Full length article

Investigating individual trust in semi-virtual collaboration of multicultural and unicultural teams

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Keywords:
Individual trust development
Semi-virtual collaboration
Multicultural
Education

A B S T R A C T

This study aims to investigate individual's trust development for semi-virtual collaboration teams with multicultural and unicultural background. We aim to explore whether the trust levels in multicultural and unicultural semi-virtual groups will be the same, how trust develops over time and what the cor- responding factors to the trust development are. In order to answer the questions, a longitudinal case study was conducted in unicultural and multicultural teams. We have taken survey for 144 participants over three stages, as well as interviewed 64 participants. Results of the analysis of the survey data firstly show that no significant difference exists between multicultural and unicultural groups. Then, two factors, collaboration process and clear task help explain this phenomenon. However, the trust devel- opment of multicultural groups shows instability and keeps decreasing over time, while unicultural groups behave differently. We found that language, values and habitual behavior lead to the differences in these two types of groups.

1. Introduction

The development of economic globalization and world inte- gration has led to an increase in the popularity of semi-virtual team collaboration in modern organizations, schools, and companies (Krishna, Sahay, & Walsham, 2004; Lee-Kelley & Sankey, 2008). The organizations involved increasingly coordinate activities that span geographical, cultural, and organizational boundaries (Mukherjee, Lahiri, & Billing, 2012).

Nowadays, many organizations use collaborative work practices to maximize their success. The use of information technology in communication and collaboration has witnessed remarkable development during recent years (Hatem, Kwan, & Miles, 2012). To date, research in computer mediated collaboration has investigated various factors influencing the effectiveness of collaboration experienced in online settings (Weinel, Bannert, Zumbach, Hoppe, & Malzahn, 2011). Among the factors affecting the collaboration,

trust plays a critical role, especially in computer mediated groups (Wilson, Straus, & McEvily, 2006). If members of a team do not trust each other, they are likely to expend additional time and effort monitoring one another, backing up or duplicating each other's work, and documenting problems (Wilson et al., 2006). Since most group work involves interdependence, what really matters is in- dividual trust within the group (Clelland & Zarankin, 2012). As a consequence, improvement in collaboration effectiveness can be directly affected by improving individual trust. To improve the in- dividual trust in a team, the first thing we need to know is what an individual's trust level is and how a member's individual trust de- velops. In the recent years, some scholars mainly focus on the factors affecting the trust level (Cheng & Macaulay, 2014) and the trust development in the online collaboration (Cheng, Nolan & Macaulay, 2013). The established theories of trust encompass how trust succeeds for face-to-face communication or pre-meeting face-to-face (i.e. with the condition of a future meeting) commu- nication (Ashleigh & Prichard, 2012; De Jong & Dirks, 2012). Therefore, it is necessary to have further discussion on trust development in the semi-virtual context.

According to existing research, we know that different culture, history, and political system are the main factors that influence the

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development of collaboration (Sanchez-Burks et al., 2003). Cultural distinctions are also important in the context of online community research as they provide the most commonly utilized frameworks to understanding how cultures exhibit different behaviors (Gallagher & Savage, 2012). Thus, it's vital to compare the multicultural groups and unicultural groups on the issue of individual trust. Furthermore the different context of the experiment may yield a different result (Rhoads, 2010; Ryen, 2008; Yuki, Maddux, Brewer, & Takemura, 2005).

Therefore, we can find that there is a lack of research in the development of individual trust in the background of multicultural semi-virtual collaboration. It will be interesting to fill this gap by investigating the individual trust development of multicultural and unicultural groups with undertaking the same project. These issues that this research intends to explore are summarized in the following questions:

Question 1: Does trust develop differently in the multicultural groups than in the unicultural groups in the semi-virtual environment?

Question 2: How does individual trust in multicultural groups and unicultural groups develop over time in the semi-virtual environment?

Question 3: What are the factors that lead to the development of individual trust in semi-virtual multicultural and unicultural teams?

This paper reports an exploratory study that examined the individual trust in semi-virtual teams relying on face-to-face interaction and virtual interaction. Initially, the paper gives an extensive introduction of prior literature in the field of cultural diversity, trust in team collaboration, and trust development. We then describe our longitudinal case study followed by the analysis of results. Next, a summary of the findings is provided whilst the contribution and implications are discussed. Lastly, we also identify the limitations and list some future works.

2. Literature review

2.1. Cultural diversity within team collaboration

Team collaboration is exchanging information, altering activities, sharing resources, and enhancing the capacity of another organization for mutual benefits and common purposes (Boughzala & De Vreede, 2015; Rico, Sánchez-Manzanares, Gil, & Gibson, 2008). A significant number of organizations, especially task-oriented groups, use collaborative work practices to help achieve success (Stahl, Cress, Ludvigsen, & Law, 2014). With the ongoing globalization process, the use of cross-cultural teams in group collaboration is becoming increasingly common (Zhang, Lowry, Zhou, & Fu, 2007). However, many factors, such as team performance, members' trust, teamwork efficiency were proposed to be differently in cultural diversified team collaborations (Jarvenpaa & Leidner, 1999; Pieterse, Van Knippenberg, & Van Dierendonck, 2013; Schneid, Isidor, Li, & Kabst, 2015).

