IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 4 Issue 1, January 2017
ISSN (Online) 2348 – 7968 | Impact Factor (2015) - 4.332
www.ijiset.com

# How information quality leads to operational capabilities and corporate performance

**Shu-Mei Tseng**
Information Management, I-Shou University, Kaohsiung, 84001, Taiwan

**Abstract**
Facing the increasing complexity of business processes, firms should find ways to improve performance. Firms thus build enterprise applications that can coordinate activities, decisions, and knowledge across many different functions, levels, and business units in a firm. The information quality (IQ) of enterprise applications has become a critical concern of firms. However, there are still few studies focusing on the relationships among IQ, operational capabilities and corporate performance, and thus this study applied questionnaire and statistical analytical techniques to investigate these. The findings from a survey of 130 firms in Taiwan confirmed the mediating role of operational capabilities. The results show that the IQ of the enterprise applications will positively influence corporate performance, and the relationship between IQ and corporate performance will be mediated by operational capabilities. Lastly, specific recommendations are provided for enterprises to understand how IQ leads to operational capabilities and corporate performance.
***Keywords:*** *Information Quality, Operational Capabilities, Corporate Performance, Enterprise Applications*

## 1. Introduction

Enterprises often adopt different kinds of information systems to raise the quality of information provided to customers, as well as gain access to real-time information that helps them better understand and meet their customer's needs and wants. However, getting all the different kinds of information systems in an enterprise to work together is as a major challenge (Iqbal et al., 2013). As a consequence, some companies implement enterprise applications which are systems that span functional areas, focus on executing business processes across the business, and include all levels of management. In other words, enterprise applications are type of information systems that are used in order to manage activity within teams or beyond organizational boundaries. This type of information systems help businesses become more flexible and productive by coordinating their processes more closely and integrating groups of these so that staff can focus on the efficient management of resources and customer services (Lorenzo et al., 2012). Enterprise applications include enterprise resource planning (ERP) systems, supply chain management (SCM) systems, customer relationship management (CRM) systems, and knowledge management (KM) systems (Lai & Yang, 2009).

Youn et al. (2014) showed that information systems are regarded as complementary resources that enhance the value of other organizational resources and capabilities. They further stated that organizational capabilities are the unique resources that enable the firm to conceive of and implement value-creating strategies, which enhance its efficiency and effectiveness. Therefore, organizational capabilities are crucial for realizing contemporary business strategies because they can boost the ability of a firm to identify and react to changes taking place in the business environment (Roberts & Grover, 2012), while operational capabilities are enablers in the form of skills and knowledge within a firm that enable it to be a productive provider of products and services based on its existing resource (Krasnikov & Jayachandran, 2008). That is, operational capabilities are the specific sets of skills, processes and daily tasks that have been developed by the operations management system so that a firm would be able to solve problems by utilizing its operational resources (Wu et al., 2010).

Due to the fact that studies on operations management have long focused on operational practices to improve performance, this study thus views operational capabilities as a subset of the organizational capabilities construct, and assumes that knowledge acquired from various studies on organizational capabilities can be applied to research on operational capabilities (Setia et al., 2013). Wu et al. (2010) further stated that the concepts of unity, integration and directions with regard to resources and operational practices are actually derived from a firm's operational capabilities. They embody both the explicit factors (e.g., resources and practices) and tacit factors (e.g., leadership, know-how, and skill sets) that are needed to manage a myriad of issues or uncertainties. Moreover, enterprises now realize the importance of providing high-quality information to their staff, and thus invest heavily in information systems to achieve operational excellence. This means that the relationships among information quality (IQ), operational capabilities, and corporate performance are closely intertwined. However, a review of prior research shows there has been little focus on how IQ leads to operational capabilities and corporate performance. This study thus proposes a research model to understand

the relationship among IQ, operational capabilities and corporate performance, as well as concrete suggestions for enhancing competitive advantage and achieving sustainability.

