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How ECS Improve Creative Use of Employees' Knowledge?

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Abstract

Recently, organizations are using crowdsourcing systems (CSs) to collect innovative ideas from their employees harnessing their insights of companies' products, processes, customers, and competitors. While crowd workers in third-party CSs are a diverse and multifaceted population with a range of motives and experience, and yet few researchers have grappled with the facilitators of the employees' behavior comprising the creative application of their knowledge using enterprise CSs. This study develops a theoretical framework to identify enterprise CSs role and to provide the way how CSs are related to creative behavior via knowledge sharing. In this research, we used a survey to collect data from organizational employees and conducted data analysis to understand how enterprise CSs affect employees' creative knowledge application. The findings of this study can help organization refine their ECSs and innovative initiatives.

Keywords

Innovation, creativity, crowdsourcing, enterprise crowdsourcing, creative knowledge application.

Introduction

It would be interesting if some colleagues collect and share their knowledge, and develop creative ideas based on shared knowledge in company repository systems. In fact, the very system called crowdsourcing has emerged as an effective paradigm for human-powered problem solving and are now in widespread use for large-scale data-processing tasks (Karger et al. 2014), fueling innovation and collaboration in research, business, society, and government alike (Bott and Young 2012).

In recent years, various studies have been published that seek to improve our understanding of crowdsourcing by delineating it from related phenomena and analyzing its various manifestations. For example, third-party crowdsourcing systems and crowd workers on micro-tasks in design science perspective (Nevo et al. 2012), theoretical examinations in the domain of crowdsourcing such as a defining of crowdsourcing as a new model (Estellés-Arolas and González-Ladrón-de-Guevara 2012), and the crowdsourcing phenomenon has been widely studied by means of exploring various case studies (Geiger et al. 2011). Despite various studies, however, these supportive crowdsourcing systems in business organizations have been largely ignored by the IS research community (Geiger et al. 2011). While crowd workers in third-party CS are a diverse and multifaceted population with a range of motives and experience (Kittur et al. 2013), and yet few researchers have grappled with the facilitators of the employee's behaviors comprising the creative application of their knowledge using crowdsourcing.

This lack of employee participation prompted us to investigate the following research question: We do not know how ECSs are connected to creative performance? Specifically, 1) what ECS features encourage employees to use CS to share their knowledge? 2) How does this shared knowledge bring creative application? To address this problem, this study develops a theoretical framework to identify CS's role and to provide the way how CS is related to creative behavior via knowledge sharing. We propose to perceive crowdsourcing as an approach to further align the organization as a system with its environment and to seek ways of benefitting from the input of elements and systems external to the organizational system.

Theoretical Background and Hypotheses

Crowdsourcing Systems in Business Organizations

Crowdsourcing systems have emerged as an effective paradigm for human-powered problem solving (Karger et al. 2014). In general, Estellés-Arolas and González-Ladrón-de-Guevara (2012) defined crowdsourcing systems as "a type of participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call [i.e., announcement], the voluntary undertaking of a task. (p. 9)". The key characteristic of these systems is that a requester structures his problem in a set of tasks, and then assigns tasks to workers that provide answers, which are then used to determine the correct task solution through a decision rule (Tarable et al. 2015). This traditional third-party crowdsourcing, however, has shown several disadvantages such as reliability, trust, or reward regarding the relationship between information users and providers (Deng and Joshi 2016). On the other hand, some believe that crowdsourcing systems will provide a significant new type of work organization paradigm, and will employ large numbers of workers in the future, provided that the main challenges in this new type of organizations are correctly solved (Li et al. 2013). Since if an organization is sufficiently broad and heterogeneous, its employee pool also can act as a crowd (Bjelland and Wood 2008). Saxton et al. (2013) defined enterprise crowdsourcing as "a sourcing model in which organizations use pre-dominantly advanced Internet technologies to harness the effort of a virtual crowd to perform specific organizational needs" (p. 5). Enterprise crowdsourcing is to leverage the expertise and heterogeneous knowledge of an industrial firm's employees (Howe 2008), since employees possess rich and often tacit information on their companies activities to enhancing their competitive advantages (Simula and Ahola 2014). Thus, unlike third-party provider-hosted, the organization hosted crowdsourcing systems (ECSs) is all their employees across various domains with a different background that will participate to solve organizational problems innovatively.

