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Enabling innovative ability: knowledge sharing as a mediator

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Abstract

Purpose – The purpose of this paper is to investigate the relationships among job satisfaction, workplace friendship, knowledge sharing and service innovation.

Design/methodology/approach – This is an empirical study that targets electronic information engineers at the science parts located in Taipei, Hsinchu and Tainan ($n = 851$), utilizing a survey questionnaire as the data collection instrument to test the relationship among the four dimensions.

Findings – The results indicated that: first, both job satisfaction and workplace friendship have demonstrated a significant effect on service innovation; second, knowledge sharing significantly moderates the effect of job satisfaction and workplace friendship on service innovation.

Originality/value – The present study adds value by examining the moderating effect of knowledge sharing. The results can contribute to the strategic planning of human resource development in order to enhance the capability of service innovation in the technological industry.

Keywords Job satisfaction, Service innovation, Knowledge sharing, Workplace friendship

Paper type Research paper

1. Introduction

In the current stage of global development, Taiwan, like other developing countries, has entered the phase of industrial structural transition. The fast developing technological industry has presented an opportunity where the performance of electronic information industry, has become one of the mainstream industries, playing a critical role in Taiwan's economic and employment growth. The key lies on whether the industry is moving toward the right direction. How organizations grasp the core abilities of the knowledge economy and achieve management innovations as well as value creations have become the most important issues of all (Ho, 2009). These are indispensable elements for sustainable corporate operations.

The electronic information industry constitutes a great proportion of the high tech industry, forming the technological foundation in Taiwan. The electronic information industry also plays an important role in the international supply chains, as one of the most competitive industries worldwide (Hou and Gee, 1993). However, there is an urging need to improve the existing model of business management and administration to sustain the competitive edge. In the era of market orientation, technological manufacturers also try to learn how to better serve their customers by developing an innovative attitude for increasing market competitiveness. In addition, the electronic information industry draws from a relatively young and also intelligent labor force. Engineers, particularly, have become a crucial human resource which

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differentiates one company from another. Engineers' conditions (physically and psychologically) and their performances, hence, should be the key issue for human resource management in the high tech industry (Širca *et al.*, 2013).

Due to the fact that job satisfaction is the most fundamental expectation of organizational employees, exploring their psychological status helps to understand how it may trigger other organizational psychological factors (Ibrahim and Dickie, 2010), such as level of participation, job autonomy, adaptation, commitment, etc. As employees spend a large portion of their lives at work, the time they spend with co-workers is very likely to be longer than what they have with friends and families. Interpersonal relationships and friendships between/among employees at work are often formed. Thus, the status of workplace friendship is an issue worth investing in.

In the knowledge-intensive electronic information industry, the value of engineers relies on their continuously utilization of knowledge. If they can effectively share their experience and knowledge, not only will it smooth the communication channels among individuals or different divisions, it enables a complementary mechanism which ultimately benefits the entire organization. Finally, service innovation is a new way of business thinking to reform relatively conservative and inflexible operational procedures and processes, which can transform organizations to better meet the needs of their markets (Chong *et al.*, 2011). Therefore, the present study aims to investigate the relationships among job satisfaction, workplace friendship, knowledge sharing and service innovation.

2. Literature review and hypotheses building

2.1 Job satisfaction

Job satisfaction refers to the positive feelings about one's job based on one's evaluation of the characteristics of the job (Robbins and Judge, 2007). It can be also be defined as a positive emotional state resulting from one's evaluation of the characteristics of the job experience (Locke, 1976), or as a set of feelings and beliefs that a person has about his job (George and Jones, 1999). Regardless of the nature of a job or the job environment, one compares what one expects and what one actually gets to decide whether one is satisfied or not (Porter and Lawler, 1968). Kuo and Chen (2004) suggested that job satisfaction refers to the extent to which one enjoys one's job in the work processes. One's satisfaction increases when job-related elements (including people, tasks, activities, etc.) are favorable. Arnett *et al.* (2002) defined job satisfaction as one's overall appraisal of a job, influenced by the role one plays in an organization, management systems, work environment and so on, and the higher the appraisal, the higher the job satisfaction. In the Minnesota Satisfaction Questionnaire, constructed by Weiss *et al.* (1967), job satisfaction consists of three dimensions:

(1) intrinsic satisfaction, measuring the positive feelings regarding the nature of the job tasks, for example sense of achievement, the freedom for one's professional judgment and so on;

(2) extrinsic satisfaction: measuring the positive feelings regarding situational job aspects external to the job, for example equipment and facilities, salary, reward structure and so on; and

(3) general satisfaction: referring to overall positive feelings about a job – the sum of the intrinsic and extrinsic satisfaction.

