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ABSTRACT

This study proposes a model based on flow theory by postulating key antecedents as the critical drivers of knowledge sharing and interemployee helping. In the model, knowledge sharing is influenced by flow experience directly and also indirectly via the mediation of interemployee helping. Accordingly, the flow experience is influenced simultaneously by four exogenous factors related to individuals' perception about their work: work skills, self-fulfillment in challenges, perceived control, and vividness. The empirical findings of this study confirm the applicability of flow theory in business organizations by investigating online knowledge workers from business organizations. This study contributes to the knowledge management literature by extending flow theory to the area of knowledge sharing and interemployee helping, by validating idiosyncratic antecedent drivers of the flow theory, and by performing a practical operationalization of the flow experience. This research also provides managerial implications and limitations.

Keywords:

Knowledge sharing, interemployee helping, flow experience.

INTRODUCTION

Dramatic advances in information technology (IT) today enables new methods of collaboration among organizational members, and the novel opportunity provided by such advanced IT and the increasingly intense competition facing organizations have led many to take advantage of virtual organizations (Gwebu, Wang & Troutt, 2007). The virtual organizations are referred as the organizations in which their members use tools such as e-mail, Usenet news, discussion boards, listservs, and group support system to effectively facilitate their collaboration with online others in the organizations. Knowledge sharing in virtual organizations provides increased value when the organization is under great threat or pressure to create synergies with limited resources under its control. Employees need to be included on knowledge-sharing-based virtual organizations in order to meet complicated task requirements and eventually help obtain their organization's success.

In addition to knowledge sharing, a successful and smooth organizational operation also relies heavily on helping behaviors, which allows individuals to complement one another in the organizational operation (Siemsen, Balasubramanian & Roth, 2007). Collectively, organizations that encourage knowledge sharing and interemployee helping not only incorporate professional knowledge into their strategies, but also improve their members' helping behaviors to assist with one another. Even though much discussion about interemployee helping and knowledge sharing has been dispersed across different research fields (e.g., Jackson & Tisak, 2001; Mergel, Lazer & Binz-Scharf, 2008), a model

that explores their antecedents and mediator based on flow theory among online knowledge workers has been rarely tried.

For that reason above, this study proposes a model to explain the formation of such helping and sharing based on flow theory that is well grounded and suitable for online working contexts. Whereas organizations combine the expertise and talent of many employees and can thus exceed the limits of their personal ability and know-how (Lainema & Lainema, 2008), flow experiences allow one to become fully involved in one's work, stretching one's capabilities (e.g., through co-workers' helping) and knowledge (e.g., through co-workers' sharing) to the limit (e.g., Csikszentmihalyi & Rathunde, 1993). This strongly suggests the applicability of flow theory in learning the interemployee helping and the knowledge sharing.

Flow is considered the holistic sensation that employees feel when they act with total immersion and engagement, and nothing else seems to matter at the time (Csikszentmihalyi, 1990; Eisenberger, Jones, Stinglhamber, Shanock & Randall, 2005). The state of flow occurs when employees participate in an organizational activity for their own sake, and the participative state is so satisfying that the employees try to continue partaking in the activity (Choi, Kim & Kim, 2007). Specifically, flow theory highlights the necessity of organizational members' experience reinforcement in boosting interemployee helping and knowledge sharing given that flow mechanisms encourage individuals to have a strong focus and concentration towards working activities that involve organizational participation and social interaction with others in depth. Unfortunately, little is known so far about how the flow theory can be appropriately utilized in research related to knowledge working professionals.

Due to the absence of the aforementioned literature, this study derives two research questions of interest: (1) How can the flow theory be appropriately applied to research related to online knowledge workers? (2) What critical antecedents and mediators drive interemployee helping and knowledge sharing in online working contexts and how are they accomplished? Exploring these research questions is important, because an improved understanding of such helping and sharing can remind management to treat their determinants with great caution.