According to the definition of Hofstede, Hofstede, and Minkov (1991), five independent dimensions were generally perceived as the criterion to investigate cultural diversity which could be referred as multicultural and unicultural. These dimensions respectively are power distance, individualism and collectivism, masculinity and femininity, uncertainty avoidance, and long-term versus short-term orientation.

Based on the aforementioned criterion, we have divided our research as both unicultal studies and multicultural studies from the cultural diversity. Specifically, unicultural groups refer to those have no cultural differences among five dimensions. For example, some researchers used data of China and Russia, two collectivism

countries (Michailova & Hutchings, 2006). But we can not account it as a unicultural study because the differences of power distance. In this sense, unicultural studies mostly exist within one country background.

On the other hand, team collaborations within multicultural background were widely investigated (Ess & Sudweeks, 2005; Klitmøller & Lauring, 2013; Zhang et al., 2007). Some researchers investigated the issue of culture in global outsourcing relationships (Gefen, Wyss, & Lichtenstein, 2008). Some focused on the team collaboration of software production (Daniel, Agarwal, & Stewart, 2013; Walsham, 2002). Others were conducted in the educational collaboration environment (Kim & Bonk, 2002), business organizational cooperation (Hoch & Kozlowski, 2014), military context (Fisher & Hutchings, 2013), etc. Among these literature, language was frequently mentioned as a negative impact on community engagement (Daniel et al., 2013). In a group decision-making research, shared values and attitude were conceived as antecedents of social grouping and good team performance (Walsham, 2002). Moreover, a variety of norms, customs, traditions, habits in cross-cultural collaborations influence individuals' behaviors, and serve as antecedents of cultural diversity in team collaboration (Shiraev & Levy, 2015).

According to the review above, we find that culture was not generally investigated in the unicultural environment, while multicultural research was diversified in different research context. Nevertheless, little research was proposed from the perspective of unicultural and multicultural in the literature. Therefore, we aim to conduct research to compare unicultural team collaboration and multicultural team collaboration respectively.

2.2. Trust in teamwork

There are various kinds of team collaboration, such as pure virtual collaboration (Brown, Poole, & Rodgers, 2004), semi-virtual/hybrid collaboration (Cheng, Yin, Azadegan, & Kolfschoten, 2016), global virtual collaboration (Jarvenpaa, Knoll, & Leidner, 1998), and face-to-face collaboration (Liu & Kao, 2007). However, trust is an important part in building relationships, no matter online or offline (Altschuller & Benbunan-Fich, 2010; Child, 2001; Engelmann, Kolodziej, & Hesse, 2014; Henri, Jacques, & Alina, 2015; Shi, Sia, & Chen, 2013).

Virtual team is comprised of a group of members working in different locations and interacting primarily by telephone or computer (Berry, 2011; Robert, Denis, & Hung, 2009). Compared with face to face collaboration, virtual collaboration reduces "social context cue." With lower level of social control, participants exhibit a lower incidence of behaviors associated with individual trust (Paul & McDaniel, 2004; Wilson et al., 2006; Zaheer, McEvily, & Perrone, 1998). While in global virtual teams, cultural issues should be considered because of the global trait. Trust is even more complex in this research setting, and is influenced by larger numbers of factors (Barki, Robert & Dulipovici, 2015; Jarvenpaa & Leidner, 1999; Pinjani & Palvia, 2013; Sarker, Ahuja, Sarker, & Kirkeby, 2011).

Semi-virtual groups allow an individual to work independently of time and location (Briggs, De Vreede, & Nunamaker, 2003; Hertel, Konradt, & Orlikowski, 2004). Under some circumstances, team members also communicate with each other face-to-face when necessary (Citera, 1998). This form of teamwork combines the feature of both face-to-face collaboration and virtual collaboration, which also calls for a higher level of trust to keep the team work efficiently (Cheng et al., 2016; Lee-Kelley & Sankey, 2008). However, little research was conducted on the basis of semi-virtual collaboration, especially from the perspective of trust to measure relationship development. At the meanwhile, cultural diversity

issue is also an interesting topic to investigate in the context of semi-virtual collaboration. The combination of global virtual collaboration and face-to-face collaboration can be studied by multicultural groups in semi-virtual collaboration.

In order to follow the status quo above, some researchers have focused on cultural influence on trust and team performance (Schumann, Wangenheim, Stringfellow, Yang, & Praxmarer, 2010). Zhang et al. (2007) have also investigated how national culture, social presence, and group diversity may affect majority influence in a group decision-making context. In addition, Daniel et al. (2013) found the diversity in the spoken language and country of participants has a negative impact on community engagement but an unexpected positive effect on market success. It is also proposed by Hwang and Lee (2012) that uncertainty avoidance cultural values moderate the relationships between subjective norms and cognition-based trust. Trust could be linked with cultural factors in the teamwork.

The influence of culture to trust in teamwork is a dynamic process. In order to track this influence, it's essential to focus our research on the trust development.