2.2 Workplace friendship

According to Fehr (1996), friendship is "a voluntary, personal relationship typically providing intimacy and assistance" (p. 20). Derrida (1997) suggested that friendship is similar to family relations that come naturally. However, friendship can be differentiated from marital relationship since it is not bounded by legal contracts. In other words, there is no formal restraining power that can order sustainability of friendship (Boyd and Taylor, 1998). However, workplace friendship is distinct from general types of friendship because workplace friendship is focussed on friendship occurred in the workplace (Song, 2005). Wright (1978) defined workplace friendship as a broad and fuzzy relationship. It is a relationship resulting from how people get along with each other and how people respect and relates to each other emotionally in a working environment. Nevertheless, Sias *et al.* (2003) pointed out that friendship at workplace have great influences on both individuals as well as organizations.

Berman *et al.* (2002) suggested that workplace friendship is "nonexclusive voluntary workplace relations that involve mutual trust, commitment, reciprocal liking and shared interests and values" (p. 218). Dotan (2007) identified six main reasons to explain why employees form friendships at work, including work safety/trust, missing role, sanity check, work values/life interests similarity, proximity and instrumentality. Nielsen *et al.* (2000) defined workplace friendship as one's perception of the closeness of oneself and the other co-workers in a work environment. Past researchers also suggested that friendship at work is a dynamic, rather than static, relation. For instance, Dotan (2007) argued that as employees have trustful friends at work, they can get help or advice from them and, therefore, gain feelings of security, comfort, as well as satisfaction with their jobs. Similarly, Hamilton (2007) discovered that employees in friendship tend to engage in unselfish behaviors by providing their fellow co-workers with help, guide, advice, feedback, recommendation or information on various work-related matters. Moreover, Oreg *et al.* (2009) suggested individuals form friendships with co-workers because they want to obtain peer support or gain recognition on special work-related perspectives.

2.3 Knowledge sharing

Senge (1997) pointed out that knowledge sharing, which refers to knowledge exchange among individuals via social interactions, is the most important element of knowledge management. Not only do knowledge sharing allow passing of knowledge to others, it facilitates for others to acquire useful information. In other words, knowledge sharing is a mechanism through which knowledge is transmitted from one to another. Through the transformation, individuals gain a new edge to enable new actions. Thus, knowledge sharing adds values to existing knowledge within organizations. On the other hand, if individuals are reluctant to share knowledge, organizations cannot benefit from existing knowledge held by individuals. With organizations' inability to acquire useful information, solving problems or creating new ideas through sharing knowledge becomes challenging (Nonaka *et al.*, 1994). Existing literature has different interpretations for knowledge sharing. For example, Bartol and Srivastave (2002) defined knowledge sharing as "individual sharing organizationally relevant information, suggestions, and expertise with one another" (p. 65). The shared knowledge can be explicit and tacit. Nonaka (1995) characterized knowledge sharing as an interactive process through which explicit and tacit knowledge are exchanged among people. Different processes of interaction (i.e. socialization, externalization, combination and internalization) produces

different types of knowledge (i.e. tacit and explicit), which can be utilized within organizations to promote knowledge creation.

Davenport and Prusak (1998) described knowledge as being dynamic rather than static. Dieng *et al.* (1999) suggested knowledge as a form of corporate memory, which represents the resources and know-how of an organization. They further classified corporate memory into professional memory, consisting of references, documents, tools and method, and individual memory, consisting of competencies and know-how of particular subject matters within organizations. It has been acknowledged that knowledge sharing maximizes the power of knowledge that resides in individuals. The power of collective knowledge through social exchanges is far greater than the sum of individual knowledge (Nonaka *et al.*, 1994). Through knowledge sharing, people quickly expand their personal knowledge domains (Quinn *et al.*, 1996), and improve their problem-solving ability and job performance (Kim and Lee, 2006), and as a result improve organizational competitiveness (Lin, 2007a).

