Why knowledge integration ability differs: team co-creation and sharing climate as a mediating variable

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Abstract. The richness of material life and the progress of digital technology have largely promoted the development of the knowledge economy, and the team's ability to integrate knowledge has increasingly become the key to the competitive advantage of enterprises, and the knowledge base theory also points out that knowledge is the core resource for enterprises to participate in the competition, especially the importance of tacit knowledge is more and more highlighted nowadays. Therefore, this study was conducted based on 528 valid questionnaires and tested the hierarchical regression model with the help of SPSS. The study reveals the mechanism of the positive effect of corporate structural flexibility on team knowledge integration ability and the realisation path of the positive effect of employees' career growth on team knowledge integration ability and finds for the first time that the use of digital technology weakens the positive effect of structural flexibility on team knowledge integration ability.

Keywords: knowledge base theory; team knowledge integration ability; knowledge economy; structural flexibility; employee career growth.

1. Introduction

In recent years, with the abundance of material life and the rise of the digital revolution, the knowledge economy is ushering in unprecedented development opportunities. The development of digital economy greatly reduces the cost and speed of knowledge dissemination[1][2], but it also puts higher requirements on the effectiveness of enterprises in integrating external knowledge and circulating internal knowledge. It has been pointed out that the stronger an enterprise's internal knowledge integration capability is, the stronger its ability to adapt to new situations and carry out innovations[4], and the knowledge integration capability is regarded as a key resource for enterprises to acquire and utilise knowledge. According to knowledge base theory, the key to sustaining a firm's core competitive advantage lies in the efficiency of its team in transforming knowledge, information, and technology[5], as well as the efficiency of storing and utilising knowledge within the firm[6]. Therefore, how firms can enhance their ability to integrate knowledge has become a key issue for firms to compete[3].

Prior research on team knowledge integration capability has focused on the positive effects of team knowledge integration ability on team creativity[8], the relationship between team knowledge integration ability and the knowledge exchange process[6], the relationship between the external environment and team knowledge integration[14], and the impact of team knowledge integration ability on innovation performance[9][10]. While the aforementioned studies have provided a great deal of interpretation of knowledge integration capabilities based on different perspectives, relatively little attention has been paid to how knowledge integration abilities can be enhanced within a team and the impact of digital technologies on a team's knowledge integration abilities[6][11].

In summary, based on the previous research results and theoretical gaps in the literature, this study constructs a conceptual framework to explore the relationship between structural flexibility, employee growth and development, and team knowledge integration ability, as well as the roles of team co-creation and sharing and the use of digital technology in the above mechanisms. The value of this study lies in investigating the realisation mechanisms of enhanced team knowledge integration capability, and the findings complement the mechanisms of structural flexibility and employees' career growth on team knowledge integration ability, suggesting that structural flexibility and
employees' career growth have a positive effect on team knowledge integration ability. In addition. Expanding the research perspective of knowledge-based theory, it is found that the use of digital technology plays a weakening role in the relationship between structural flexibility and team knowledge integration ability, providing a new research direction for enhancing knowledge competitiveness within enterprises in China.

2. Theoretical basis and research hypothesis

2.1 Structural flexibility and team knowledge integration ability

Due to the advantage of the enterprise as a platform for knowledge transfer, the enterprise is more conducive to the sharing and transfer of knowledge within the organisation than the fragmented individuals in society[7]. However, the hierarchical system of enterprises tends to hinder the flow of knowledge[12]. Therefore, organisational structure flexibility can be regarded as the glue within the organisation due to its features such as synergistic work process, flat organisational structure, decentralisation of management decisions and blurring of organisational boundaries, which closes the distance of knowledge transfer between different hierarchical levels within the enterprise[13][14], creates more opportunities for communication within the team and creates a more open environment for communication, which in turn enhances the enterprise team's knowledge integration capabilities[15]. In summary, the following hypothesis is proposed:

H1: Firms' structural flexibility positively affects team knowledge integration ability.

2.2 Employee career growth and team knowledge integration ability

Employee's career growth is mainly reflected in the employee's own career goals, organisational support for members, competence growth and salary increase[16][17]. In the communication and exchange of corporate teams, the differences in members' backgrounds and experiences with each other can lead to knowledge heterogeneity[18], and the understanding of the same knowledge, especially for tacit knowledge, can differ, while the professional growth of employees can promote the members' motivation for pursuing the team's common performance and active learning, thus reducing the impact of knowledge heterogeneity. In addition, access to more training and communication opportunities with team support for employees enables employees to communicate and collaborate with other members more tacitly[19] and improves the team's knowledge integration by increasing their own understanding of communication skills. In summary, the following hypotheses are proposed:

H2: The professional growth of corporate employees has a positive effect on team knowledge integration ability.

