Knowledge Management, Organizational Culture and Structure: A Serial Multiple Mediation Model

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Abstract

Small- and medium-sized enterprises (SMEs) on the internet contribute enormously to China's growth. Developing the pathways that lead to sustainable knowledge management in SMEs is the key to maintaining core competitiveness. The survey collected responses from 443 internet SME project managers, project team members, IT professionals and top managers representing 64 internet SMEs. This paper examines the antecedents of knowledge management and the causal paths among them and compares the estimated values of different paths with knowledge sharing as the independent variables; flat organizational structure and knowledge-friendly organizational culture as the mediating variables; and knowledge management as the dependent variable, the final results show that that knowledge sharing can improve knowledge management in internet SMEs, and the implications for theory and practice are given.

Keywords

Knowledge Sharing; Knowledge-Friendly Organizational Culture; Flat Organizational Structure; Knowledge Management; Small- And Medium-Sized Enterprises.

1. Introduction

In China, the internet industry has developed very well, with the emergence of many large internet companies, such as Alibaba and Tencent. However they will also bring great competitive pressure to internet mall- and medium-sized enterprises (SMEs). Therefore, how to keep Internet small and medium enterprises away from threats from large companies is a problem that must be solved. At present, SMEs consistently adopt knowledge management (KM) methods rather than the traditional concept of human resource management due to economic globalization, talent competition, a new round of global financial crisis and the emergence of a knowledge economy caused by the progress of internet technology [1]. As a new discipline, KM emerged in the 1990s and has gradually become a hot issue for scholars and practitioners as well as business and technology leaders [2]. In the context of the information age, knowledge itself has become an intangible asset for internet SMEs, which means that KM can play a very important role in the competitive advantage of those organizations [3]. After all, the resources available to SME are very limited. Among different departments in internet SMEs, understanding, sharing and competing are quite complicated because of the intangibility of knowledge. Since KM integrates and consolidates the important resources of a company's competitive advantage, enterprises can gain competitive advantages only by using knowledge effectively and continuously [4,5]. Using the most common innovation dynamics, such as knowledge strategies and human resource management, is a difficult requirement for achieving sustainable development [6]. Moreover, a collaboration-oriented human resource management system consistently has a positive effect on knowledge sharing (KS) for sustainability-oriented performance [7]. Organizational goals can be achieved only by seeking, absorbing and sharing knowledge. For this reason, an increasing number of SMEs are beginning to attach importance to internal KS and are also creating a work environment and organizational culture based on the reactions of employees who use the KM system [8]. In reality, the success of an enterprise's KM

implementation will be affected by many factors [9], such as technology or equipment [10] and soft power, for example, organizational culture [11-13]. A flat organizational structure (FOS) is more conducive to the communication of information and knowledge between superiors and subordinates and colleagues and is more beneficial to the KM of SMEs [14]. For colleagues, sharing and collecting information with each other will be helpful in effectively and conveniently improving SMEs' possibilities to obtain information and innovate [15].

Therefore, KM is a key factor in establishing a competitive advantage, particularly in the competitive environment of SMEs. The purpose of KM is to take knowledge as the most important resource of companies, to maximize its acquisition, mastery and application as the key factor in improving the competitiveness of companies, and to promote the development of companies through effective KM [15]. At present, consensus has been reached regarding how to better build a KM model for SMEs to achieve sustainable organizational development. Therefore, we need to understand the ways and mechanisms of KS. According to related research, the competition of SMEs is very fierce, which leads to their short life expectancy [16,17], So SEMs need to make good use of the intangible asset of knowledge to help them get out of trouble. In this line, empirical research in this domain remains rather scarce, and many studies examine real enterprises but seldom involve new internet enterprises [7,18,19].Therefore, we select internet SMEs to conduct research to explore how KS and KM affect the sustainable development of these enterprises.

In summary, this study establishes a serial multiple mediation model of KS, knowledge-friendly organizational culture (KOC), a FOS and KM. This paper uses empirical research methods to verify the mechanism of the effect of KS on KM, and it further discusses the important mediating effect of knowledge-friendly organizational culture (KOC) and a flat organizational structure (FOS) on KS and KM in internet SMEs.