2.4 Service innovation

Not only do innovations help in sustaining organizational market competitiveness worldwide (Phusavat *et al.*, 2012), innovation is necessary for an organization that wishes to enter a new market (Stock *et al.*, 2002). However, the design and implementation of new services is a poorly understood process (Tax and Stuart, 1997). McDermott and O'Connor (2002) classified service innovation into two categories, namely radical innovation and incremental innovation. While radical innovation refers to a service yet to be market oriented, incremental innovation refers to improve and better diffuse existing services to a market. Tax and Stuart (1997) proposed two ways to classify service innovation. One way is identified by the change of the service system itself, the other is by the change in the service implementation and performing personnel. Moreover, after a thorough review of literature, Johne and Storey (1998) identified six themes involved in the new service development process, namely corporate environment, the process itself, the people involved, analysis of opportunity, development and implementation, which indicated that the development of a new service product is a complex process involving various components. Hipp *et al.* (2000) suggested three types of service innovation existed in organizations, namely service, process and organizational innovation. Finally, Drejer (2004) argued that service innovation not only refers to new service and product development, but also includes amending the distribution process of existing product and services. In short, service quality increases the values of products and services by meeting customers' needs with quality goods (Vang and Zellner, 2005).

2.5 Hypotheses building

According to Ziegler *et al.* (2012), employees are the enablers who support both individual and integrated activities in business operations that aimed to produce profit. From a systemic perspective, employees' quality performance directly influences corporate revenue. Therefore, making sure whether employees' performance meets the standards is the most fundamental principle of management (Wood *et al.*, 2012). Grandey *et al.* (2013) argued that as employees are satisfied with their job, increasing performance, meeting project deadlines, or creating new ideas can be expected, which consequently affects organizational performance. However, due to the complexity of work tasks, frequent horizontal communications (with peers) and vertical communications (with management or subordinates) are needed and are constantly

taking place to achieve work-related goals. In addition to work-related contacts, when positive friendship is formed among co-workers, it may save unnecessary time and cost in the successful implementation of planned tasks (Sündermann, 2013). For knowledge-oriented work, advantages depends on effective sharing and utilization of knowledge rather than pure labor and repetitive movements. Furthermore, the exchange of knowledge among co-workers can result in innovative ideas (Kim and Lee, 2013). Service innovation is one type of innovation which not only improves the physical attributes of products, it is also a fundamental revolution of thinking and ideas. Knowledge sharing that triggers the exchanges of key information predicts and facilitates service innovations with organizations (O'Cass *et al.*, 2013). Therefore, based on above reviewed literature, the study tests the following hypotheses (see Figure 1):

H1. Job satisfaction significantly and positively affects service innovation.

H2. Workplace friendship significantly and positively affects service innovation.

H3. Job satisfaction significantly and positively affects knowledge sharing.

H4. Workplace friendship significantly and positively affects knowledge sharing.

H5. Knowledge sharing significantly and positively affects service innovation.

H6. Knowledge sharing significantly moderates the effect of job satisfaction and workplace friendship on service innovation.

3. Method

3.1 Research design and samples

This is a quantitative research. The data are from questionnaire responses from engineers in Taiwan's electronic information industry who are responsible for R&D, production, manufacturing and so on. Survey questionnaires were distributed through personal contacts in electronic information companies located in Taipei, Hsinchu and Tainan science parks. The duration of data collection is from June to September 2013. A total of 895 questionnaires were retrieved, among which 851 were valid for analysis (valid return rate 95.1 percent). The demographic statistics of the valid sample show

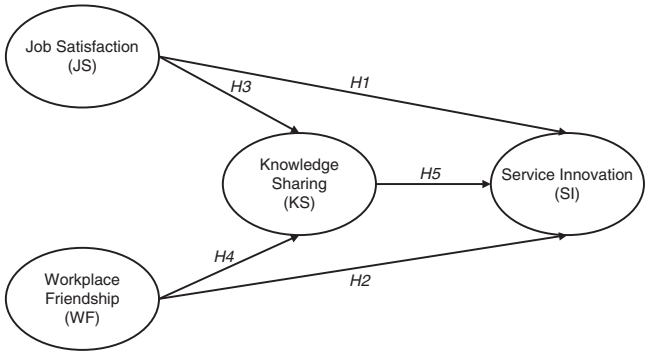

Figure 1.
Research structure

more male engineers (84 percent) than female (16 percent). The majority of the participating engineers fall into the 31-40 age category (70 percent), followed by the 21-30 age group (22 percent). In all, 60 percent of engineers hold a college/university degree and 36 percent have a master's degree.