ECS Features

Doan et al. (2011) classified CS systems along with several dimensions such as nature of collaboration and type of target problem, the degree of manual effort, the role of human users, and standalone versus piggyback architectures and so forth. The uniqueness of ECSs compared to other information systems and E-Commerce is its ability to provide knowledge management features to acquire, share and apply knowledge. The primary features of ECSs include user collaboration management, contribution management, and trust management (Hetmank 2013).

The Effects of ECS Features

User management coordinates any required collaboration between employees. Employees would continue using ECSs when they believe that the systems would help improve their work (Tojib et al. 2008) and satisfy their intrinsic and extrinsic motivations. In this sense, we posit that ECS features can promote employees' intention to knowledge sharing (KS *hereafter*) activities. Collaboration is required to 1) determine what action is relevant and required 2) determine what knowledge is required to carry out the required action and 3) initiate the demand for action (Qureshi and Keen 2005). Collaboration among employees can help to elicit best skill sets, ideas, or solutions. Based on the complexity of the problem, employees can choose to collaborate with all employees, selected few, or none. ECS provides employees with the ability to easily choose the collaboration level, and protect their ideas during competitions (Saxton et al. 2013). For effective collaboration to take place, relevant knowledge must be communicated by employees and management sponsors who are part of the initiative. When employees think that collaboration is required they intend to share knowledge. ECS's collaboration and coordination features will allow employees to collaborate among themselves and also with the sponsor to provide feedback and get clarification. Based on this, we hypothesize that,

H1a: There is a positive relationship between ECS' collaboration management and employees' knowledge sharing behavior.

Employees who decide to work with others form virtual teams. Virtual teams, individual employees, and requesters will use ECS enthusiastically when they can share their tacit knowledge using collaboration

tools such as instant messaging, document sharing (Benbya et al. 2004), emails, discussion threads (Tojib et al. 2008) and social media technologies (Peng et al. 2014) seamlessly integrated. All participants and requesters' ECS use would improve when they can view updated statuses of their tasks, development environments, collaborators, and competitors. Being aware of others' work can prompt crowd members to learn from each other and enhance their creativity (Peng et al. 2014).

H1b: There is a positive relationship between ECS' collaboration management and employees' CS Use.

Contribution management allows employees to submit their ideas and other employees to view the submitted ideas to provide their comments, cast votes, select the best ideas, and also adapt them into their ideas and apply in their domain (Hsu and Lin 2008). Contribution management evaluates employees' knowledge and incorporates them into projects for them to use effectively. In this case, evaluation is not to be influenced by the undue pressure exerted by the crowd. KS participation in ECS will be increased based on organization and sponsors' active participation and transparency to the process. Because of clear criteria on contribution process, the employee would have the credibility of the system (Jain 2010). Based on this, we hypothesize that,

H2a: There is a positive relationship between ECS' contribution management and employees' knowledge sharing behavior.

Crowdsourcing systems support the management and coordination of people and processes by providing facilities for creating, assigning, executing, evaluating, and rewarding crowdsourced tasks and supervises commitments of both service requestors and contributors (Peng et al. 2014). System design quality and information quality impact system use (Tojib et al. 2008). Specifically, Web application users prefer using effective websites that are organized, well-structured, and easy to navigate (Tojib et al. 2008). These users like user interfaces that allow them to quickly search contributions (Benbya et al. 2004) to receive relevant information (Lee et al. 2003). A poorly structured and incorrectly described interface could create confusion among users and inhibit their contribution. ECS use could be enhanced by providing the status of contributions, rewards, and instances of their applications in improving products, processes, services, etc. (Benbya et al. 2004). Based on this, we hypothesize that,

H2b: There is a positive relationship between ECS' contribution management and employees' CS Use.