The objectives of this study are as follows:

1. To assess the relationship between knowledge sharing and knowledge management in internet SMEs;

2. To assess the relationship between knowledge sharing and knowledge-friendly organizational culture in internet SMEs;

3. To assess the relationship between knowledge sharing and flat organizational structure in internet SMEs;

4. To assess the relationship between knowledge-friendly organizational and flat organizational structure in internet SMEs;

5. To assess and test the mediating effect of knowledge-friendly organizational culture and flat organizational structure on knowledge sharing and knowledge management in internet SMEs.

This specific survey places an emphasis on accomplishing the research objectives mentioned above, and it sought to find the answers to the following questions:

Does a relationship between knowledge sharing and knowledge management in internet SMEs?What is the association between knowledge sharing and knowledge-friendly organizational culture in internet SMEs? Is there any relationship between flat organizational structure and knowledge-friendly organizational culture in internet SMEs? Does knowledge-friendly organizational culture and flat organizational structure mediate the relationship between knowledge sharing and knowledge management in internet SMEs? Based on the results of this study, what decisions can enterprise managers make regarding enterprise knowledge sharing?

This specific research article comprises several sections: Section 2 presents the literature review and hypothesis development, including the main theoretical approaches, constructs and hypotheses. Section 3 describes the sample characteristics and the measurement assessment. In Section 4, the analysis and results are shown. Finally, Section 5 and Section 6 include a discussion and conclusions, the limitations of this study and suggestions for future research.

2. Literature Review and Hypothesis Development

2.1 Knowledge sharing, knowledge-friendly organizational culture, a flat organizational structure

The purpose of KM is to take knowledge as the most important resource to be acquired, controlled and used as much as possible to improve the competitiveness of companies and benefit their development [15,19]. To describe its focus, KM is generally divided into two dimensions. On the one hand, knowledge management helps to create, store, share and use the knowledge clearly recorded by the organization. On the other hand, there is an emphasis on sharing knowledge through interpersonal communication. The strategy at this level is to use the dialogue that takes place in social networks to help share knowledge through interpersonal contact [20,21]. In today's global open market, organizations in different industries are using knowledge to stay competitive, and further investigation shows that the use of KM systems to support KS activities has gradually become a priority for organizations to stay competitive in the global market [22]. KM is an ongoing process that involves the sharing of tacit and explicit knowledge by individuals and groups within the company, as well as the ability and process of creating new knowledge within and outside the organization and incorporating it into products, services and systems [23]. Therefore, the question of how to transform knowledge in the knowledge sharing process from individual ownership to collective ownership falls under the category of KM [24,25].

KS is one of the main contents of KM, and it is also a basic way for members to make important contributions to the organization [26]. However, when implementing KS, organizations will encounter many challenges, such as whether the culture of the organization is suitable for KS [27]. Studies have shown that an organization's culture is an important factor in effective KM and the sharing of organizational learning [28]. Because the KS process can be affected by the social situation, the top-down KS activities of some organizations are more obviously affected by the organizational culture [29]. Of course, not all types of organizational cultures can have a positive impact on KS. For example, competitive culture has a negative impact on KS but has a positive impact on knowledge collection. However, a culture that values creativity and the exchange of ideas can positively influence KM behavior [27]. Therefore, the organization of KM and KS must be based on whether it is conducive to internal communication, and coordination based on a FOS is an effective way to improve internal communication and coordination [30]. Another important factor that promotes KS is teamwork [31]. In conclusion, the following hypotheses are proposed:

Hypothesis 1 (H1): KS will positively affect KOC.

Hypothesis 2 (H2): KS will positively affect a FOS.

Hypothesis 3 (H3): KOC will positively affect a FOS.

2.2 Knowledge-friendly organizational culture, flat organizational structure, knowledge management

Organizational structure refers to the relationship between the rights and responsibilities of the internal members of an organization. KM is generally considered to be used to solve the lengthy information transfer process of companies, improve the quality of service sand provide solutions for the production of innovative products [32]. Effective KM needs to be implemented in the appropriate organizational structure so that KM will promote organizational structural reform. Organizational structure is restricted in the organization of KS. The type of organizational structure depends on whether it promotes an open mode of communication for horizontal and vertical information [33]. Organizational members must work together to build on each other's ideas and advantages and to help the organization cope with change, adaptation and innovation [34]. In a flat organization, employees do not need to follow specific orders to communicate, cooperate and make decisions, minimizing the levels and barriers between "bottom" employees and "top" employees; thus, the innovation and adaptability of the enterprise will be stronger. Therefore, in terms of organizational structure, employees can minimize the sense of bureaucratic hierarchy [30], which can be seen to have a certain influence on KM.