This research is substantially different from previous studies in two crucial ways. First, while a majority of studies apply flow theory from a hedonic aspect such as online learning, shopping, gaming, or friend-making (e.g., Choi et al., 2007; Koufaris, 2002; Mathwick & Rigdon, 2004), organizational issues containing employees' hard work, dedication, and sacrifices (i.e., a non-hedonic aspect) are rarely examined from an instrumental or utilitarian perspective in flow theory. Previous research suggests that flow does not just occur during relaxing moments or passive entertainment, but rather when people are actively involved in a task that stretches their metal and/or physical abilities (Williams & Dargel, 2004).

Traditional antecedents of flow experience, such as vividness, skills, and challenges that are popularly used in the hedonic context, cannot be directly applied in the context of organizational working without further modifications. For that reason, this study is one of the first to utilize flow theory in evaluating individuals' flow experience of their working and its antecedents in business organizations by properly modifying the traditional antecedents mentioned above. This study is also one of the few to assess interemployee helping and knowledge sharing based on flow theory by empirically testing a model through a survey of interactively online knowledge workers. Although many organizations unite their employees by encouraging them to share knowledge and help with each other, little is known about whether the flow experience and its antecedents can truly contribute to knowledge sharing or interemployee helping in virtual contexts, which have been a popular mode of today's business organizations.

RESEARCH MODEL AND HYPOTHESES

This study proposes a model explaining the formation of knowledge sharing and interemployee helping based on flow theory. In the model, knowledge sharing is influenced by individuals' flow experience directly and also indirectly via the mediation of interemployee helping. Accordingly, the flow experience is influenced simultaneously by four exogenous factors related to work: work skills, self-fulfillment in challenges, perceived control, and perceived vividness.

The merging of action and awareness is the extent to which an activity becomes spontaneous (e.g., automatic and self-motivated), and individuals stop being aware of themselves as separate from the organizational activity they are performing (Csikszentmihaiyi, 1990). Based on the above definition, individuals' flow experience in this study is defined as a holistic experience particularly in a working

context in which online members are so focused that it amounts to absolute engagement in their working activities, causing a sense of discovery (Heckman, 1997) and a strong feeling of pushing to higher levels of knowledge sharing. More specifically, flow can be considered the experience of temporally merging individuals' situation awareness with the automatic application of activity-relevant knowledge and skills in, for example, the online collaboration with co-workers of their team. It has been found that, for instance, people engage themselves in depth during web discussions so as to exchange ideas with other people (Lee, Cheung, Lim & Sia, 2006), implying the potential association between flow experience and knowledge sharing among online knowledge workers.

When employees enjoy executing their work and their subjective experience of time is altered (i.e., strong flow experience), they attempt to stretch their capabilities and thus increase the likelihood that they will, for example, share updated information and help with each other, suggesting the positive influence of flow experience on interemployee helping and knowledge sharing. Flow experience represents individuals' full engagement, and their synergy manifests in the ways in which they accomplish high levels of organizational solidarity that leads to great interemployee helping and knowledge sharing. Thus, the first two hypotheses are derived as below.

H1: Flow experience has a positive effect on knowledge sharing in online working contexts.

H2: Flow experience has a positive effect on interemployee helping in online working contexts.

Interemployee helping is derived from the concept of altruism (Organ, 1988), which encompasses discretionary behaviors that assist others with relevant tasks or problems in the organization. Previous literature has indicated that interemployee helping and knowledge sharing are both highly correlated (Siemsen et al., 2007). Individuals who are engaged in intellectual pursuits and enjoy helping others are intrinsically motivated to share their knowledge with others (Wasko & Faraj, 2000; Wasko and Faraj, 2005). Employees' dedication to helping others is important for knowledge sharing since the process of such help facilitates intangible knowledge collection and donation. Hence, knowledge professionals particularly in virtual contexts who enjoy helping one another are more likely to share knowledge with others (e.g., Lin, 2007a), suggesting the hypothesis stated below.

H3: Interemployee helping has a positive effect on knowledge sharing in online working contexts.