2.3 The mediating role of co-creation and sharing

A co-creation and sharing atmosphere allows all members of the organisation to participate on a consensual and equal basis, reducing the obstacles to the flow of knowledge caused by the hierarchy of the organisation. In a co-creation and sharing environment, members within a team are more conducive to building mutual trust and increasing opportunities for communication in the same atmosphere, allowing for more open sharing of experiences and understanding among members[15]. In addition, in a co-creation and sharing team atmosphere, team members can be categorised into a more intuitive sense of what others are trying to convey and improve the quality of knowledge exchange based on their knowledge of other members and the company as well as the particular work environment[20]. In summary, the following hypothesis is proposed:

H3: The atmosphere of co-creation and sharing plays a positive role in team knowledge integration ability.

The increase in structural flexibility will flatten the organisational structure and blur the sense of boundaries of different hierarchical levels[14], thus pulling in the distance between different hierarchical levels and different members of the same hierarchical level within the enterprise[13],
creating a more harmonious atmosphere of communication, enabling members to fully feel the cohesion of the enterprise as a whole and motivating different members to work together to create value for the enterprise and to share the fruits of development[21]. In summary, the following hypothesis is proposed:

H4: Structural flexibility has a positive effect on co-creation and sharing.

Employee's professional growth means that employees can learn job-related knowledge and skills, and gain job advancement and material income growth by taking on more challenging tasks and gaining extensive work experience[22]. Such positive incentives increase employees' engagement in their work and obtain corresponding results in joint efforts with other teams[23]. Secondly, when the corporate team focuses on the professional growth of employees and provides appropriate opportunities, employees feel support from the organisation, reward the team with more team contributions and teamwork and demonstrate the value of their professional growth[24]. This mutually reinforcing partnership makes it a win-win situation for both the organisation and the employees. In addition, the pursuit of professional growth through the employees themselves is more conducive to the creation of a team learning atmosphere, encouraging the exchange of knowledge and ideas, in order to enhance the communication and collaboration within the team, and to promote the formation of a team atmosphere of co-creation and sharing[25].

H5: Employees' professional growth positively affects co-creation and sharing.

Structural flexibility, with its emphasis on blurring the sense of distance between different levels of the organisation, can bring different levels closer together, thus creating a more open and equal communication environment[13]. In this environment, team members are more likely to build trust in each other, which strengthens the continuous dialogue of knowledge among members as a community, thus creating a co-creative and sharing atmosphere for the team[15]. Working together in this atmosphere to exchange and transform knowledge creates a common base of understanding. It further increases the team's knowledge integration capability. This article provides an explanation of the mechanism of co-creation and sharing the role between the flexibility of corporate structure and the team's knowledge integration ability. Based on this, the following hypotheses are proposed:

H6: Co-creative sharing mediates between structural flexibility and team knowledge integration ability.

Employee's professional growth can encourage the members of the team to work hard to create their own value for the team's common goal and to co-create value for the team through proactive continuous learning and positive learning behaviours[26], so as to obtain the benefits of the team's growth, and to promote the team's co-creation and sharing in a result-oriented manner. At this point, the team's overall knowledge integration ability is realised due to the growth of team members' mutual understanding of tacit understanding and their own ability to integrate knowledge. In this article, it is surmised that co-creation and sharing interprets the mechanism of employee's career growth on the team's knowledge integration ability. Based on this, the following hypotheses are proposed:

H7: Co-creative sharing mediates between employees' career growth and team knowledge integration ability.

2.4 The moderating role of the use of digital technology

In the era of the knowledge economy, information technology can increase the speed of knowledge dissemination and has become a necessary condition and basic configuration for enterprises to compete[27]. In this regard, Arrow argues that one of the strengths of a firm is its ability to save communication through common code[28]. If enterprise teams that make extensive use of digital technology have better structural flexibility, they may be able to improve the speed of knowledge dissemination, especially explicit knowledge, through a flat internal hierarchical structure by leveraging the convenience of information transfer through digital technology, and, as Wenger suggests, make the exchange of knowledge across geographical limits through digital technology, so as to better exert the positive effect of structural flexibility on the team's ability to integrate knowledge[29].

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H8: The use of digital technology enhances the relationship between structural flexibility and team knowledge integration capability.