In other words, at the organizational level, one of the key factors for the success of KM is the existence of a KOC, one that is created by the basic assumptions and beliefs shared by the members of the organization [35]. Such a culture is found to operate unconsciously and to define the organization's view of itself and its environment [36], suggesting that KOC may reinforce the relationship between KS and KM in the organization. In addition, KOC is more conducive to the formation of a FOS because the communication between superiors and subordinates is more frequent and the information exchange and KS are smoother [37,38]. In this way, the organization can better manage knowledge to achieve the purpose of KM and innovation and further enhance the competitiveness of the organization. In conclusion, the following hypotheses are proposed:

Hypothesis4 (H4): KS will positively affect KM.

Hypothesis 5 (H5): KOC will positively affect KM

Hypothesis 6 (H6): A FOS will positively affect KM

2.3 The mediating effect of knowledge-friendly organizational culture and flat organizational structure

Organizational culture is the values, assumptions, and expectations of an organization [39], and it is also the common basic pattern learned by a group in solving its external adaptation and internal integration problems. As long as the assumptions under this model are proven to be valid, they will be taught to new members as correct perceptual experiences. This organizational culture of knowledge transfer is KOC, and relevant studies have proven that there is a close relationship between organizational culture and KM [40,41]. Therefore, to succeed in KM, organizations should cultivate a culture that reinforces the desire to create and share knowledge [42]. Furthermore, the success of KM leads to an effective and comprehensive change in behavior and organizational culture, which means that organizations need a good atmosphere for KS [43], and this cultivated organizational culture should be knowledge-friendly. Collaboration, trust, and tolerance for errors among employees and between employees and the organization are the most widely cited cultural values that promote KS and creativity [44]. Some studies have shown that to ensure the effective implementation of enterprise resource planning, KM is divided into four "knowledge processes": knowledge creation, knowledge storage, knowledge transfer and knowledge application. Additionally, descriptive research in this domain proves that KOC is the main catalyst of the knowledge process and that there is an influential relationship between KOC and KM [44]. In conclusion, the following hypotheses are proposed:

Hypothesis 7 (H7): KOC mediates the relationship between KS and KM.

Hypothesis 8 (H8): A FOS mediates the relationship between KS and KM.

The sequence of Hypotheses 1-6 also indicates the existence of a serial mediation model. A serial multiple mediator model explains how different mediating variables of a model are causally linked with each other in a specific direction along a chain. Thus, benefiting from the hypothesized relationships of the study, we also hypothesized the presence of a serial mediation model describing how KS positively influenced FOS and KOC, as supported by team work [31]. Then, knowledge culture lead to flatten the organization which develop positive perceptions further among organization culture who develop a perception of KM, as supported by both organizational culture and knowledge relationship study [41] and the communication between superiors and subordinates [37,38]. In conclusion, the following hypotheses are proposed:

Hypothesis 9 (H9): KS are positively associated with KM through the chain of a FOS and KOC.

In summary, the theoretical framework of this paper can be summarized as a model that includes mediating effects and moderating effects, as shown in Figure 1.
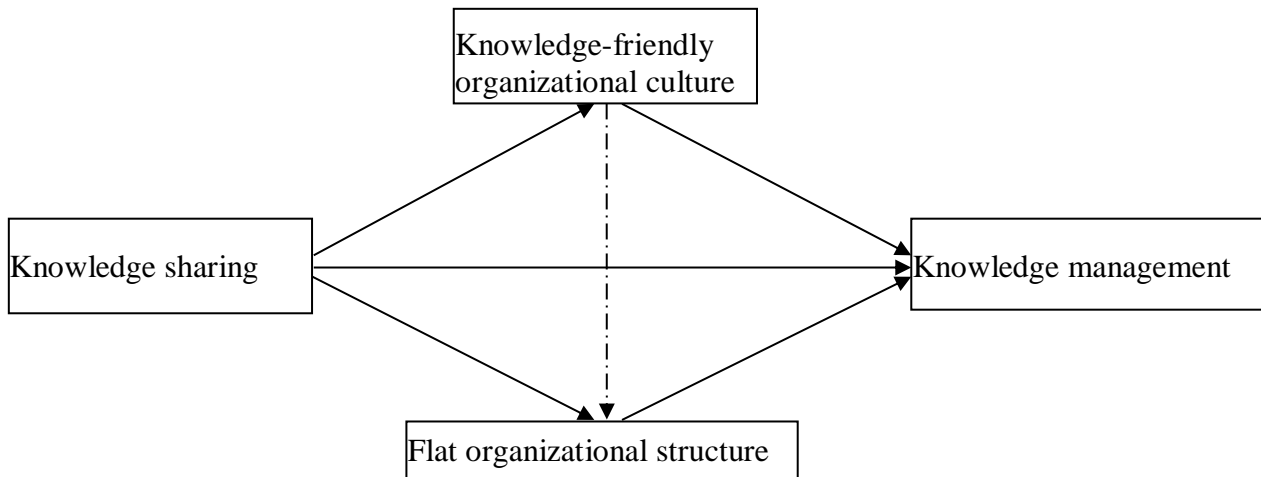
Figure 1. Research model