3.2 Measures and methods for data analysis

For the survey items to fit the actual work context of Taiwan's electronic information industry, existing measures were adopted and revised for the present study. The survey questionnaire consists of four constructs, namely job satisfaction, workplace friendship, knowledge sharing and service innovation.

Six items from the Minnesota Satisfaction Questionnaire (proposed by Weiss *et al.*, 1967) were adopted according to the research objective of the present study. The sample items are "I am satisfied with the freedom to use my own judgment" and "I am satisfied to try my own methods of doing the job."

The friendship opportunities (a total of six items) from the two-dimensional workplace friendship scale, proposed by Nielsen *et al.* (2000), were adapted to measure workplace friendship in this study. Sample items are "Communication among employees is encouraged by my organization" and "I have the opportunity to develop close friendships at my workplace."

The five items measuring knowledge sharing (developed by Bock *et al.*, 2005) were adopted. The sample items are "My knowledge sharing with other organizational members is an enjoyable experience" and "My knowledge sharing with other organizational members is valuable to me."

Finally, five items from the service innovation scale proposed by Van Riel *et al.* (2004) which describe the high tech service innovation success were used in this study. The sample items are "The new service enabled expansion into new markets" and "The new service increased customer satisfaction and loyalty."

Collected data were analyzed using SPSS 18.0and AMOS20.0. Pearson correlation, confirmative factor analysis and structural equation modeling (SEM) were used for statistical analysis.

4. Results and discussion

4.1 Multivariate normal distribution testing

To confirm whether the collected samples match a normal distribution, this study undertook the skew and kurtosis testing for all observation variables. The value of the Mardia coefficient then was used to assess if all sample data meet the assumptions of a multivariate normal distribution.

According to Kline (1998), the absolute value of skew should be less than three and the absolute value of kurtosis should be less than ten to be considered a univariate normal distribution. Our results meet these criteria. Second, parameters from the maximum likelihood estimator (MLE) were used in this study for confirmative factor analysis and SEM testing. The limitation of MLE is that the sample data must fit a multivariate normal distribution. Thus, we used the Mardia coefficient to test our data's multivariate normality. When the Mardia coefficient is smaller than $p \times (p+2)$, where "p" is the number of observation variables, the data has multivariate normality (Bollen, 1989). In this study, the number of observation variables is 22. Thus the corresponding value is $22 \times (22+2) = 528$. As present in Table I, the Mardia coefficient is 78.405, which is <528, as a result, even though our sample distribution is not multivariate normal distributed, MLE is still applicable for SEM testing.

Table I. A summary of univariate and multivariate normal distribution testing

Variable	Item	Min.	Max.	Skew	Critical ratio	Kurtosis	Critical ratio
SI	SI 5	2	5	−0.308	−3.673	−0.095	−0.565
	SI 4	2	5	−0.328	−3.909	−0.254	−1.515
	SI 3	2	5	−0.151	−1.8	−0.268	−1.598
	SI 2	1	5	−0.342	−4.076	0.353	2.099
	SI 1	2	5	0.044	0.522	−0.267	−1.587
KS	KS 5	2	5	−0.146	−1.742	−0.233	−1.387
	KS 4	2	5	−0.045	−0.533	−0.361	−2.151
	KS 3	1	5	−0.427	−5.086	0.163	0.968
	KS 2	2	5	−0.187	−2.233	−0.353	−2.101
	KS 1	2	5	−0.393	−4.679	−0.215	−1.279
WF	WF 6	1	5	0.125	1.494	−0.077	−0.457
	WF 5	1	5	0	0	0.011	0.067
	WF 4	1	5	−0.039	−0.467	−0.066	−0.39
	WF 3	2	5	−0.211	−2.51	−0.119	−0.709
	WF 2	1	5	−0.491	−5.851	0.513	3.054
	WF 1	1	5	−0.286	−3.402	0.143	0.851
JS	JS 6	1	5	−0.427	−5.091	0.388	2.309
	JS 5	1	5	−0.032	−0.377	−0.491	−2.923
	JS 4	1	5	−0.175	−2.081	−0.048	−0.287
	JS 3	1	5	−0.313	−3.731	0.012	0.072
	JS 2	1	5	−0.327	−3.897	0.271	1.616
	JS 1	1	5	−0.387	−4.606	0.256	1.525
Multivariate						174.679	78.405