At the same time, based on the proposed concept of tacit knowledge, this article also speculates that the use of digital technology has the potential to reduce the quality of knowledge dissemination and integration.

The research framework is as follows:

![Figure 1 research model](image)

3. Research methodology

3.1 Research sample

This study used a questionnaire research method to collect questionnaires in March 2024 from 11 enterprises in Shanghai, Beijing, Zhejiang, and Shandong, covering seven industries, including e-commerce, logistics, construction, and services. Consultations were held with the managers of the enterprises before the start of the research, the confidentiality principle was reiterated to the subjects during the formal survey, and the results were informed that the research results were only used for academic research. A total of 553 samples were recovered, and 528 valid questionnaires were obtained after excluding invalid questionnaires, the validity rate of the questionnaires was 95.31%. Descriptive statistical analysis of the samples showed that there were 272 males, accounting for 51.51%, and 256 females, accounting for 48.49%, with a male-to-female ratio close to 1:1; 154 respondents were in managerial positions, accounting for 29.17%, and most of them were general employees. The average age of the respondents was 38.3 years old. There were 197 employees from state-owned enterprises, accounting for 37.31 per cent, 243 from private enterprises, accounting for 46.02 per cent, and 88 from foreign enterprises.

3.2 Variable measurement

Mature Chinese and English scales were selected for the study, all of which were scored on a Likert-5 point scale, with 1 to 5 indicating strongly disagree, disagree, average, agree, and strongly agree, respectively.

Structural flexibility was measured using a 4-item scale developed by Feletto et al[30] with an alpha coefficient of 0.852. Employee's career growth was measured using a 5-item scale developed by Chen et al[31] with an alpha coefficient of 0.887. Digital technology was measured using a 4-item scale developed by Yu et al[32] with an alpha coefficient of 0.876. The atmosphere of co-creation and sharing was measured using a 6-item scale developed by Chen et al[31] with an alpha coefficient of 0.902. Team knowledge integration capability was adopted from the 11-item scale developed by Ke et al[33], with an alpha coefficient of 0.937. In addition, gender, age, nature of the business, and position held were selected as control variables to reduce the interference of demographic information in the theoretical model.
4. Data analysis

4.1 Homologous method bias test

The assessment questionnaires in this article are answered by employees' self-assessment, and there may be a homologous method bias effect, in order to avoid its impact on the accuracy of the research conclusions, the following methods are used to control: (1) questionnaire measurement procedure control, based on the mature question items for many times to communicate with corporate executives for checking, to avoid ambiguities and ambiguities in the content of the scale items. In addition, the principle of respondent information concealment was adopted to avoid psychological guessing of the measurement purpose by the test subjects; meanwhile, the order of the scale items was randomly arranged to reduce the order effect error of the test subjects' responses. (2) Harman's single-factor test was used: all the items of the research variables were included in SPSS 29.0, unrotated exploratory factor analysis was conducted, and a total of 5 factors with a characteristic root greater than 1 were extracted, and not only a single factor was analysed; the overall variance explained by the five factors was 66.619%, of which the factor with the largest characteristic root had a variance explained of 35.161%, there is no serious homology method bias problem of one factor explaining most of the variance of all variables, indicating that the homology bias of the data in this paper has been well controlled.

4.2 Discriminant validity test

CFA was conducted through SPSSAU to examine the discriminant validity of structural flexibility (SF), co-creation and sharing (CAS), career growth of employees (CGOE), use of digital technology (TUODT), and team knowledge integration ability (TKIA). The results of the treatment are shown in Table 1, and the five-factor model fitted the data best ($X^2 = 538.325$, df = 395, CFI = 0.984, TLI = 0.983, and RMSEA = 0.026), which indicates that there is good discriminant validity of the variables in this study.

<table>
<thead>
<tr>
<th>Model</th>
<th>$X^2$/df</th>
<th>TLI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-factor model</td>
<td>10.889</td>
<td>0.528</td>
<td>0.561</td>
<td>0.137</td>
</tr>
<tr>
<td>Two-factor model</td>
<td>7.574</td>
<td>0.686</td>
<td>0.709</td>
<td>0.112</td>
</tr>
<tr>
<td>Three-factor model</td>
<td>5.080</td>
<td>0.805</td>
<td>0.820</td>
<td>0.088</td>
</tr>
<tr>
<td>Four-factor model</td>
<td>3.396</td>
<td>0.886</td>
<td>0.895</td>
<td>0.067</td>
</tr>
<tr>
<td>Five-factor model</td>
<td>1.363</td>
<td>0.983</td>
<td>0.984</td>
<td>0.026</td>
</tr>
</tbody>
</table>

Note: five-factor model: SF, CAS, CGOR, TUODT, TKIA; four-factor model: SF+CGOR, CAS, TUODT, TKIA; three-factor model: CAS, TKIA, SF+CGOR+TUODT; two-factor model: TKIA, SF+CGOR+TUODT+CAS; one-factor model: SF+CAS+CGOR+TUODT+TKIA.