Work skills represent employees' own judgment of their capabilities in performing particular work. Different levels of perceived skills are associated with optimized mental states (e.g., immersion or concentration) and increased activation (Delespaul, Reis & deVries, 2004), suggesting the substantial influence of work skills on flow experience. According to flow theory, an activity is emotionally rewarding in relation to whether individuals believe that they have the skills to accomplish it (Schweinle, Meyer & Turner, 2006). As the level of individuals' skills has been one of the most important antecedents to flow experience (Csikszentmihalyi, 1990; Koufaris, 2002), the hypothesis in online contexts is likewise developed as below.

H4: Work skills have a positive effect on flow experience in online working contexts.

Self-fulfillment in challenges is considered the perceived degree of individuals' success in dealing with challenges when performing their work. Various ratios of working challenges are predicted to be associated with different qualities of flow experience (Schweinle et al., 2006). Previous research indicates that adequate challenges (e.g., accomplishable challenges) positively influence employees' response to the flow experience (Hoffman & Novak, 1996) due to self-fulfillment perceived in the process of them overcoming the challenges. Working in online collaboration or virtual organizations is often more challenging and inspiring than working individually, and thus employees having a strong self-fulfillment in challenges likely work up to a higher level of flow experience. Consequently, the hypothesis can be stated as follows.

H5: Self-fulfillment in challenges has a positive effect on flow experience in online working contexts.

Perceived control can be defined as the level of individuals' control over their own actions and the environment in which they interact with others (Koufaris, 2002). In other words, it considers feeling unrestricted or free to act in a variety of ways in a specific working situation (Mehrabian & Russel, 1974). Even though perceived control has been similarly used across some theoretical models under slight variations with analogous construct names such as locus of control (Rotter, 1966), self-efficacy, (Bandura, 1982) and perceived behavioral control (Ajzen, 1991), these constructs have been seldom used in research related to knowledge workers. Organizations and their working process that are totally out of control can be very discouraging to organizational members, and thus they are unlikely to concentrate on working activities, leading to weak flow experience. This phenomenon has been

partially supported by previous research that studied perceived control as an influential factor to flow experience (e.g., Ghani & Deshpande, 1994). Collectively, the hypothesis is derived and stated based on online working contexts as below.

H6: Perceived control has a positive effect on flow experience in online working contexts.

Perceived vividness is defined as the intrinsic enjoyment employees perceive during their interaction with others in an organization (e.g., Hoffman & Novak, 1996), similar to the emotional response of pleasure from environmental psychology (Koufaris, 2002). Employees are unlikely stimulated to experience great flow if their work is often unpleasant and reveals inanition during the working activities. By contrary, previous research indicates that individuals such as musicians, writers, painters, rock climbers, and sportsmen are found to enjoy a particular activity process itself and consequently become totally absorbed in the process (Csikszentmihalyi, 1975), implying the positive relationship between perceived vividness and flow experience.

H7: Perceived vividness has a positive effect on flow experience in online working contexts.

METHOD

Subjects and procedures

The subjects surveyed in this study consist of online knowledge workers in Taiwan's high-tech industry. The online knowledge workers across virtual teams were recruited, because virtual working has become a very important work mode in modern industries nowadays. Fifty large IT firms located in the northern part of Taiwan from Taiwan's business directory were initially consulted and 17 out of the 50 firms consented to help us with the questionnaire investigation. Note that the sample firms herein cannot be randomly chosen, since they must have organized virtual working environment in their firms to meet the basic needs of our investigation. Nevertheless, the sample firms that confirmed with us concerning their utilization of virtual working and online collaboration reveal the fact that they are appropriate representative samples. Of the 510 questionnaires provided to the subjects, 426 usable questionnaires were collected after a follow-up by telephone (response rate of 83.53%) containing 214 males (50.23%) and 212 females (49.77%).