Trust management ensures that right compensation, recognition, and credit go to the contributing employees. Trust motivates individuals to share valuable knowledge in an online community with the organization and other employees. The ECS should consistently evaluate and reward the contributors by providing trusting outcomes. Employees will be able to successfully share their knowledge on the ECS when company shows their trust on the outcomes based on the KS in ECS. If the company does not know KS process using the ECS, has low ability using shared knowledge, is not honest, or does not care about employees who are involved in sharing their knowledge voluntarily, accomplishing such a task may be much harder. Since trust establishes the credibility of the organization in providing what has been promised (Ganesan 1994), the trust provides a measure of subjective guarantee that the company can make good on genuinely caring about their employees. Thus, employees will achieve the expected benefits from sharing knowledge through ECS which the management communicates with its ECS users who share their knowledge. This could occur in an interaction manifested in the medium employees have with an organization. Based on this, we hypothesize that,

H3a: There is a positive relationship between ECS' trust management and employees' knowledge sharing behavior.

A high-quality website that is reliable, responsive, shows empathy to users and excellent following up service would enhance trust for ECS (Tojib et al. 2008). Trust drives the continued use of ECS (Molla and Licker 2001) by putting users at ease in transacting with the website, continuing their relationship by using it (Tojib et al. 2008). It is hypothesized that heightened levels of trust, as specific beliefs about the ECS, are associated with heightened levels of intended use. As in other activities, interaction with an employee requires another employee to deal with the work complexity embedded in the interaction and to solve work-related problems. Trust could be a significant antecedent of ECS participation in sharing their knowledge because they have their own tasks to be solved, and even more so in ECS settings because of the greater ease

with which organizations can behave opportunistically (Reichheld and Schefter 2000). Trust helps reduce the work-related complexity an employee faces in the workplace by allowing him/her to subjectively rule out undesirable yet possible actions in ECS use, including inappropriate use of various knowledge shared in ECS. In this way, trust encourages employees to use ECS. Based on this, we hypothesize that,

> *H3b: There is a positive relationship between ECS' trust management and employees' CS Use.*

Creative Knowledge Application as Creative Behavior

We define creative knowledge application (CKA) as an employee's behavior to creatively apply existing knowledge in *ECS that helps attaining their goals*. In management, creativity behavior has been defined as the production of novel and useful ideas or production or adoption of useful ideas and idea implementation (Carmeli et al. 2008; Scott and Bruce 1994). According to the definitions, creativity is considered as the root (Caniëls and Rietzschel 2013) and seed for creative activities (Amabile et al. 1996). Creatively applying knowledge shared in ECS or existing ideas to their tasks or adapted to different contexts by other departments can be considered as the example of creative behavior (Carmeli et al. 2008), creative performance (Tierney and Farmer 2011), innovation, innovative behavior (Scott and Bruce 1994), innovative work behavior (De Jong and Den Hartog 2010), and problem solving (Vogl et al. 2016), which have been often used interchangeably

Knowledge Sharing in ECS

Individuals in organizations have always shared knowledge and therefore sharing was originally considered to be a natural function of the workplace (Chakravarthy et al. 1999), transferring individual knowledge to organizational systems (Yang 2007) across individuals, groups, departments, or organizations. For this reason, knowledge sharing has been defined in several ways (see, (Becerra-Fernandez et al. 2004; Davenport 1997; Yang 2007). Since KS was viewed as a transaction process of knowledge markets, the knowledge buyers and sellers needed to have reciprocal benefits from the exchange as intrinsic or extrinsic motivations (i.e., incentives) such as reputation, altruism, and trust (Hsu and Lin 2008; Wasko and Faraj 2005). Thus, leveraging knowledge is achievable when members of the network can share the knowledge that they have and build on the other's knowledge. Choi et al. (2010) showed the organizational factors such as IT support and transactive memory systems increases KS and it eventually improves organizational effectiveness (Choi et al. 2010; Yang 2007).