4.3 Descriptive statistics and correlation analysis

The means, standard deviations and correlation coefficients between the variables involved in this study are shown in Table 2, which shows that employee career growth is positively correlated with co-creation and sharing ($r=0.405$, p<0.01), career growth of employees is positively correlated with co-creation and sharing ($r=0.431$, p<0.01), structural flexibility is positively correlated with co-creation and sharing ($r=-0.282$, p<0.01), co-creation and sharing is positively correlated with team knowledge integration ability ($r=-0.367$, p<0.01), structural flexibility is positively related to the use of digital technology ($r=0.326$, p<0.01), and the use of digital technology is positively related to the team's knowledge integration ability ($r=-0.359$, p<0.01).

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1.48</td>
<td>0.50</td>
<td>4</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4 Hypothesis testing

Hierarchical regression is used to test the hypotheses, and the data fit the model well, and the specific results are shown in Table 3. M2 test H5, the results show that the employee's professional growth has a significant positive effect on the team's co-creative and sharing atmosphere \((r=-0.402, \ p<0.01)\), and H5 is established. M3 tests H4, the results show that team structural flexibility has a significant positive effect on co-creation and sharing atmosphere \((r=0.268, \ p<0.01)\), H4 is established. M5 tests H2, the results show that employees' career growth has a significant positive effect on team knowledge integration ability \((r=0.423, \ p<0.01)\), H2 is established. M6 tested H1, the results showed that team structure flexibility and team knowledge integration ability were significantly positively correlated \((r=-0.350, \ p<0.01)\), H1 was established. M7 tested H3, the results showed that team co-creation and sharing atmosphere had a significant positive effect on team knowledge integration ability \((r=-0.360, \ p<0.01)\), H3 was established. M8 and M9 tested the mediating role of team co-creation and sharing atmosphere, and the results showed that after the independent variable and co-creation and sharing atmosphere entered the model at the same time, \(r\) structural flexibility decreased from 0.350 to 0.274, at this time \(r\) co-creation and sharing 0.286; r employee's career growth decreased from 0.423 to 0.331, at this time \(r\) co-creation and sharing 0.230, all of which showed that the indirect effect was still smaller than the direct effect, that is, the Co-creation and sharing play a partial mediating role, H6 holds. M10 tested the moderating effect of the use of team digital technology and showed a significant coefficient on the interaction term \((r=-0.210, \ p<0.01)\), suggesting that the use of team digital technology weakened the positive effects of team structural flexibility and team knowledge integration ability, and that H8 did not hold.

Table 3 Results of the hypothesis-testing regression analysis

<table>
<thead>
<tr>
<th>Classification</th>
<th>CAS</th>
<th>TKIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>M2</td>
<td>M3</td>
</tr>
<tr>
<td>Sex</td>
<td>0.10</td>
<td>0.06</td>
</tr>
<tr>
<td>3</td>
<td>**</td>
<td>3</td>
</tr>
<tr>
<td>Age</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>0</td>
</tr>
</tbody>
</table>
## 5. Discussions

### 5.1 Research conclusions

This study extends the application of knowledge-based theory in the context of knowledge economy and digitalisation, and further explores the mechanism of structural flexibility and employee's career growth on the team's knowledge integration ability based on knowledge-based theory, extending the scope of application of the theory. In addition, the study found that the use of digital technology can limit the dissemination of knowledge to a certain extent, especially for tacit knowledge. Digital means of communication make it difficult to create a trusting, open and more inspiring communication environment for teams, and therefore hinder the dissemination of tacit knowledge instead. This finding makes a marginal contribution by deepening the inquiry on tacit knowledge based on knowledge base theory.

Firstly, this study identifies the positive mechanism of corporate structural flexibility on team knowledge integration capability. Based on the hierarchical culture and system of Chinese enterprises, we use the organisational structure flexibility of the enterprise as the independent variable to theoretically demonstrate the mechanism of its influence on the team's knowledge integration ability, and introduce co-creation and sharing as the mediating variable. The empirical study confirms that good organisational flexibility is conducive to the formation of a good atmosphere of co-creation and sharing within teams, which increases the effective knowledge flow within teams and improves their knowledge integration ability.