## 2. Theoretical background and model development

### 2.1 Information Quality (IQ)

Information systems quality model defines IQ as the quality of outputs the information system produces, which can be in the form of reports or online screens (DeLone & McLean, 1992). Gorla et al. (2010) further stated that IQ is an idea related to the quality of outputs of an information system, which can be beneficial for business users, suitable for decision making, and easy-to-understand (showing the value of information systems quality), along with outputs that meet users' information specifications (showing the conformance of information systems quality to certain specifications). Chavez, Yu, Gimenez, Fynes, and Wiengarten (2015) further indicated that IQ refers to information richness, rather than the amount, and thus it emphasizes the quality and nature of information shared among buyers, suppliers, and partners.

Setia et al. (2013) defined IQ as based on the completeness, accuracy, format and currency of information produced by customer service units' digital technologies. Completeness means the level to which the system supplies all information that is necessary, while accuracy is defined as the user's perception that the information is correct. Format is how well the user perceives the presentation of the information, and currency is to what degree the user perceives that the information is up-to-date. Ghasemaghaei and Hassanein (2015) also used the concepts of intrinsic, contextual, representational, and accessibility quality to identify the online IQ categories and then evaluate online IQ. They further stated that information quality on websites should be a focus for online vendors and website developers as it has tremendous influence on consumers' online satisfaction.

### 2.2 IQ as an Antecedent of Corporate Performance

IQ is likely to be even more important with regard to the operational coordination associated with operational capabilities in a firm with a more sophisticated business processes (Setia et al., 2013). Rai et al. (2006) explain that a high degree of IQ helps improve operational coordination, because it help to enhance connectivity with customer applications, ascertain the integrity of data information across the firm, provide real-time visibility into supplier systems in order to provide observations of the in-transit inventory, as well as helping to synchronize operations across a network of producers and consumers with a higher degree of complexity. IQ is associated with superior operational performance such as quality, flexibility, customer service and cost improvement (Chavez et al., 2015). Data accuracy is critical in affecting operating efficiency and customer service, as well as associated positively with the ability to cope with product changes (flexibility), while poor information quality resulted in an increase in supply chain costs (Dai, Li, Yan, & Zhou, 2016). Zhou et al. (2014) also indicated that firms should align the level of effective supply chain practice with the level of information quality in order to achieve superior business performance. Based on these arguments, this study propose that IQ is an important antecedent of corporate performance, because it enables firms to achieve production-related goals, such as consistent product quality, cost reduction, volume and product flexibility, and delivery dependability and speed. This study thus hypothesizes the following:

**$H_1$:** The IQ of the enterprise applications will positively influence the corporate performance.

### 2.3 Operational Capabilities

Operational capabilities are an intricate series of tasks that a firm performs in order to boost its output by efficiently utilizing its production capabilities, technology and flow of materials (Yu et al., 2014). Davies and Brady (2016) stated that the coordination and performance of productive activities in a firm determines the company's operational capabilities, because they generate stability and direction when performing reoccurring tasks, as well as reduce the necessity to forecast upcoming unpredictable events. Operational capabilities are thus focused on performing organizational activities efficiently and flexibly with a minimum wastage of resources.

Operational capabilities have been described as focusing on the efficient delivery of quality products and services, cost, and flexibility and measured through scales of its various dimensions, such as flexibility, cost efficiency, and logistics (Tan et al., 2004).

### 2.4 Mediating Impacts of Operational Capabilities in Enhancing Corporate Performance

IQ facilitates strategic coordination amongst a firm's executives. Gorla et al. (2010) further stated that, at the operational level, inaccurate or inadequate information would lead to customer dissatisfaction and low job satisfaction among employees. At the tactical level, irrelevant information might unfavorably affect the quality of decision-making. Inaccurate or delayed information

would also hinder the selection and execution of a solid business strategy. There is thus a need to find ways in which a business can manage all the information in its information systems, and how managers and employees are able to coordinate their work. One solution is to implement enterprise applications. Enterprise applications automate processes that span multiple business functions and organizational levels, and then ultimately extend outside the organization (Iqbal et al., 2013; Lai & Yang, 2009; Lorenzo et al., 2012).