2.3. The development of trust

Trust development is in line with the relationship development processes (Jarvenpaa et al., 1998). To measure trust development, some researchers focused on electronic mail archives and questionnaires to conduct case study research (Jarvenpaa & Leidner, 1999). Specifically, some used informant sampling approach to conduct field survey (Pinjani & Palvia, 2013). While some recruited undergraduate students to conduct longitudinal experiments (Wilson et al., 2006). Others worked on the dynamic of trust in implementation of longitudinal projects where participant observation, individual semi-structured interviews and document studies were used (Rose & Schlichter, 2013). Except for empirical studies, some researches proposed a research model based on cross-level process theory to study trust dynamics (Schilke & Cook, 2013).

In terms of trust research models, most scholars used to divide the overall trust level to a limited number of influencing factors. By this way, they could measure trust level through the research models established by some observable factors. For example, from the perspective of trusting beliefs and trust intention (Mayer, Davis, & Schoorman, 1995; McKnight, Cummings, & Chervany, 1998; Stoel & Muhanna, 2012), from the categories of the cognition based trust, the affect based trust, and the experience based trust (Kim, Steinfield, & Lai, 2008; Hwang & Lee, 2012). However, these models investigate trust from the static point. The cultural influence on trust is also a dynamic process that leads to trust development. The trust development and dynamic nature of trust were not considered (Schilke & Cook, 2013).

Nolan, Brizland, and Macaulay (2007) have deconstructed individual trust into six components to measure trust development: *Risk*, *Benefit*, *Utility value*, *Interest*, *Effort*, and *Power*. In order to seek the development of trust, they have explored the trust level three times during the whole research period. In Wilson et al. (2006)'s work, the whole research topic is also divided into three isotonic sub-periods. Recently, Cheng, Nolan, et al. (2013) have used the six trust factors to further measure individual trust development for online collaboration teams in the UK. Thus, we intend to inquire into the individual trust development from the six aspects listed above in three stages, based on their formal method.

3. Case study

Case study research is a frequently used method in contextual research, although it has been subject to significant criticism (Claeyé & Jackson, 2011). The discussion on generalizability and replication logic underlies our rationale to use multiple case studies in this research (Tsang & Kwan, 1999; Yin, 2009). Empirically, students undertaking a group project are frequently used as the sample for researchers testing or evaluating techniques and models in group decision and collaboration research. In this work we also conduct our research within a student environment (Richards, 2009). In addition, for the study of computer-mediated groups, computer-mediated teams with geographically dispersed members using mainly electronic communication technologies (e-mail, web conferencing, etc.) to accomplish common goals are typical (Hertel, Geister, & Konradt, 2005). Besides, according to the research of Zhang et al. (2007), the use of computer-mediated communication can also reduce *majority influence* (*majority influence* is defined as the attempt by a majority of group members to impose their common position on group dissenters during group decision making).

3.1. Data collection

In this case study, we sample 144 undergraduate students who are attending the same course called *Management of E-commerce Projects* at a university in China. The samples are graduating within one or two years, some also have internship experience. The 144 students are aged between 20 and 25 years, with 75 females and 69 males. The participants are well-educated and capable of conducting the case study following the collaboration process and their professors' facilitation. We divided the students into 36 groups composed of four students randomly. Within these groups, 18 groups are comprised of multicultural students such as coming from China, Mongolia, Korea, Russia, France, US, UK and Germany. These groups are labeled multicultural. All the overseas students stayed in China between 2 and 5 years. The remaining 18 groups are comprised exclusively of Chinese students and they are labeled unicultural. The groups are all assigned the same project task to be completed using group collaboration. Specifically, the project task was to create a business plan with the help of their professional knowledge. The participants are allowed to collaborate face-to-face or via the Internet. With regards to face-to-face collaboration, they can deliver, share or even debate their ideas directly. In terms of online collaboration, they can use QQ, Skype, Wechat and other online chat platforms. While in class, the sample students collaborate by communicating face-to-face. After class, they continue to communicate, switching to online collaboration. At the weekends, they mainly use face-to-face discussion. All the groups are required to record their collaboration every time. This shows when, where and how they collaborated. Overall, all groups are expected to spend approximately the same time communicating face-to-face and online. The whole collaboration period was initiated with face-to-face collaboration.

In order to track the development of individual trust, we conduct our survey at three points in the project as was implemented by previous research (Cheng, Macaulay & Zarifis, 2013). Thus, we divide the whole period into three nearly equal stages, that is, the initial stage, the middle stage and the final stage. At the start of each stage, the professor (facilitator) assigns the task of the corresponding stage. To conclude each stage, all the students are required to complete a questionnaire to measure the individual trust (Cheng, Nolan, et al., 2013). In parallel, we randomly interviewed 1 or 2 students from each experiment group. These interviews are designed to examine the individual trust level from the perspective of the student's cognitive feelings in the collaboration process. We collect the questionnaire data of the 144 students for all three stages, as well as the interview data of 64

students involved in the study. First we compare this data between groups at the end of each of the three stages. We then conduct an overall data analysis and illustrate the results along with the student interview conversations. In Fig. 1 the timetable we followed in our study is shown.