As knowledge is considered to be an organizational asset (Afuah and Tucci 2012) and involves the process of creating, capturing, sharing, and applying it to produce value, reservoirs using IT/IS such as ECS may become a good tool to create and share knowledge. Past study suggested that KS could be enhanced via IT integration and IT support including network participation (See, Choi et al. 2010; Saraf et al. 2013; Sawy et al. 2001; Wasko and Faraj 2005). Consistent with these studies, ECS as one of IT infrastructure could play a role for employees to share and apply tacit knowledge by congregating, collaborating, producing or improving new products, services, and processes (Saxton et al. 2013).

The Effect of Knowledge Sharing

We argued earlier that KS not only provides employees with the necessary encouragement to use their systems effectively but also conveys the belief that ECS would help them to increase new ideas in their job. The value of knowledge is realized when employees' highly tacit and subjective domain insights are tapped into and made available for sharing and applying across the organization. When knowledge is shared by employees, learning takes place, which could result in an improved pool of organizational knowledge (Nonaka and Takeuchi 1995). In this case, ECS could be an option for users to provide and gain their knowledge, not only because it is technically less time consuming and a wide range of solutions (Greengard 2011) but also because it brings a work-related network effect to build a stronger relationship with colleagues (Schnitzer and Axfjord 2015). In fact, Angehrn et al. (2009), by exploring video-based communities in the context of the enterprise, showed that the participants enthusiastically engaged and pointed out the usefulness of gaining a better knowledge of team members, accessing the know-how and ideas, and "enjoying" the process of finding or submitting relevant videos. This introduction of ECS would lead them to effective usage on how to quickly/effectively/efficiently use it. Employees may be required to frequently use their ECS for sharing their knowledge to improve their job. Knowledge sharing can also

increase the likelihood of combinations of existing and new knowledge to produce new products and improvements (Huang and Li 2009). This indicates that characteristics of the ECS are likely to affect employees' effective ECS use. Therefore,

H4a: Employees' knowledge sharing behavior will increase Effective ECS use.

In this study, we propose that users' KS will make them use it more effectively, which in turn will be critical to increase their belief of the support role of ECS on creative behaviors [i.e., the extent to which employees apply novel and useful ideas regarding knowledge applications at work]. For example, in the KS in ECS context, employees could experience positive consequences, such as finding better ways to solve problems or enhancing their job performances, because this supportive role of ECS could neutralize employees' concerns about the limited role of general information systems and about engaging in innovative behavior with ECS. Thus, users' KS behavior is more likely to bring their belief on ECS support on the creative application of their knowledge. As users' KS through ECS, their perception will be increased that the ECS system is supportive of their creativity results from their ECS experience. By incorporating ECS to help to share their knowledge, they will accumulate shared knowledge, leading to the more effective use of their systems. Therefore,

H4b: Employees' knowledge sharing behavior will increase perceived support for creative behavior.

Using or integrating the shared knowledge in existing business processes is known as knowledge application (Choi et al. 2010). CKA focuses more on the employee's applying the knowledge collected from colleagues in their organizations. In this case, ECSs help them to apply their collected knowledge by sharing, assessing, adapting and adopting their knowledge that subsequently contributes to producing or improving new products, services, and processes (Saxton et al. 2013). As they share and store their knowledge in ECS, their usage of knowledge would vary by enhancing their applying ability on the job. Thus, whenever employees apply their highly skilled tacit knowledge adopted from ECSs in their job, employees would improve current business processes or products or enhance product development, procedure, etc. Therefore,

H4c: Employees' knowledge sharing with ECS will increase their creative knowledge application.