4.2 Confirmatory factor analysis

CFA is part of SEM analysis. Before structural model analysis, the measurement model is analyzed first because measurement model can correctly reflect the dimensions and factors in the research design. The result of CFA analysis shows that all standardized factor loadings are >0.5 and the values of indicator reliability are >0.25, which indicate an excellent goodness-of-fit model (as shown in Figure 2). The component reliability is 0.867, with an average variance extracted of 0.521 for job satisfaction; 0.847 with an average variance extracted of 0.5 for workplace friendship; 0.860 with an average variance extracted of 0.563 for knowledge sharing and 0.833 with an average variance extracted of 0.5 for service innovation. The results show that the variables in this study demonstrated good convergent validity. Additionally, as we computed the confidence interval of the paired correlations, the results showed the discriminant validity is supported (Torkzadeh *et al.*, 2003). Table II indicates our data pass the convergent validity and discriminant validity testing.

4.3 Structural model and hypotheses testing

Figure 3 presents the results. Due to the large sample in our study, the χ^2-value was large and significant. Therefore, Bollen-Stine Bootstrapping was used to re-calculate the χ^2-value. The results show good model fit (i.e. $\chi^2 = 263.668$, df $= 203$, χ^2 with 203 df $= 1.299$, GFI $= 0.975$, AGFI $= 0.967$, CFI $= 0.994$, NNFI $= 0.993$, IFI $= 0.994$, RMSEA $= 0.019$, SRMR $= 0.0743$). All indicators meet the SEM criterion of the overall model fit (Jackson *et al.*, 2009).

For the hypothesis testing, the study adopted the bootstrap method, all standardized regression weights are significant, indicating that job satisfaction (standardized regression weight $= 0.33$) and workplace friendship (standardized