Superior operational capabilities increase efficiency in the delivery process, reduce the cost of operations and help firms achieve a competitive advantage (Terjesena et al., 2011). Operations capabilities thus have a significant impact on a firm's business performance. Ahmed et al. (2014) defined operational capabilities as the ability to efficiently utilize inputs and resources (e.g., raw materials, labor, and technology) in order to generate products and services. Such capabilities strive to generate the highest positive influence possible on economic value by enhancing the cost efficiency, quality and timeliness of the conversion of inputs to outputs. Jiang et al. (2015) indicated that integrative capability is a critical dynamic capability, and an important mediator in relationship between operational capabilities and firm performance. In other words, integrative capability has a significant, direct impact on a firm's performance, and also an indirect impact via the creation of new operational capabilities. Therefore, this study proposes that localized operational capabilities could be used to enhance corporate performance. Based on the above argument and the results of these empirical studies, this leads us to propose the second hypothesis:

**$H_2$:** The relationship between IQ and corporate performance will be mediated by operational capabilities.

Figure 1 presents the above mentioned two hypotheses that explain the relationship between the IQ of enterprise applications and operational capabilities to locally respond to changes in the business environment and thus achieve operational excellence, as well as enhance corporate performance.

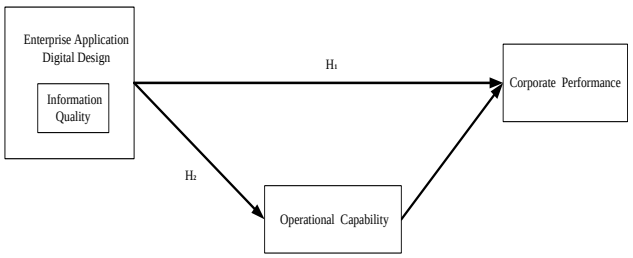



Fig. 1 Research model

## 3. Methodology

### 3.1 Data collection

The survey includes two data collection stages: pilot survey and large-scale survey. The pilot survey is designed to test the viability of the study and purify the data collection instrument. It was carried out with four companies and three scholars in Taiwan. The questionnaire for the large-scale survey was subsequently revised based on the pilot study feedback to improve understanding of its content. The integrity of the collected data can be affected by the low willingness of respondents to participate. Therefore, purposive sampling was used in this study in order to ensure that the respondents had a high willingness to participate in the research. The contact information was obtained by the largest Taiwanese corporations compiled from a list of China Credit Information Service (2014), from which the top 5000 firms were selected. Afterwards, the online questionnaire was sent to the respondents in various companies via e-mail. Administrators were asked to fill out the questionnaire, since they tend to play key roles in organizational activities. The link to the online questionnaire for this study was distributed to the companies at the beginning of April 2015, with 130 questionnaires returned by May 2015. Of these, only one was eliminated from the sample because it was incorrectly completed, and the statistical results obtained from remaining questionnaires were analyzed.

### 3.2 Measures Instruments

All measures were created or adapted from scales that have been validated in prior research. Items in the questionnaire were measured using a seven point Likert scale ranging from (1) strongly disagree to (7) strongly agree. To ensure the desired balance and randomness of the questionnaire, all items were randomly sequenced in order to reduce the potential ceiling (or floor) effect that can induce biased responses.