Effective ECS use

Recently, Burton-Jones and Grange (2013 suggested an 'effective IS use' concept and introduced related terms studied in different ways. As Orlikowski (2000, p. 425) notes, "technology per se can't increase or decrease the productivity of workers' performance, only the use of it can." Based on the review of this literature, we define *effective ECS use* as "*using ECS in a way that helps attain the goals for using the system*." E*ffective ECS use* looks for the extent to which users successfully employ the ECS to improve their job because system usage should be linked to user performance (Burton-Jones and Grange 2013).

Given that *effective IS* use has the potential to improve jobs, thereby changing people's reactions to their work situation, we predict that *effective IS use* will positively influence employees' perception of the support for creative behavior (PSC hereafter) and CKA. Our theoretical ground is based on the notion that *habitual IS use* may affect creativity (Glăveanu 2012). In other words, *habitual ECS use,* which eventually turns in effective use of ECS, may lead employees to perceive that ECS can support and increase their creativity. For example, in volitional contexts, employees are required to repeatedly use their system (i.e., ECS) to conduct their job regardless of their preference, because repeated ECS use is almost always embedded within larger, frequently practiced, higher-level routines or task sequences (Polites and Karahanna 2013). Dalton (2004) suggested that creativity is not just a reaction to the interruption of previously successful routines but can be the result of conscious attempts at improving habitual actions. Users habitually respond to problems in fresh and novel ways, rather than allowing themselves to respond mindlessly and automatically (Sternberg 2012). Thus, "habit can become an actual foundation for creative action" (Dalton 2004, p. 609).

H5a: Effective CS use is positively associated with PSC.

In this study, we propose that users' effective ECS use will make them recognize the capability of ECS, which in turn will be critical to increase their belief on creative support. There is an alternative way to increase PSC. For example, the effective ECS use may also direct user's belief in creativity using ECS. Thus, users could experience positive consequences, such as finding better ways to solve problems or enhancing their

job performances, because this usage context could facilitate employees' belief on engaging in innovative behavior with information systems. Thus, users who are using ECS effectively are more likely to believe ECS support. Since users' perception that the system is supportive of their creativity results from their previous experience, whether they use the systems effectively would be relied on PSC. By incorporating ECS to address problems that occur in the face of their tasks, they will accumulate PSC, leading to the more effective use of their systems. Therefore,

H5b: Effective CS use is positively associated with CKA

The Effect of PSC on CKA

This study posits that PSC can increase CKA for two reasons. First, individuals may attempt to be creative when they perceive that creativity is valued and supported by an organization (Scott and Bruce 1994). In an organization, being creative is somewhat risky, because engaging in voice behaviors such as creativity can be costly for an organizational member (Zhou and George 2001). Thus, when individuals have something to rely on, the potential risk associated with creativity is minimized, and the perception of creative ideas being effective would be high (Zhou and George 2001). Second, therefore, before they involve in applying creative knowledge using ECS, PSC would give them more confident clue to apply knowledge. In fact, employees resisting engagement in creative behaviors when they perceive creative attempts will be unsuccessful. Thus, they only try to do so when they perceive that creativity has the potential to be effective. If employees perceive that ECS is useful enough to support their creative knowledge application, they are likely to find more effective ways to use the ECS, since employees' inputs become meaningful and influential (Scott and Bruce 1994).

In this way, the systems would be satisfactory since employee input is meaningful and influential (Scott and Bruce 1994). Since users' perception that the system is supportive of their creativity results from their previous experience, and whether they use the systems effectively would rely on PSC. By incorporating ECS to address problems that occur in the face of their tasks, they will accumulate PSC, leading to the more effective use of their systems. Therefore, based on the logic above, this study predicts that increased PSC can result in effective CKA.

H6: PSC is positively associated with CKA.