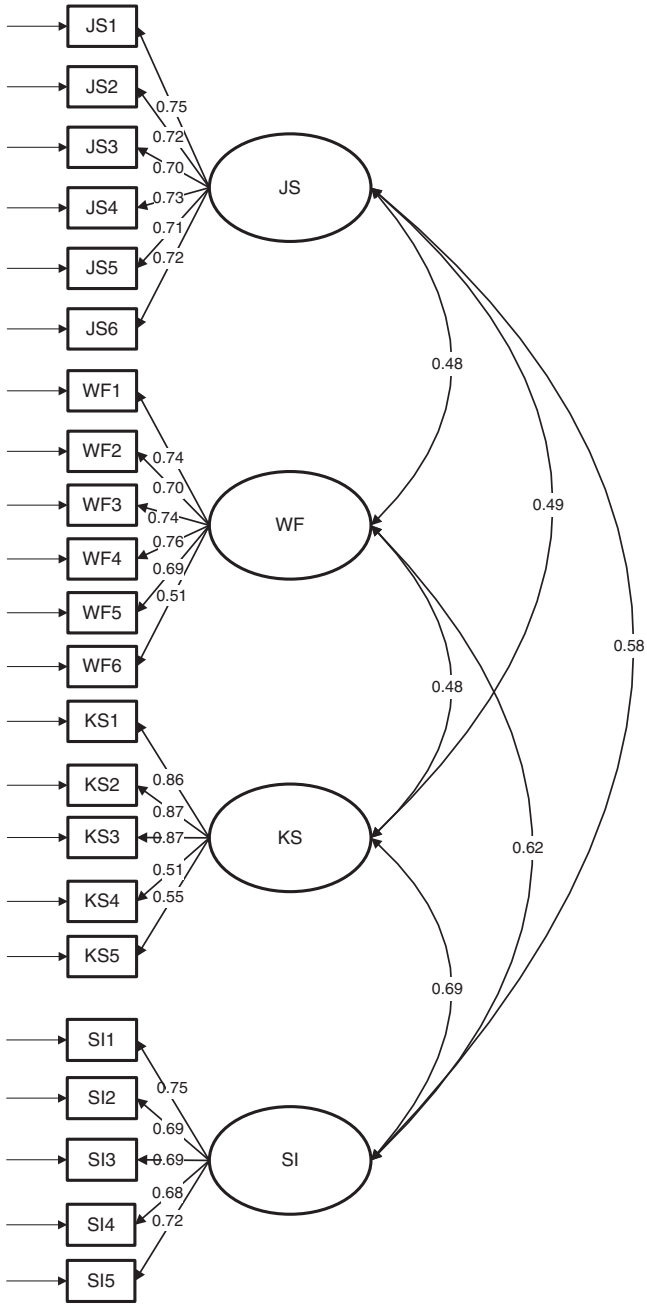

Figure 2.
The results of confirmatory factor analysis

regression weight = 0.33) have positive and significant effect on knowledge sharing. The explained variation of both job satisfaction and workplace friendship on knowledge sharing is 32 percent. Additionally, job satisfaction, workplace friendship and knowledge sharing demonstrated positive and significant influence on service innovation. Their standardized regression weights are 0.23, 0.31 and 0.42, respectively. The total explained variation of the three dimensions on service innovation is 61 percent. All hypotheses concerning direct effect (*H1-H5*) are therefore accepted. The results are summarized in Table III.

In order to examine the moderating effect of knowledge sharing in the overall structural model, the confidence intervals for the direct and indirect effect were used as testing standards. The results show that all confidence intervals for the indirect effect do not include 0, which indicate that moderating effect exists. However, since the confidence intervals for the direct effect do not include 0 as well, so knowledge sharing demonstrates a partial moderating effect. The moderating effect of knowledge sharing between job satisfaction and service innovation is 50.2 percent of the total indirect effect, whereas the

Table II. The correlation coefficients for confidence interval and discriminant validity

Parameter			Estimate	Lower	Upper
JS	←→	WF	0.483	0.404	0.561
JS	←→	KS	0.486	0.415	0.567
JS	←→	SI	0.582	0.511	0.651
WF	←→	KS	0.487	0.411	0.572
WF	←→	SI	0.626	0.543	0.711
KS	←→	SI	0.679	0.593	0.757

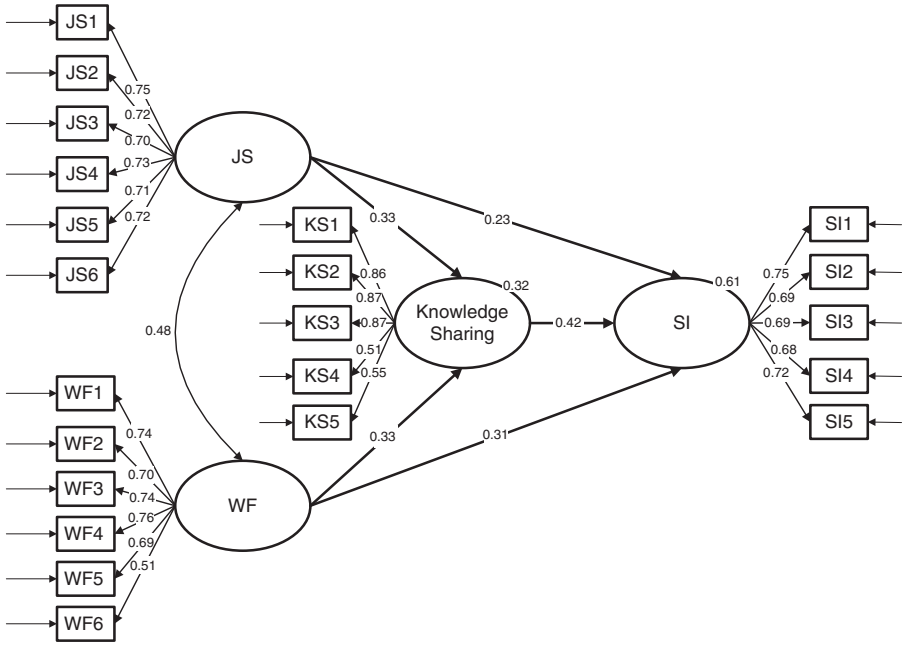

Figure 3. Standardized structural model and hypothesis testing

moderating effect of knowledge sharing between workforce friendship and service innovation is 49.87 percent of the total indirect effect (see Table IV).

4.4 Discussion

The results of our study indicated that both job satisfaction and workplace friendship have demonstrated a significant effect on service innovation and that knowledge sharing significantly moderates the effect of job satisfaction and workplace friendship on service innovation. Modern organizations have tried to maintain market competitiveness through enhanced human capital in a knowledge economy. Some studies have demonstrated that various forms of knowledge management can be a moderator that strengthen the influences of various factors on organizational performance, such as self-directed learning (Ho, 2008), human resource management, organizational learning (Lin and Kuo, 2007), information technology (Lin *et al.*, 2007) and so on.