3. Data Collection and Measurement Indicators

3.1 Data Collection

The main source of information was an online survey conducted using Wenjuanxing, an online crowdsourcing platform in mainland China that provides functions equivalent to Amazon's Mechanical Turk. We sent the survey to 64 Chinese internet SMEs. A total of 634 questionnaires were received, of which 443 were valid, for an effective response rate of 73.9%. Table 1 summarizes the participants' demographic information.

Table 1. Sample characteristics (N=443)

Project		Number	Percentage/%	Cumulative percentage/%
Gender	Female	139	31.38	31.38
	Male	304	68.62	100.00
	Total	443	100.00	
Age	18-30 years old	206	46.50	
	31-40 years old	159	35.89	82.39
	Above 41 years old	78	17.61	100.00
	Total	443	100.00	
Marital status	Married	119	26.86	26.86
	Unmarried	324	73.14	100.00
	Total	443	100.00	
Educational level	High school and below	60	13.54	13.54
	Junior college degree	120	27.09	40.63
	Bachelor's degree	207	46.73	87.36
	Master's degree or above	56	12.64	100.00
	Total	443	100.00	
Average monthly income	Less than 3500 CNY	57	12.87	12.87
	3501-5000 CNY	45	10.16	23.02
	5001-8000CNY	157	35.44	58.47
	Above 8000 CNY	184	41.53	100.00
	Total	443	100.00	

3.2 The measurement indicators

In this study, we use one-dimensional Likert-type scales from other studies [45]. The scales range from 7 (strongly agree) to 1 (strongly disagree). Table 2 summarizes the descriptions of the variables and their references.

Table 2. Description of variables

Constructs	Measurement	Reference
Knowledge management (KM)	Companies can quickly regroup resources to adapt to changes in the environment.	[46]
	Companies can quickly introduce foreign knowledge.	
	Companies have a perfect knowledge dissemination platform.	
Flat organizational structure (FOS)	Companies emphasize the speed and authenticity of information.	[47]
	It is convenient for enterprise workers to exchange information with their subordinates.	
	The staff members of companies have full autonomy.	
Knowledge-friendly organizational culture (KOC)	My company encourage employees to create and share their knowledge.	[48]
	My company often holds some experience sharing and summary meetings.	
	Employees feel that there is a knowledge-friendly atmosphere in the organization.	
Knowledge sharing (KS)	My company provides relevant knowledge to our business partners for sustainability-oriented performance.	[49]
	My company has teamed up with business partners to enhance interfirm learning for sustainability-oriented performance.	
	My company and other business partners jointly organize job training to enhance each other's knowledge for sustainability-oriented performance.	

Note: The measurement items were slightly modified from the original questionnaire we referenced to suit our study.

4. Reliability and validity

The reliability and validity analysis results are shown in Table 3. The analysis results showed that all the standardized factor loadings of items were over 0.7, and all composite reliability (CR) values for each construct were greater than the threshold value 0.6 [50], indicating that the constructs were internally consistent. I can be seen from Table 3 that all average variance extracted (AVE) values for the constructs in this study were greater than 0.5 [50], indicating good convergent validity for constructs. This study evaluated discriminant validity through the Fornell–Larcker criterion [50]. Here, the square root of the AVEs and the correlation of the respective constructs are compared. The comparing results showed that each square root of the AVEs for constructs was greater than its correlation coefficients with other constructs. Therefore, the discriminant validity of the constructs in this study was good.