Research Method

Data Collection

Online surveys were conducted for panel participants residing through an online survey. The subjects were employees in organizations that utilize enterprise crowdsourcing systems to innovate. To avoid participation bias (Wendelken et al. 2014), the sample was randomly selected to include subjects that have used and not-used ECS to submit innovative ideas. Data were collected online from employees of 15 information technology-related companies in the U.S between September and November 2016. These participants worked in a wide range of professional occupations (e.g., executives, managers, administrators, sales, technicians, services personnel). A total of 500 qualified panelists participated in the online surveys. We then removed the surveys that included 50% or more missing responses and those in which respondents checked the same value consecutively even for the reverse-coded questions. This step resulted in 511 usable samples (response rate = 75.2%.). Among the 376 employee respondents, 174 (46.3%) were female. The average age and organizational tenures were 37.3 years (S.D. = 10.2) and 7.5 years, respectively. The respondents were generally well educated, with 84.6% having completed a college or university degree[1].

Measures

[1] Collecting data from the Internet yields a sample more representative of the planet's population with more diverse demographics than collecting data from traditional college students alone, thereby eliminating a great deal of the representativeness bias found in traditional samples (Gosling et al. 2004).

Constructs	Definitions	Items (reference)
Contribution	The extent to which employees help to solve organizational problems by using ECS.	5 items modified from (Jain 2010)
Collaboration	The degree that employees in the organization can constructively search for solutions and provide their vision to collectively solve organizational problems using ECS.	7 items modified from (Nambisan & Baron 2010)
Trust	The willingness to take shared knowledge in ECS collected from coworkers based on the expectation that they will provide a particular action important to the employees' job	6 items modified from (McKnight et al. 2002)
Knowledge Sharing (KS)	A transfer process where individual competencies are developed through sharing and learning from others.	6 items adapted from (Koh & Kim 2004)
ECS Use	The user's behavior of using the system.	6 items modified from (Davis 1989)
Perceived Support for Creative Use (PSC)	The extent to which an employee perceives that IS stimulates, helps and motivates him/her to exhibit creativity.	6 items modified from (Zhou & George 2001)
Creative Knowledge Application (CKA)	An employee's behavior to finding new uses of existing ECS knowledge, workplace IS, and resources to support their job.	5 items modified from (Choi et al. 2010)
Control variables	Age, Education, Gender, IS experience, Job Position	

Table 1. Definitions and Sources of Measurement Items

Data Analysis and Results

The hypotheses were tested using structural equation modeling (SEM) procedures with AMOS 4.0. Using SEM allows for simultaneous evaluation of both the quality of measurement (the measurement model) and the construction of interrelationships (the structural model).

Measurement Model

Examining the correlations between our marker items and other substantive variables provided evidence that common method bias was not a serious concern in our study. In this study, a two-step approach was used to assess the correlations, as recommended by Anderson and Gerbing (1988). First, the quality of the measures was assessed through the measurement model using confirmatory factor analysis (CFA). Then, the convergent validity, unidimensionality, and discriminant validity of each construct were assessed.

Table 2 exhibits the means, standard deviations, zero-order correlations, and reliability estimates. It also shows the discriminant validity assessment: The square root of each construct's average variance extracted (AVE) was larger than its correlations with other constructs. As seen in Table 2, the AVE of the diagonal

Constructs	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
Creative Application	4.21	1.21										
PSC	3.10	0.72	0.466									
CS Use	4.55	1.41	0.414	0.347								
Knowledge Sharing	34.11	9.66	0.491	0.472	0.44							
Contribution	—	—	0.485	0.341	0.396	0.399						
Trust	—	—	0.563	0.356	0.357	0.333	0.521					
Collaboration	—	—	0.453	0.374	0.345	0.372	0.44	0.478				
Age	—	—	-0.09	-0.106	-0.033	-0.087	0.04	-0.084	0.052			
Gender	—	—	0.07	0.079	0.085	0.062	0.108		0.034	0.04		
Education	—	—	-0.052	-0.059	0.085	-0.093	-0.107	-0.041	-0.039	0.047	-0.165	
Experience Year			-0.001	-0.053	0.001	-0.007	0.074	0.006	0.064	0.445	-0.01	0.032
Note: $^{*}P < 0.05$, $^{**}P < 0.01$ (two tailed)												