This study measures the constructs utilized herein by using five-point Likert scale items drawn from the existing literature and then modified repeatedly by a focus group of five people, including three graduate students and two professors familiar with human resource management and organizational behavior. The measurements were thoroughly verified via two pilot tests before the actual survey. The pilot test data were subjected to exploratory factor analysis (EFA) and reliability analysis to identify items that loaded poorly on their hypothesized scales, which were then further refined. The questionnaires in Chinese and English were both examined and compared based on proposed tips by Reynolds, Diamantopoulos and Schlegelmilch (1993). A high degree of correspondence between the two questionnaires (Chinese vs. English) assures that the language translation process did not substantially introduce artificial translation biases. To sum up, these scale items modified from existing literature are embedded with the traits or features associated with online working of business organizations. It is important to note that focusing is a critical component of a flow experience (Csikszentmihalyi, 1990), and such flow experience only occurs to individuals and makes them have distorted sense of time. Thus, the perceived flow experience in this study is measured as individuals' mental flow experience based on the holistic effects of both their perceived concentration and sense of time (e.g., experiencing immersion in, frequently paying attention to and involving most of time in the online collaboration with my co-workers).

Data analysis and test results

The survey data were analyzed using a two-step structural equation modeling (SEM) approach consisting of measurement and structural model testing (Anderson & Gerbing, 1988). Empirical results from each stage of analysis are presented in the following.

Measurement model

In measurement model testing, the overall goodness-of-fit indices shown in Table 1 indicate that all the fits of the measurement model are satisfactory. Convergent validity was identified by examining the three following conditions (Fornell & Larcker, 1981). To begin with, all factor loadings were

1 statistically significant at p<0.001 as presented in Table 1. The average variance extracted (AVE) for all
2 research constructs equaled or exceeded 0.50, implying that the overall proposed scale items capture
3 sufficient variance in their underlying construct than that attributable to the measurement error. Finally,
4 the reliabilities for each construct exceeding 0.70 meet the general requirement of reliability for
5 research instruments. Consequently, the empirical data in this study assure convergent validity.

6 This study applies chi-square different tests to evaluate discriminant validity. Controlling for the
7 experiment-wise error rate at the overall significance level of 0.01, the Bonferroni method indicates
8 that the critical value of the chi-square difference should be 12.21. In this study, chi-square difference
9 statistics for all pairs of constructs exceeded the critical value of 12.21, thereby assuring quality
10 discriminant validity in this study.

12 **Table 1.** Standardized Loadings and Reliabilities

Construct	Indicators	Standardized loading	AVE	Cronbach's α
Knowledge sharing	KS1	0.81 (t = 18.89)	0.64	0.84
	KS2	0.80 (t = 18.69)		
	KS3	0.79 (t = 18.24)		
Interemployee helping	IH1	0.85 (t = 20.89)	0.66	0.88
	IH2	0.81 (t = 19.48)		
	IH3	0.85 (t = 21.02)		
	IH4	0.73 (t = 16.82)		
Flow experience	TF1	0.83 (t = 19.89)	0.67	0.86
	TF2	0.85 (t = 20.76)		
	TF3	0.78 (t = 18.25)		
Work skills	SK1	0.78 (t = 17.28)	0.61	0.82
	SK2	0.83 (t = 18.71)		
	SK3	0.72 (t = 15.79)		
Self-fulfillment in challenges	CH1	0.75 (t = 15.91)	0.50	0.76
	CH2	0.69 (t = 14.39)		
	CH3	0.69 (t = 14.49)		
Perceived control	CO1	0.76 (t = 16.57)	0.50	0.74
	CO2	0.67 (t = 14.30)		
	CO3	0.68 (t = 14.35)		
Perceived vividness	VI1	0.88 (t = 22.45)	0.75	0.90
	VI2	0.87 (t = 21.82)		
	VI3	0.85 (t = 21.31)		

Goodness-of-fit indices (N = 426): χ^2_{188} = 303.34 (p-value < 0.001); NNFI = 0.97; NFI = 0.94;
CFI = 0.98; GFI = 0.94; AGFI = 0.92; RMR = 0.02; RMSEA = 0.04

14 *Structural Model*

15 The measurement model in the preceding section was then transformed to a structural model that
16 reflects the model paths hypothesized in our research framework for the purposes of statistical testing
17 for the paths. Figure 1 presents the empirical results of this statistical analysis, which shows that six out
18 of the seven hypothesized model paths of this study were validated at the p<0.01 significance level.