Secondly, it explored the path of the positive influence of employees' career growth on team knowledge integration capability. This study confirms the partial mediating role of co-creation and sharing between employees' career growth and team knowledge integration ability, extending the research on the mechanism of employees' career growth and team knowledge integration ability. When employees and the company pay attention to their professional growth, it is more conducive to the formation of an internal co-creation and sharing atmosphere oriented to common goals, forming
a more open communication environment and increasing the motivation of employees to acquire knowledge, which in turn enhances the team's knowledge integration ability.

Thirdly, this study is the first to find that the use of digital technology weakens the positive impact of structural flexibility on teams' ability to integrate knowledge. Contrary to previous hypotheses and existing research, the use of digital technology did not enhance the positive impact of structural flexibility on team knowledge integration ability as previously expected due to the fact that digital technology provides teams with more communication opportunities and increases the speed of knowledge dissemination. As Michael Polanyi suggests: individuals seem to know more than they can explain because knowledge can be tacit, implying that the dissemination of tacit knowledge needs to be inspired by specific environmental or other conditions[34]. An over-reliance on the use of digital technology may make it difficult to develop a co-creative and shared team atmosphere due to factors such as the difficulty of getting to know team members more authentically, influencing the environment in which discussions take place, and deeper levels of trust. In such a case, while explicit knowledge can be efficiently disseminated, the dissemination of tacit knowledge will become difficult. When a team relies more on the use of online technology to use such localised collaboration, it makes the team more reliant on online forms of communication that make it difficult to disseminate tacit knowledge [7]. The advantages of team structural flexibility for the team's ability to integrate knowledge will be diminished by the reliance on digital technology.

5.2 Management recommendations

This study has some guiding significance for Chinese enterprise management. Influenced by the traditional hierarchical culture, the hierarchical system in the enterprise is obvious, which hinders the flow of knowledge at different levels. Therefore, enterprises can flatten the communication and exchange of knowledge at different levels through good organisational flexibility, forming a more open and tolerant team atmosphere of co-creation and sharing, which provides the necessary conditions for the efficient circulation of knowledge. In addition, enterprises should also pay attention to the professional growth of employees and stimulate their own motivation for professional growth, thus enhancing the pursuit of common goals of the enterprise employees and their own learning motivation to form a collaborative community and enhance the team's knowledge integration ability from the members themselves.

Nowadays, the difficulty of disseminating explicit knowledge and its importance to enterprises has decreased due to the high development of information technology. Tacit knowledge becomes a more important key resource for enterprises in the era of the knowledge economy[1][2]. However, due to the characteristics of tacit knowledge itself, it is difficult to disseminate it through the use of digital technology. Therefore, while enjoying the dividends brought by the digital era, enterprises should also be wary of over-reliance on digital technology. Once the "path dependence"[7] is formed on communication through digital technology, it will make the enterprise can use structural flexibility to carry out efficient knowledge exchange in an open, face-to-face, and inspiring environment, and then transfer to the online channel which is difficult to disseminate the tacit knowledge. For example, in enterprises, topics that could have been discussed in a seminar room in a shared atmosphere co-created by structural flexibility are disseminated through online meetings or even in-group communication, which reduces the quality of tacit knowledge dissemination.

In conclusion, enterprises should create a flatter environment for knowledge circulation by optimising structural flexibility and focusing on the professional growth of employees, so as to form a more friendly atmosphere of co-creation and sharing in order to enhance the knowledge integration ability of the enterprise team, and at the same time, enterprises should be wary of over-reliance on the use of digital technology and focus on the quality of communication and knowledge dissemination.

5.3 Research Limitations and Prospects

There are some limitations and shortcomings in this study: (1) most of the arguments for the results of the study remain theoretical, future research can collect data at different points in time and through...
qualitative research to better explain the findings based on practical experience to improve the precision and rigour of the study; (2) the use of digital technology has risen to a large extent to the field of intelligence at the moment, and research has shown that digital technology has a weakening effect on the relationship between structural flexibility and the ability to integrate team knowledge. The research shows that digital technology has a weakening effect on the relationship between structural flexibility and team knowledge integration ability, and future research will put smart technology into the research to understand the effect of smart technology on team knowledge integration ability.

References


[34] Polanyi, Michael (1966), The Tacit D