the ambidextrous process, management balances the autonomous extent of lower operation by both instructing and listening firm population (Foss and Kirkegaard, 2020).

5.2 Practical Implications

Creativity and innovation are the core competence of creative firms (Jones, Lorenzen and Sapsad, 2015; Gohoungodji and Amara, 2022), and artistic innovation as creativity-driven novelty and entertainment could be distinct from organisational innovations of solving a consumer problem (Brown, 2019). Meanwhile, creative industries are renowned for extensive engagement with technologies (Khlystova, Kalyuzhnova and Belitski, 2022). Compared to innovations from high-technology industries, artistic innovations from creative industries are collective creativity and group interactions by diversified creative professionals with discrepant knowledge, skills and backgrounds, who may perform better creative exploration when work together within a tolerant culture and appropriate network structure. Artistic distinctiveness, subjective and unique (Hirschman, 1983), is obtained by directorial instruction from core creators, who are rare talents and gifted minds with prominent personal knowledge, intelligence, and expertise.

Emerging technologies may transform how creative majors lead industries' production fundamentally (Smith, 2021). For example, digital logic and information system applications in

creative business can improve the efficiency of distribution, engage the audience, facilitate sales (eg. Courchesne, Ravanas and Pulido, 2019) etc. Novel digital technologies, such as generative artificial intelligence (GAI) and virtual reality/augmented reality (VR/AR) are always changing and adapting, the impact of such emerging technologies is yet to stabilise around a recognisable set of patterns for organisations and management (Bailey et al., 2022). For such dynamic phenomena, this study propose creative professionals should constantly learn, collective group creativity should take advantage of routine dynamics for the process of artistic innovations and creative firms should be ambidexterity to address the evolving challenges brought by emerging technologies.

Practically, we contribute knowledge of creative industries by advancing the innovation approach into creativity centre leads constellations (Bailey et al., 2022). Through emerging functionalities, it appears the system and dynamics of an enhanced creative constellation by emerging technologies are establishing around the case firm. Hence, we consider a creative major firm could build creative constellations as various digital technologies enacted constellations with both collaborative and combinatorial artistic innovations orchestrated. With corresponding development of creative constellations along emerging technology deployments, the centre of creative constellations, creative major, as long accepted centre of artistic innovation, could involve multiple technologies for creative constellations.

5.3 Limitations and Future Research

Social science research is influenced by the researcher's philosophical stance, as all research stages involve subjective assumptions by the researcher (Burrell and Morgan, 2016). A philosophical stance is people's systematic belief and knowledge that build upon epistemological, ontological, and axiological assumptions (Guba and Lincoln, 2005). Hence, my formulation of the research problem and interpretation of data are subject to my experience, which is the limitation of the entire research.

For future study of creative industries and artistic innovations, other researchers could explore relational perspective of emerging technologies further. By integrating the architecture of digital innovation (Yoo, Henfridsson and Lyytinen, 2010; Yoo *et al.*, 2012; Constantinides, Henfridsson and Parker, 2018; Autio, 2022; Bogers *et al.*, 2022; Thomas and Tee, 2022) to theoretically develop creative constellations as artistic innovations in digital transformation with dynamic architecture.

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