The groups all handed in their assignments punctually at the end of the semester. In view of our research, we analyze the questionnaire data and interview transcripts gathered from students once they finish each stage. We compare the data from each stage between groups. We also compare the data for the same group between stages. At the end of the study, we analyze the data in detail, specifically focusing on the difference between the multicultural and unicultural groups.

3.2. Data analysis and results

In terms of data analysis, Nolan et al. (2007) used to deconstruct the trust value level from six aspects, that is, Risk (associated with providing information to unknown recipients and acting upon information received from them), Effort (exerted to acquire information), Benefits (an overall perception that involvement will provide individual gain), Power (an individual's ability to influence others by means of his/her superior knowledge and/or access to information), Utility Value (measured by high information quality such that it can be absorbed into immediate practice) and Interest (indicating an inherent interest in the system and the information available).

In the research of Cheng, Macaulay, et al. (2013), the notion of an ideal value of the six factors was raised with the help of a spider diagram (Fig. 2).

Specifically, for individual trust development, there is a large body of research adopting the line chart and the table matrix to illustrate the development tendency and trust level (Wilson et al., 2006). In order to improve the accuracy of the results, mathematic methods, such as mean and deviation, are used in the research of trust issues (Wilson et al., 2006).

3.3. Comparison between the real value and the ideal value

For each of the six factors, neither of the student groups managed to achieve the ideal values, however, they were sufficiently close to them. During the collaboration of computer mediated groups, both multicultural groups and unicultural groups have the similar individual trust level.

Furthermore, we employed the Independent-Samples T Test (SPSS 16.0, $a = 0.05$) to explore whether a significant difference emerged between the multicultural groups and unicultural groups. By testing the value of each trust factor from the multicultural samples and unicultural samples three times, we could have the results in Table 1.
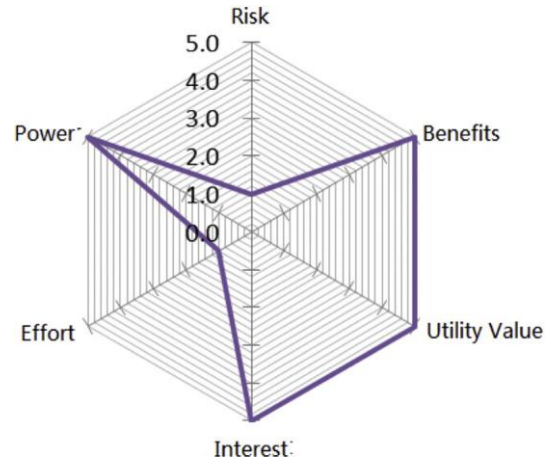

Fig. 2. Ideal values of the six trust factors.

From Table 1, we find that in all three stages, all the values of Sig. are greater than a (0.05). Thus, during all the three stages, the values of all the six trust factors don't emerge a significant difference between the multicultural groups and unicultural groups.

Finding 1: Comparison of trust level between multicultural groups and unicultural groups revealed no significant difference.

3.3.1. The development of the trust level in multicultural and unicultural groups

All six factors change as time progresses. Some of the factors change to demonstrate an improvement in the trust. However, some are increasing, signaling a lowering of the trust level. In order to determine how the trust level changes, we calculate the mean value of the six factors respectively (Aj). Using Formula 1, we then adopt T to represent the deviation of the difference between the real value and the ideal value for the two types of group at each stage

$$T = \sqrt{\sum_{j=1}^{6} (A_j - I_j)^2},$$ Formula 1

where, j is the serial number of the six factors, A_j is the average real value of the factor j of each type of group, and I_j is the ideal value of the factor j.

Since T represents the deviation of the comprehensive variation between the real and the ideal values, we can see that the greater the value of T, the lower the trust level. Table 2 demonstrates the results. The data of the first six columns shows the
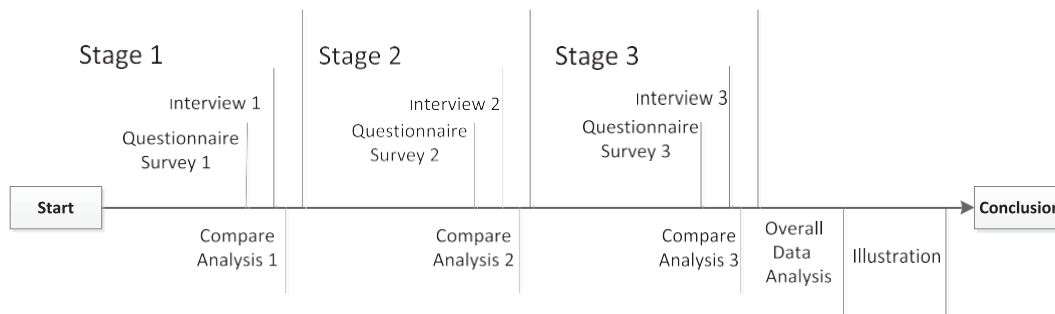

Fig. 1. Data collection procedure.

Table 1
Independent samples test of unicultural and multicultural groups.