This study defined IQ as the quality of outputs the information system produces, which can be in the form of reports or online screens (DeLone & McLean, 1992). The measures that have been employed for IQ in the literature include information completeness, information accuracy, information format, information currency, and information relevance (Gorla et al., 2010; Setia et al., 2013; Wixom & Todd, 2005). This study is limited to examining the operational capabilities that can help a firm to achieve competitive advantage. The measures used in the items examining operational capabilities were adopted from Wu et al. (2010). Operational capabilities consist of the abilities of operational improvement, operational

innovation, operational customization, operational cooperation, operational responsiveness, and operational reconfiguration (Coltman & Devinney, 2013; Wu et al., 2010; Yu et al., 2014). The measure of firm performance came from Zheng Zhou et al. (2005), Shou et al. (2014) and Tseng (2014). And this includes return on investment, sales growth rate, the growth rate of profit, sales amount and profit level. The final questionnaire items are shown in Table 1.

Table 1: Measurement scale items for model variables

**IQ** (DeLone & McLean, 1992; Gorla et al., 2010; Setia et al., 2013; Wixom & Todd, 2005)
- IQ1: Our information outputs (including the output on the screen and reports) can provide all the information we need.
- IQ2: Our information outputs (including the output on the screen and reports) are accurate.
- IQ3: Our information outputs (including the output on the screen and reports) are well formatted.
- IQ4: Our information outputs (including the output on the screen and reports) are up to date.
- IQ5: Our information outputs (including the output on the screen and reports) are very useful when I am dealing with my daily jobs.
- IQ6: In general, our information outputs (including the output on the screen and reports) are excellent.

**Operational capabilities** (Coltman & Devinney, 2013; S. J. Wu et al., 2010; Yu et al., 2014)
- OC1: We will modify and extend the business processes in order to gain unique positions in the market.
- OC2: We can be flexible to adjust processes to cope with unexpected variations in the components and material inputs.
- OC3: We can be flexible to adjust processes in order to cope with unexpected demand for manpower.
- OC4: We can adopt newer and better practices to respond to market changes.
- OC5: We can reconfigure (combine/release) resources to respond to market changes.
- OC6: We will continue to learn from and improve our processes based on past successes and failures.
- OC7: We will be innovative to improve the currently outdated process expertise.
- OC8. Our staff has the skill to maintain good relations with others, as well as to work together to diagnose or solve problems.

**Corporate Performance** (Shou et al., 2014; Tseng, 2014; Zheng Zhou et al., 2005)
- CP1: Compared with other companies in the same industry, our return on investment is very high.
- CP2: Compared with other companies in the same industry, our sales growth rate is very high.
- CP3: Compared with other companies in the same industry, our growth rate of profit is very high.
- CP4: Compared with other companies in the same industry, our profit level is very high.
- CP5: Compared with other companies in the same industry, our sales amount is very high.

### 3.3 Data analysis procedures

First, this study uses SPSS statistical software to conduct the descriptive data analysis. Second, this study uses the Partial Least Squares (PLS) path modelling (variance based structural equation modelling) to conduct the model analysis. This technique is less stringent with regard to the data distribution and sample size requirements compared to covariance-based structural equation modeling. The minimal demands on distributional assumptions and sample size make PLS an appropriate analysis technique for this study (Chin, 1998; Fornell & Cha, 1994). Third, the Sobel test is a traditional method of testing the significance of mediation effects, and thus it is also used in this study.

## 4. Results

### 4.1 Descriptive statistics

Table 2 shows the details of the sample, which includes the industries, annual sales, number of employees, job position, and years of work experience.

Table 2: Profile of the respondents (n =129)

| | Percentage of firms | | Percentage of firms |
|---|---|---|---|
| **Industries** | | **Job position** | |
| Traditional manufacturing industry | 25.6 | CEO, general/vice manager | 6.2 |
| High tech industry | 34.1 | (Vice) division manager, assistant manager | 21.7 |
| Service industry | 26.4 | Chairperson, chief, project supervisor | 17.0 |
| Others | 14.0 | Administrator, executive board, engineer | 41.1 |
| | | Others | 14.0 |
| **Annual sales (NTD)** | | **Years of work experience** | |
| Less than 30 million | 15.5 | ≦ 3 years | 7.8 |
| 30 million to 100 million | 16.3 | > 3 years and ≦5 years | 15.5 |
| 100 million to 1 billion | 15.5 | > 5 years and ≦10 years | 20.8 |
| 1 billion to 10 billion | 20.9 | > 10 years and ≦15 years | 23.3 |
| 10 billion to 30 billion | 8.6 | > 15 years and ≦20 years | 18.6 |
| 30 billion to 50 billion | 5.4 | Over 20 years | 14.0 |
| 50 billion and above | 17.8 | | |
| **Number of employees** | | | |
| Less than 100 | 24.8 | | |
| 101 to 500 | 19.4 | | |
| 501 to 1,500 | 16.2 | | |
| 1,501 to 3,000 | 4.7 | | |
| 3,001 to 6,000 | 17.8 | | |
| Over 6,001 | 17.1 | | |