While a number of studies have revealed that knowledge management is the key for improved organizational performance (e.g. Choi *et al.*, 2008; Perez-Arostegui *et al.*, 2012), and there is a positive relation between job satisfaction and knowledge sharing (e.g. de Vries *et al.*, 2006), job satisfaction and innovation (e.g. Shiptona *et al.*, 2006; Pierce1 and Delbecq, 1976), workplace friendship and knowledge sharing (e.g. Lin, 2007), workplace friendship and innovation (e.g. Albrechta and Hall, 1991; Xerri, 2013), as well as knowledge sharing and innovation ability (Hu *et al.*, 2009; Lin, 2007b), none has provided an confirmed overall structure that proves that knowledge sharing could link job satisfaction, workplace friendship and service innovation ability together. The present study adds value by examining the moderating effect of knowledge sharing among these constructs. The results can contribute to the strategic planning of human resource development in order to enhance the capability of service innovation in a technological industry.

5. Conclusion, implication and limitation

The present study aims to examine the relationship among job satisfaction, workplace friendship, knowledge sharing and service innovation that existed in the field of electronic information industry. The results show that job satisfaction and workplace friendship demonstrated significant and positive effect on knowledge sharing, which in turn influences organizational service innovation. Additionally, knowledge sharing has

Table III. Standardized regression coefficient and significance of the direct relation

Parameter			Estimate	Lower	Upper	*p*
KS	←	JS	0.327	0.237	0.418	0.001
KS	←	WF	0.329	0.24	0.436	0.002
SI	←	JS	0.229	0.128	0.321	0.001
SI	←	WF	0.313	0.21	0.422	0.002
SI	←	KS	0.416	0.301	0.534	0.001

Table IV. The confidence interval for standardized direct and indirect effect

Parameter			Direct effect	Indirect effect
JS	→	SI	0.128 ~ 0.321	0.090 ~ 0.199
WF	→	SI	0.210 ~ 0.422	0.088 ~ 0.202

a positive and significant influence on service innovation. It also significantly moderates the effect of job satisfaction and workplace friendship on service innovation. In particular, knowledge sharing has demonstrated a stronger moderating effect to influence the relationship between job satisfaction and service innovation than between workplace friendship and service innovation.

The results suggest that, first of all, enhanced job satisfaction and workplace friendship can facilitate organizational service innovative ability. Job satisfaction is a personal need that every employee tries to pursuit. Satisfying jobs facilitates quality performance, consequently aiding innovations. Moreover, since workplace friendship can affect service innovation, it is recommended that the management foster interaction among employees in order to enhance trust as well as mutual relationships at workplace, which may effectively reduce dysfunctional conflicts and nurture a healthier environment for creating new ideas.

Second, knowledge sharing is found to be a catalyst of service innovation. Human capital is what creates value in a knowledge economy. However, individuals have limited knowledge and experience. A knowledge sharing mechanism that brainstorms employees' creativity and new knowledge will supplement individual insufficiency and maximize the benefit of knowledge through better individual and organizational performance. Since knowledge sharing greatly influences service innovation, it is recommended that the management supports and arranges various activities, such as support groups, seminars, business retreat, etc., to induce knowledge sharing within organizations.

Third, knowledge sharing can be seen as a bridge between job satisfaction, workplace friendship and service innovation. In order to achieve a win-win situation of individuals and organizations, the management should strategize necessary plans and policies to provide more satisfying jobs and foster friendship building at workplace since happier employees result in happier organizational results. Workplace harmony is also a criterion for a cohesive and open-minded organizational culture. It is recommended that the management shows consideration for organizational members. Various types of horizontal communication channels among individuals, teams or divisions can be strengthen, and vertical communication channels, such as feedback, suggestion or grievance system can be established to assist an open atmosphere that allows information and knowledge to flow freely.

Even though the empirical results of this study largely support the proposed research model, at least three limitations should be noted. First, the research participants were recruited only by invitation; it may decrease the reliability of the analysis results. Second, possible biases or preferences (e.g. work habits, communication or social preferences) may affect the results. Third, since the data collection targets different electronic information companies located in the north, central and southern region of Taiwan, the characteristics and operations of these companies may be quite different among themselves, from those in other countries, as well as from those in other subject domains. Nevertheless, results for this report may provide a fundamental reference for technological industries in other countries whose environments are similar to those in Taiwan.

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