Trust factor	Equal variances	Stage 1		Stage 2		Stage 3	
		Levene's test sig.	T-test sig. (2-tailed)	Levene's test sig.	T-test sig. (2-tailed)	Levene's test sig.	T-test sig. (2-tailed)
Risk	Assumed	0.000	0.613	0.000	0.835	0.000	0.111
	Not assumed		0.613		0.835		0.111
Benefits	Assumed	0.012	0.536	0.002	0.198	0.001	0.099
	Not assumed		0.536		0.198		0.100
Utility value	Assumed	0.007	0.640	0.001	0.917	0.018	0.451
	Not assumed		0.640		0.917		0.452
Interests	Assumed	0.001	0.237	0.001	0.393	0.187	0.107
	Not assumed		0.237		0.394		0.107
Effort	Assumed	0.000	0.132	0.000	0.565	0.064	0.291
	Not assumed		0.133		0.566		0.291
Power	Assumed	0.001	0.710	0.058	0.110	0.302	0.172
	Not assumed		0.710		0.110		0.172

mean scores for the two types of groups for the six factors at different stages (Aj), while the final column shows the deviation (*T*) of each situation.

From Table 2, we can see that in all three stages, the deviation (T) of the multicultural groups is larger than that of the unicultural groups. As time progresses, the value of T for the multicultural groups increased while that of the unicultural groups decreases. From the definition of T, we may conclude that the individual trust development trends of the two types of group are different. In relation to the development tendency of the individual trust level, we arrive at our second conclusion:

Finding 2: The trust level of the multicultural group decreases over time. However, for the unicultural group, the trust level increases over time.

In relation to the stability of the development of the trust level, we calculate the mean and deviation of *T* in three stages for the multicultural and unicultural groups in turn (Formula 2). *Mean*(*T*) represents the average trust level of either group during the whole study, where a greater value for *Mean*(*T*) represents a lower level of trust. D demonstrates the stability of the individual trust development. So we can find that the greater the value of D, the lower the stability.

Formula 2

$$Mean(T) = \frac{1}{3}\left(T_{stage1} + T_{stage2} + T_{stage3}\right)$$

$$D = \sqrt{\sum_{j=1}^{3}\left(T_{stagej} - Mean(T)\right)^2}$$

We can then calculate the results of Table 3, which demonstrate

the stability of individual trust intuitively.

From Table 3, we find that both *Mean*(*T*) and D of the multicultural groups is greater than the unicultural groups. We conclude that not only is the trust level of the multicultural groups lower than the unicultural cultural groups in all three stages, but also that the individual trust development of the multicultural groups is less stable than the unicultural ones. The results suggest that multicultural collaboration is more likely to be vulnerable to issues with trust than unicultural groups. These results also tell us that the multicultural collaboration relationship is harder to preserve. We arrive at our third finding:

Finding 3: The individual trust development in multicultural groups is less stable than that seen in unicultural groups.

3.3.2. Qualitative analysis of interview data

In order to further explain the survey analysis findings above, we also conducted interview analysis. All the qualitative interview data were analyzed carefully. Three of our authors have coded the data independently. For each interview, we coded the transcripts with uniformed sequential numbers. Unicultual teams range from U1eU32, while multicultural groups range from M1-M32.

When coding the interview data, firstly, we selected the most frequently mentioned keywords from the interview. Frequency was counted for each keyword. For different collaboration stages, we tracked the keywords to find the contributors of trust development. Then, secondly, we clustered the keywords according to previous literature, and removed several keywords that are coincident in meanings and redundant. Furthermore, keywords with low frequency were also eliminated. Finally, the interview results were documented and delivered to all of our authors to offer comments. Besides, all the participants in our research have access to our interview results. If the inconsistency exists between our results and the cognitive feelings of the participants, we were open to make corresponding changes to the final results. After several rounds iterations, five keywords were left to be important, we concluded them into five corresponding trust factors, respectively are collaboration process, clear task, language barriers, value and habitual behavior. These five trust factors are very important and explain various research findings from the quantitative results.

Key Factor 1: Collaboration process is a factor to explain

Table 2
Comparison of the trust level between the multicultural and unicultural groups during the three stages.

	Risk	Benefits	Utility value	Interest	Effort	Power	Tc(Tn)
Stage 1 Multicultural	2.12	2.06	4.03	4.10	3.73	3.79	4.0496
Stage 1 Unicultural	2.06	4.03	4.10	3.73	3.79	4.06	3.9571
Stage 2 Multicultural	2.11	2.10	4.05	4.20	3.87	3.86	4.0515
Stage 2 Unicultural	2.10	4.05	4.20	3.87	3.86	4.00	3.9448
Stage 3 Multicultural	2.43	2.00	3.96	4.26	3.87	3.96	4.1677
Stage 3 Unicultural	2.00	3.96	4.26	3.87	3.96	3.94	3.9174

(*T*) is negatively related to the true trust value.

Table 3
Comparison of the individual trust stability between the multicultural and unicultural groups.

	T_{stage1}	T_{stage2}	T_{stage3}	$Mean(T)$	D
Multicultural	4.0496	4.0515	4.1677	4.0896	0.0957
Unicultural	3.9571	3.9448	3.9174	3.9398	0.0287

similarities of trust in unicultural group and multicultural group, as it shown in finding 1 above.