19 First, flow experience has significant effects on both knowledge sharing and interemployee helping
20 with standardized path coefficients of 0.32 and 0.58, respectively (H1 and H2 are supported).
21 Knowledge sharing is significantly influenced by interemployee helping with the standardized path
22 coefficients of 0.48 (H3 is supported). Flow experience is significantly influenced by work skills,
23 perceived control, and perceived vividness with the standardized path coefficients of 0.18, 0.27, and
24 0.55, respectively (H4, H6, and H7 are supported), while insignificantly affected by self-fulfillment in
25 challenges (H5 is not supported).

26 Unsupported H5 is surprising and may occur because challenges that often bring on psychological
27 stress and sufferings can be hardly helpful for individuals' flow experience even if the challenges are
28 successfully solved afterward and individuals' work is accomplished. Nevertheless, the unexpected
29 empirical results for the unsupported hypothesis may warrant future research in order that the authentic
30 causes for the insignificant relationship between self-fulfillment in challenges and flow experience can
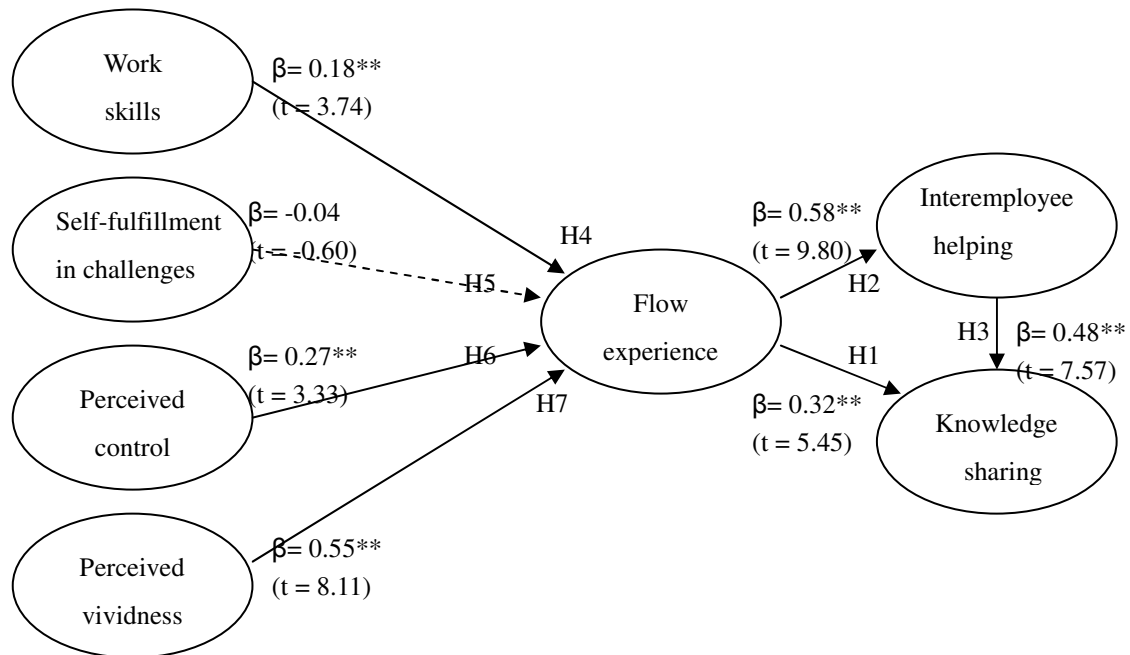
1   be accurately interpreted.