Table 2. Inter-construct Correlations

elements in the matrix indicates that the AVE of each construct was greater than its correlations with other constructs. Therefore, adequate discriminant validity was obtained based on the results of the measurement model.

Hypotheses Testing

First, three hypotheses were to find the effects of three CS features on the knowledge sharing. The results show that contribution management (β= 0.266, p<0.001), trust management (β= 0.125, p<0.05), and collaboration management (β= 0.229, p<0.001) are all significant. For the three hypotheses on the effects of same factors on ECS use, however, only trust management (β= 0.139, p<0.05) and collaboration management (β= 0.112, p<0.05) were statistically significant. Therefore, Hypotheses 1a, 2a, 3a, 1b and 3b were strongly supported.

For the second order factors (hypotheses 4 and 5), the effects of KS on ECS use (β= 0.288, p<0.001), PSC (β= 0.384, p<0.001), and creative application (β= 0.272, p<0.001) showed significant results. In addition, the effect of CS use on PSC (β= 0.170, p<0.01) and creative application (β= 0.198, p<0.05) also showed significant results. Therefore, Hypotheses 4a, 4b, 4c, 5a and 5b were strongly supported.

For the third order factor, the result showed that perceived creativity support is statistically significant to creative application (β= 0.260, p<0.001) Therefore, Hypothesis 6 was strongly supported.

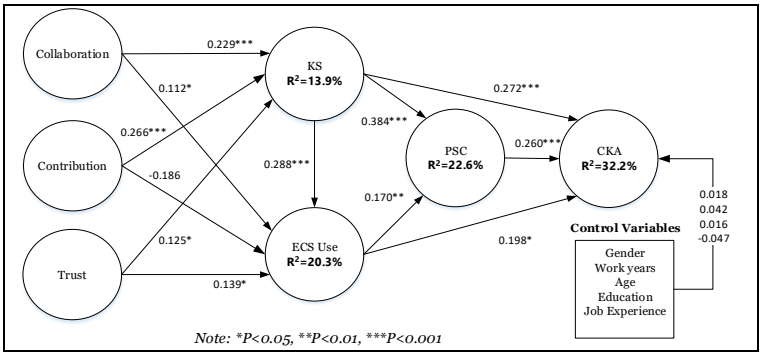

Figure 1. Analysis results

Discussion and Conclusion

Overall, this study contributes a deeper understanding of the role of KS and effective ECS Use on CKA in ECSs context, focusing on the underpinnings of KS processes. As results showed, the findings in this study imply that the relationship between employees' KS and their creative knowledge application is enhanced by effective crowdsourcing use and their corresponding perception of creativity support of it. Based on the results, this work provides empirical findings and feasible suggestions for further investigation by identifying the role of *crowdsourcing systems* in workplaces and thus, the effects of PSC on CKA. The results call our attention to system users' effective CS use and PSC act as an important vehicle that might potentially increase *their creative knowledge application*. This is especially meaningful because we focus on the importance of *effective CS use* in the relationship between KS and KA. We hope that this study encourages future research to seek out further insights into the potential dynamic of creative knowledge application and effective CS use in various contexts. We hope to see organizations consider ECS features so that it effectively enhances KS through working employees in the organization and these features should be considered to be important factors in KMS which produce expected employees' creative knowledge application. Organizations need to focus more on ECS to improve employees' creativity by applying their knowledge. Senior managers/leaders should take steps to make employees believe that ECS would help their systems usage be more effective and increase employees' job satisfaction.

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