Table 3. Reliability, and convergent and discriminant validity

Construct	Standardized factor loadings	Composite reliability	Convergent validity	Discriminant validity			
		CR	AVE	KS	KOC	FOS	KM
KS	0.783-0.832	0.855	0.664	0.815			
KOC	0.737-0.872	0.851	0.658	0.259	0.811		
FOS	0.744-0.892	0.875	0.701	0.333	0.396	0.838	
KM	0.827-0.898	0.898	0.745	0.533	0.348	0.540	0.863

Note: KS = knowledge sharing, KOC = knowledge-friendly organizational culture, FOS = flat organizational structure, KM = knowledge management. The square roots of the AVEs are on the diagonal, and the Pearson correlation coefficients are below the diagonal.

4.1 Path analysis

The structural equation model with maximum likelihood estimation was analyzed to test the study hypotheses. The fitting results of the structural model used in the study was within acceptable ranges (χ^2 = 110.422, df = 48, χ^2/df = 2.300, P < 0.001, CFI = 0.979, TLI = 0.972, RMSEA = 0.054, SRMR = 0.034).

The results of path analysis were shown in Table 4. The analysis showed that KS positively and significantly affected KOC (β = 0.278, P < 0.001), supporting H1. Meanwhile, both KS (β = 0.329, P < 0.001) and KOC (β = 0.329, P < 0.001) positively and significantly influenced KM, supporting H2 and H3. In addition, both of the effects of KS (β = 0.537, P < 0.001) and KM (β = 0.395, P < 0.001) on KM were significant, supporting H4 and H6. However, the effects of KOC (β = 0.133, P > 0.05) on KM was nonsignificant, rejecting H5.

Table 4. Path analysis and hypothesis

Hypothesis	DV	IV	Est.	S.E.	Est./S.E.	P	Std. Est.	R^2	Result
H1	KOC	KS	0.278	0.065	4.309	***	0.259	0.067	Supported
H2	FOS	KS	0.329	0.076	4.314	***	0.247	0.214	Supported
H3		KOC	0.411	0.067	6.095	***	0.332		Supported
H4	KM	KS	0.537	0.079	6.807	***	0.382	0.440	Supported
H5		KOC	0.133	0.069	1.938	0.053	0.102		Rejected
H6		FOS	0.395	0.058	6.845	***	0.373		Supported

Note: DV = dependent variable, IV = independent variable; KS = knowledge sharing, KOC = knowledge-friendly organizational culture, FOS = flat organizational structure, KM = knowledge management..

4.2 Testing of mediation effects

MPLUS7.4 software was used to test the mediation effects of KOC and FOS, adopting the bootstrapping method [51-53] with bias-corrected 95% confidence interval and 5000 samples. MPLUS 7.4 allows us to estimate every specific mediation path proposed in this study (i.e., E1 = KS→KOC→KM, E2 = KS→FOS→KM, E3 = KS→KOC→FOS→KM); thus, we could compare the specific mediation paths, as shown in Table 5.

The analysis results showed that the 95% confidence intervals of the three mediation paths did not contain 0, indicating that the mediation effects of the three paths were significant, supporting H7-H9. Comparing the mediation effects of KOC and FOS and their serial mediation effect, the total indirect effect was 0.212 (95% CI = [0.142, 0.307]), and the mediation effect of FOS was the largest (E2 = 0.130, 95% CI = [0.069, 0.215]). Meanwhile, the distal mediation effect of KOC and FOS was the next largest (E3 = 0.045, 95% CI = [0.024, 0.079]). In addition, the differences between the mediation effect of FOS and the mediation effect of KOC and the distal mediation effect of KOC and FOS were significant (C1 = -0.093, 95% CI = [-0.189, -0.007]; C3 = 0.085, 95% CI = [0.013, 0.164]). However, the difference between the mediation effect of KOC and the serial mediation effect of KOC and FOS was nonsignificant (C2 = -0.008, 95% CI = [-0.060, 0.031]).