Among the interview, 50% of the participants in multicultural groups and 47% in unicultural groups mentioned that collaboration process is a major contributor and effective group semi-virtual collaboration. Both unicultural groups and multicultural groups speak highly of the collaboration process. For example, as some interviewees said:

I think our whole collaboration is very good. We were told to use the same well-designed collaboration process when conducting virtual teamwork. We almost perform the task under the same collaboration process. Trust is definitely increasing because of our long-term cooperation through the process. (U24)

With the well-designed process, we had smooth collaboration and trusted each other well. I think the process helps a lot with our collaboration, the brainstorming, the idea reducing process, the voting process were all helpful for trust building. (M15)

Key Factor 2: Clear task is another factor to explain similarities of trust in unicultural group and multicultural group, as it shown in finding 1 above.

The frequency for this keyword is 53% for unicultural groups and 59% for multicultural groups (including the keywords that have the same meaning with clear task). Setting clear tasks enables participants have a sense of directions of what to do (Davidov, 2010; Eckhardt, 2002). Clear task driven collaboration weakens the influence of cultural diversity. For example, as some individuals stated:

We work together for the same goals and the task allocation is clear, all we have to do is to have the task well done, irrespective of our cultural backgrounds. Only do well in the collaborative task, can we get high score for the class. (M14)

All the members in our team are very diligent, we collaborate together for the business plan. The task is the reason why we collaborate together. If other members devote themselves in our task, I will trust him/her more. (U3)

Key Factor 3: Language is a factor to explain the differences of trust development in unicultural group and multicultural group, as it shown in finding 2 and finding 3 above.

Multicultural collaboration should deal with the difference of language. Language barriers inhibit communication efficiency, and then influence trust development in mutual interactions. Approximately 66% of the participants in the multicultural teams mentioned the language issues in their cultural diversified collaboration, while it accounts for nothing in the unicultural groups. For example, some interviewees said:

Owing to the relatively poor Chinese level, our multicultural members had some difficulty in communication. Sometimes, they drove me mad! I told them why we changed the initial plan, but they don't understand, and continue to collect material in the wrong direction. It's really a waste of time. Why should I continue to trust them for all their mistakes? (M12)

Because we are all Chinese, it's easy to communicate, no matter face to face or through virtual tools. We speak the same language, share the same perceptions, which makes us communication well. As long as we reach the final agreement, I certainly trust other members more. (U15)

Key Factor 4: Value is another factor to explain the differences of trust development in unicultural group and multicultural group,

as it shown in finding 2 and finding 3 above.

Because of the cultural difference, member in multicultural groups have various values (attitude and perceptions) towards the same problem (Knafo, Roccas, & Sagiv, 2011; Daniel et al., 2013). So the level of multicultural trust is unstable in general and keeps decreasing through different stages. Among the interviews, 50% participants mentioned the keywords related to personal values in multicultural groups, while the percentage in unicultural group is 6%. For instance, as some interviewees mentioned:

Due to some divergence, we had some difficulty in making the consensus; Sometimes it was difficult for us to communicate with each other, let alone making good decisions. (M18)

Sometimes we couldn't get the same perception towards the details of collaboration. We (Chinese participants) thought that the first step is to know about the government's policy, but they (participants who are not Chinese) don't agree. (M1)

I think our team collaboration perform well. Er, You mean the reason? Let me think it over, I think the homophyly in cultural may contribute to our smooth team collaboration. We shared generally the same perceptions towards many ideas. (U29)

Key Factor 5: Habitual behavior is another factor to explain the differences of trust development in unicultural group and multicultural group, as it shown in finding 2 and finding 3 above.

Generally, different cultural have various habitual behaviors, which may be not that understandable by other cultures, and serve as an antecedents of continuously low level of trust for multicultural groups. 56% of participants mentioned the related keywords in their interviews, while none of the participants mentioned keywords related to habitual behavior in unicultural groups. For example, multicultural group members said,

Some members are habitually late; this often messed up the collaboration. Some members in other country are habitually late. Although we have set the time schedule, early members should wait for the late members. The trust level is decreasing because of this difference to some degree. (M31)

My trust level decreased sharply after I found they were irresponsible. We have clear task division. Someone is told to collect materials, someone works on the analysis of the materials. But in my group, the one who collect material is irresponsible, I think people in their country are all irresponsible. (M9)

4. Discussion

4.1. Influencing factors

The results of this study draw important implications for theoretical development of trust research in a semi-virtual context. In this study, we made an important observation with the help of case study method and some graphs and diagrams. In general, these results are compatible with prior research in the field. The interview context from nearly half of the students involved in our research proves the findings from another viewpoint and introduces some factors leading to the findings.

Fig. 3 below shows the main results of this research. Three main research findings were found through quantitative analysis of survey, five important trust factors were proposed to explain the influencing mechanism of the quantitative findings. These five factors are all very important that were mentioned with high

frequency, while different factors explain different survey findings.