2

Figure 1. Research framework

** Significant at the 0.01 overall significance

3

4   **DISCUSSION**

5   This study provides strong evidence for the academic and practical application of flow theory in
6   studying the formation of knowledge sharing and interemployee helping. The significant influence of
7   interemployee helping on knowledge sharing suggests that the first priority for management is to create
8   an altruist climate for the firm's virtual environment where people care about and help each other
9   before the knowledge sharing is efficiently realized. Indeed, given knowledge is so precious in today's
10   organizations, online members may be unwilling to share their knowledge (i.e., precious intellectual
11   capital) authentically if they have no intention to help other online members in the first place.
12   Furthermore, given that knowledge sharing and interemployee helping are both influenced significantly
13   by flow experience as the only mediator, management should install a detecting system that provides
14   timely reports regarding the levels of flow experience among online members so that any potential
15   negative impact on knowledge sharing may be avoided. Management should also make good use of the
16   three influential antecedents (i.e., work skills, perceived control, and vividness) to help improve
17   individuals' flow experience, which is detailed as below.

18   One of the findings of this study regarding the significant relationship between work skills and flow
19   experience reveals that online members' selection from current organizational employees should be
20   done with caution. An organization selecting those employees who have insufficient work skills in, for
21   example, team communication, resource-seeking, and dispute-solving, can ultimately ruin its own
22   operation and activities. Even thought the right persons are chosen to be a part of a specific group or
23   department, they may still be unqualified due to insufficient training and mentoring in the long run.
24   Management should help strengthen members' skills periodically according to individuals' needs, and
25   thus flow experience can be well maintained or increased to a substantial level.

26   The significant relationship between perceived control and flow experience in the findings of this study
27   shows that satisfying individuals' instinctual sense of control and autonomy is critical towards boosting
28   flow experience. It may be particularly important in business organizations containing highly educated
29   professionals who care about their right to act on their own. Hence, management should be able to find
30   the right timing to let go and learn how to appropriately delegate members to conduct their work.

31   Finally, the significant influence of perceived vividness on flow experience provides partial support for
32   previous research that indicates job enrichment as a factor for motivating employees (Maxwell, 2008).
33   Indeed, drab work is unlikely to motivate online professionals to work dynamically, decreasing their

flow experience. Managers should encourage online members to try different ways to do their job and raise excitement regularly about new assignments which represent a vivid idea of what the future of the organization should be.

In summary, it is necessary to realize that no single solution fits all organizational problems in enhancing knowledge sharing without closely watching different determinants of flow experience. Management should create a working culture with appropriate policies or measures as suggested above in order to improve individuals' deficiency in online activities and so as to reinforce long-lasting altruist helping and the spirit of sharing.

LIMITATIONS

The empirical results of this research can be well interpreted and applied in light of two limitations. The first limitation is associated with the cross-sectional and self-reported survey of this study, which limits the ability of this study to obtain causal inferences due to the cross-sectional nature. Hence, longitudinal research may be conducted as complementary to this study. The second limitation of this study is the possibility of common method bias given the usage of Likert scales herein. To further clarify this issue, a Harman's single factor test (Podsakoff & Organ, 1986) was performed. An exploratory factor analysis of all items for the seven constructs in this study reveals seven factors explaining 18.85%, 14.40%, 14.16%, 13.69%, 13.55%, 12.85%, and 12.50% of the total variance, respectively. These values reveal that the variances are appropriately distributed among the proposed constructs and none of the factors can account for a majority of the total variance in the analysis, revealing that common method bias is not a threat in this study. The third limitation of this study is related with the sample collected from professionals in Taiwan, and thus the generalizability of this study may be limited in other different national cultures and industries. Future researchers are advised to explore other potential mediators beyond the scope of flow theory and compare their explanatory ability to that of the flow experience examined in this study.

CONCLUSION

This study presents evidence for the academic and practical application of flow theory in understanding the formation of knowledge sharing and interemployee helping. Given that knowledge sharing and interemployee helping are both affected by flow experience as the only mediator, management should establish a detecting system that generates timely reports concerning the flow experience among online knowledge workers so that any potential negative impact on knowledge sharing may be avoided. Management should create a working culture with appropriate policies or measures as suggested above in order to improve individuals' deficiency in working activities and ultimately reinforce long-lasting altruistic helping and the spirit of sharing.

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