Table 5. Specific mediation effects comparing (Samples=5000)

Hypothesis		Point Estimate	Product of coefficients				BC Bootstrap 95% CI		Result
			S.E.	Est./S.E.	P		Lower	Upper	
			Indirect effects						
H7	E1	0.037	0.020	1.870	0.061		0.004	0.084	Supported
H8	E2	0.130	0.036	3.646	***		0.069	0.215	Supported
H9	E3	0.045	0.013	3.436	***		0.024	0.079	Supported
	Total	0.212	0.038	5.514	***		0.142	0.307	
			Contrasts						
	C1	-0.093	0.046	-2.033	0.042		-0.189	-0.007	
	C2	-0.008	0.023	-0.356	0.722		-0.060	0.031	
	C3	0.085	0.038	2.238	0.025		0.013	0.164	

Note: ***P < 0.001; E1 = KS→KOC→KM, E2 = KS→FOS→KM, E3 = KS→KOC→FOS→KM, Total = E1+E2+E3; C1 = E1-E2, C2 = E1 - E3, C3 = E2 - E3; KS=knowledge sharing, KOC = knowledge-friendly organizational culture, FOS = flat organizational structure, KM = knowledge management.

5.   Discussion and conclusions

The importance of KM for SMEs has been thoroughly theoretically discussed in an increasing number of studies. However, many gaps remain, and many researchers are struggling to obtain empirical results regarding how KS and KM influence SMEs so that they can maintain sustainable development. Therefore, we originally designed a conceptual framework with KS and KM that includes a FOS and

KOC. KS showed a positive effect on the dependent variable; thus, we conducted an additional analysis of our model by adding mediating variables and verified its reliability and convergent and discriminant validity (see the results in Table 3).

Our study makes contributions to the literature in several ways. We discuss the relationship between KS and KM in internet SMEs. Although previous studies have proven that KS is an important factor that affects KM, they mainly focus on the library of KM, enterprise resource planning and the sustainable competitive advantage of private colleges and universities. In this paper, we explore whether Ks affects Km in internet SMEs. We believe that internet SMEs will reach different conclusions on KS and KM because internet enterprises need to constantly make use of knowledge to innovate so that in the competition with large companies, SMEs will obtain the advantage of sustainable development.

The results demonstrated that knowledge sharing has a positive impact on knowledge management, a FOS and KOC plays a mediating role between KS and KM. Specifically, KS has a significant positive impact on KM, a FOS and KOC mediates their impact on KM. Perhaps the most notable finding of the current investigation was that FOS and KOC acted as a contextual mediator of the relationship between KS and KM. Specifically, in work contexts where there was a more positive KOC and FOS, employees were more likely to view KOC and FOS as part of their formal role responsibilities. When KOC and FOS was not as positive, this relationship was not found. These findings are consistent with the view that organizational culture and structure of the organization establishes a context that emphasizes certain role behaviors as being significant and that KS then predicts the degree to which individuals integrate behaviors within this domain into their formal roles. In addition to these findings regarding FOS and KOC definitions, we found that FOS were positively related to KM. We did not found that KS and KOC jointly predicted KM; instead we found that support for the mediating effect of KOC. This is at odds with the work of Dadashkarimi (2012), who found some support for organizational culture mediating the relationship between organizational variables(e.g., Communication) and KM. Future research needs to further explore the relationship between organizational culture and KM, KS, and the structure of the organization. The findings are consistent with previous research on knowledge sharing and knowledge management, and our study provides a new and more nuanced explanation on the mechanism by which knowledge sharing affects knowledge management.

The research in this paper also has implications for practice. First, the findings encourage SME entrepreneurs and managers to design and implement a coherent KM approach and to explicitly adopt a strategic and operative focus on the KS embedded in the relevant knowledge that employees. The unleashing of relevant knowledge in the firm operative processes is the key for the development of a sustainable competitive advantage. Second, the study stimulates SMEs to take advantage from exploration and innovation activities. This is true especially for SMEs operating in internet industries. The search for new markets and the involvement of suppliers, customers and employees for the deployment of a more articulated value propositions to the market emerge as the two relevant drivers for the achievement of two goals: the absorption of knowledge that is relevant for the competitive action and the firm long-term profitability. Third, results show that KOC and FOS is nowadays a fundamental tool to facilitate decision-making and support KS activities. Then, the alignment of the design and use of KOC and FOS with the KM strategy and other contextual factors is an excellent managerial practice that SME entrepreneurs and managers have to take seriously into consideration. To gain a full advantage of the positive effects of KS on KM, managers are encouraged to strategically align and integrate KOC, innovation, and FOS design and use. Our study demonstrates that these three managerial actions are relevant for Sustainable development of internet SMEs.

Acknowledgments

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