4.1.1. Factors devoted to successful collaboration

Two trust factors, collaboration process and clear task serve as the contributors of the similarities of unicultural groups and multicultural groups. These two factors explained the reason why comparison of trust level between multicultural groups and unicultural groups revealed no significant difference. Multicultural groups are more diversified than unicultural groups, so it is more difficult for multicultural groups to build and maintain trust. However, the well designed collaboration process and the clear task allocation weaken the influence of cultural diversity to trust levels. On one hand, all the team members were instructed to use the same collaboration process which is designed according to the professional principles. The uniformed process enables team members in both sides fully engaged in the teamwork. Therefore, collaboration process is a widely mentioned factor to explain the similarities of the multicultural groups and unicultural groups.

On the other hand, the task allocation is very clear. Team members have the same goals to accomplish the task. No matter unicultual group or multicultural group, the task is uniformed and very clear. In order to have the task done, the trust levels between the two groups have no significant difference.

4.1.2. Factors devoted to discrepancy in cultural diversified groups

The latter three factors (language, values, habitual behavior) concerns with the trust development, and explains two research findings, namely the stability of trust and the trust develop trends over time in unicultural groups and multicultural groups.

Concerning the instability of the multicultural teams and the comparatively stability of the unicultural groups, we aim to discuss the results from the perspective of language, values, habitual behavior. Language means that the language barriers in multicultural groups inhibit team communication at times, which influence of the dynamic of trust. Therefore, multicultural trust development is less stable. While members in unicultural groups speak the same

language, communication is easier, and the trust development is more stable. The second trust factor, values, which means the attitude and perception of an individual. Unicultural group members tend to be alike in the perception of values, which lead to less contradiction, the trust development is more stable, vice versa. The third trust factor, habitual behavior can be explained from the behavioral level, the behavioral pattern of multicultural group members are diversified, which lead to misunderstandings and complaints to some degree, and influence the fluctuation of trust in semi-virtual collaboration. But the habitual behavior are alike in unicultural groups, therefore, the trust development is more stable. Concerning the trust development trend in two kinds of groups, the difference of language, values and habitual behavior in multicultural groups also explained this phenomenon. That is to say, because of the differences originated from cultural diversity in multicultural groups, team members are more difficult to collaborate together, the contradiction and inconsistency hamper the semi-virtual collaboration of team members, which makes the trust level decreases over time in multicultural groups. While in unicultural groups, there are many similarities of team members from the perspective of cultural, so trust is not influenced by cultural difference. Team members are more eager to establish trust over time in unicultural groups.

4.2. Implications

In terms of theoretical contributions, firstly, this paper contributes to the literature of trust development (Nolan et al., 2007; Sarker & Sahay, 2003), and combines cultural influence with trust development. This is one the first studies which apply and extent cultural studies in trust development. Secondly, this is also one of the studies that compare the differences of unicultural groups and multicultural groups in the context of semi-virtual collaboration (Cheng et al., 2016; Jarvenpaa, Shaw, & Staples, 2004; Zhang et al., 2007). Besides, we have also contributed to the current understanding of trust development in semi-virtual collaborations (Shi
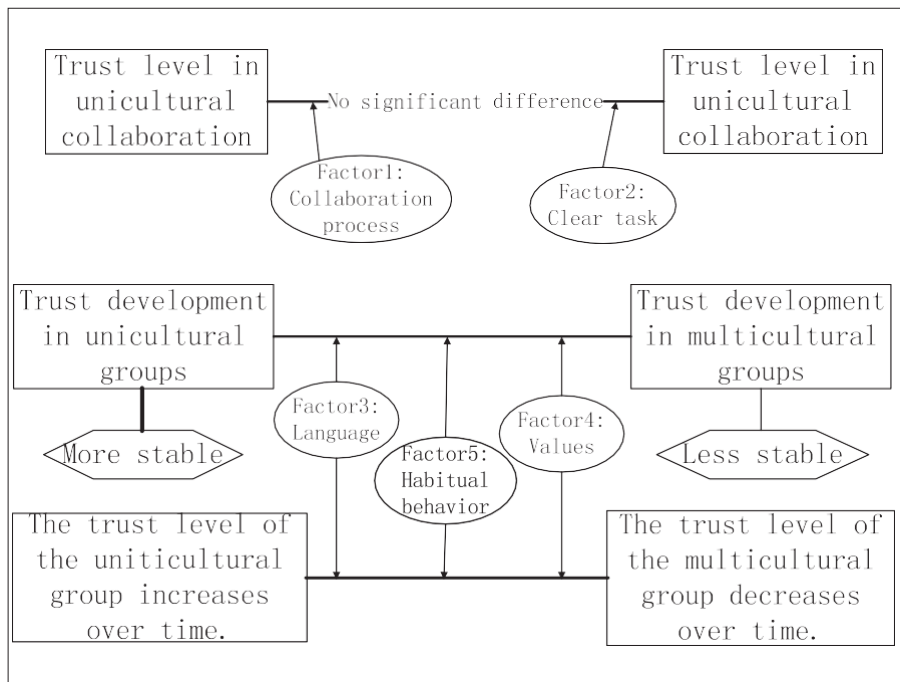

Fig. 3. Successful factors and discrepant factors diagram.

et al., 2013).

In the practical view, since cultural factors (e.g., values, language, and habitual behavioral) play such a critical role in multinational collaboration, we should have a deep understanding of a partner's cultural background. This practice allows for smoother collaboration. In terms of stability of individual trust development, the multicultural groups are less stable than the unicultural ones. This means that transnational cooperation is more vulnerable, which demonstrates the necessity of the relative laws and regulations. To be specific, both the companies and the countries involved should conduct a strict supervision mechanism (such as well designed collaboration process) over multinational cooperation, and set a clear task allocation.

4.3. Limitation and future work

There are still some limitations in our work. Firstly, the data we collected from the case study was limited. Secondly, the context based case study is conducted in a Chinese university context and we didn't-test our findings in other countries. Thirdly, in relation to the development of individual trust, we only divided the collaboration process into three stages (initial, middle, final). On the face of it, this seems reasonable and practical. However, this approach ignores the development of trust over a shorter period, for example, one week of the initial or final stage. Finally, specific to the case study, we also lack control in the frequency, nature, and content of the team communications in both online and face-to-face environments.

Future research is encouraged to expand the samples in more case studies including the context in different countries and universities. This may lead to additional interesting findings. Moreover, future research may also track the trust development in more stages and also in different length of time periods. In addition, evaluation of the influence factors of trust development in our study could be conducted in future study by using different models and methods.

5. Conclusions

This study integrated the issues of trust, culture, and team collaboration. The discoveries in this paper extend the literature of disciplines such as management, psychology, and education. We draw three primary conclusions based on the three questions we posed at the beginning of this study.

(1) *For the first research question, we find that although the average trust level of the multicultural groups is different with unicultural groups, comparison of trust level between multicultural groups and unicultural groups revealed no significant difference.*

Historically there have been many attempts to draw conclusion on the cultural influence to the trust and collaboration. Some researchers argued that the multicultural feature would have a negative effect on the collaborative trust (Johansson, 2011; Murphy, 2013; Stahl et al., 2014). However, some researchers also held the opposite opinions (Lowry, Zhang, Zhou, & Fu, 2010). Compared to the prior research, this research added a new viewpoint. We designed an effective process for the sample groups to facilitate their collaboration to gain a more accurate result, using the control variable method of scientific research. In prior studies some scholars primarily pursued the research based on a specific task and ignored the influence of the collaboration process (Wilson et al., 2006). We stated the unremarkable difference of the trust level between multicultural groups and unicultural groups.

(2) *For the second research question, we found that as time progresses, the individual trust level of the multicultural group decreased and less stable, while the unicultural group increased and more stable. This result is consistent with mainstream studies.*

In comparison to the unicultural groups, the individual trust development of the multicultural groups is less stable. The second and third conclusions from the discussion also demonstrated this from another viewpoint. In relation to the issue of trust, the findings from this paper extend the literature of computer-mediated groups and individual trust development. Historically there have been many attempts to draw conclusion on individual trust development (Cheng, Nolan, et al., 2013; Lewicki, Tomlinson, & Gillespie, 2006). For instance, we have validated the findings of Cheng, Nolan, et al. (2013) where the trust development in unicultural sample group increased.

With the development of information technology, some researchers have devoted their focus to individual trust development of online teams (Nolan et al., 2007; Olson & Olson, 2012) and global virtual teams (Jarvenpaa & Leidner, 1999). Innovatively, we focus on the transitional collaboration forming in hybrid groups combining face-to-face and online communication together in a semi-virtual environment which is a new setting. In recent years, research on trust development of computer-mediated groups has also made a significant contribution to academic circles. For example, J. Olson and Olson (2012) inquiry into issues affecting the sequence of communication methods. Schaubroeck, Lam, and Peng (2011) have researched the development of trust from a behavior aspect. In contrast, we study individual trust development from six factors dependent with trust, and then, discuss the development comprehensively. Furthermore, we also conducted our research in the comparison approach of multicultural and unicultural groups. We conclude that not only is the trust level of the multicultural groups lower than the unicultural cultural groups in all three stages, but also that the individual trust development of the multicultural groups is less stable than the unicultural ones. The results suggest that multicultural collaboration is more likely to be vulnerable to issues with trust than unicultural groups. In the future, we also hope to looking for the factors contributing to the results.

(3) *For the third research question, we found five leading factors to explain the first two conclusions.*

We have found five important factors from the interview data, the results are basically consisted with the prior researches (Eckhardt, 2002; Davidov, 2010; Knafo et al., 2011; Daniel et al., 2013).

On one hand, the two factors, clear task and collaboration process are the influencing factors to explain Conclusion 1. On the other hand, we could also sum up three aspects, language, values (e.g., attitude, perception) and habitual behaviors, contributing to the trust difference between multicultural groups and unicultural groups (Conclusion 2). Based on the homogeneous values, the unicultural groups are more likely to know, understand and approve their members. Their proficiency in Chinese also made the collaboration process smoother. Oppositely, due to the divergence in language, values and habits, the trust level of multinational groups may be more fluctuant. Along with the difficulty of communicating and making consensus, the trust levels of multinational groups are likely to decrease as time goes on.

Acknowledgement

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