### 4.2 Model analysis

This study applied PLS modeling to validate the constructs of IQ, operational capabilities, and corporate performance, and to test the hypotheses. The psychometric properties of the constructs were tested using confirmatory factor analysis (CFA) and using Smart PLS 2.0 M3 (Ringle et al., 2005). This process had two stages: (1) assessment of the measurement model; and (2) testing of the structural model. First, exploratory factor analysis was employed and questionnaire items which had not reached the standard for factor selection were deleted. From the results of factor analysis, items IQ5-6, OC6-8, and CP4-5 were thus omitted as their factor loadings were below 0.6. Hence, the measurement model of this study achieved good unidimensionality (Gefen & Straub, 2005). Second, this study assessed the quality of the measurement model by examining the construct reliability, convergent validity, discriminant validity, and standardized factor loadings of the latent variables (Henseler et al., 2009). Reliability is used to evaluate the internal consistency of a construct. CFA analysis of PLS provides the values for Cronbach's alpha and composite reliability (CR) for each construct. As can be seen from Table 3, all the constructs in the model possessed adequate internal reliability, as the Cronbach's alpha and CR value of each construct is greater than 0.70 (Nunnally & Bernstein, 1994). The three scales thus demonstrate adequate reliability. In addition, the analysis of the factor loadings of each item for all the constructs in the model shows that all the measurement items are

significant at $p < 0.001$ (Bradley et al., 2006; Hair Jr. et al., 1998). Furthermore, this study found that the average variance extracted (AVE) value for all the latent variables in the model is greater than 0.5 (Chin, 1998), which demonstrates that the constructs possess adequate convergent validity. Assessment of discriminant validity of the constructs was done by calculating the square root value of the AVE for each construct. The results show that all the square root values are greater than the correlation values with all other constructs (see the values on the diagonal in Table 4), which confirms the constructs possess adequate discriminant validity (Fornell & Larcker, 1981).

Table 3: Psychometric properties in the null model for first-order constructs (n = 129).

| Constructs | Items | Loading | CA | CR | AVE |
|---|---|---|---|---|---|
| Information Quality | IQ1 | 0.809 | 0.873 | 0.913 | 0.724 |
| | IQ2 | 0.852 | | | |
| | IQ3 | 0.900 | | | |
| | IQ4 | 0.841 | | | |
| Operational Capabilities | OC1 | 0.889 | 0.911 | 0.933 | 0.737 |
| | OC2 | 0.800 | | | |
| | OC3 | 0.855 | | | |
| | OC4 | 0.876 | | | |
| | OC5 | 0.871 | | | |
| Corporate Performance | CP1 | 0.893 | 0.898 | 0.936 | 0.831 |
| | CP2 | 0.908 | | | |
| | CP3 | 0.934 | | | |

†α = Cronbach's alpha; CR = Composite Reliability; AVE = Average Variance Extracted
** All standardized factor loadings are significant at $p < 0.001$.

Table 4: Mean, S.D., and intercorrelations of the latent variables.

| Construct | Mean | S.D. | Information Quality | Operational Capability | Corporate Performance |
|---|---|---|---|---|---|
| Information Quality | 5.194 | 1.035 | .851 | | |
| Operational Capability | 5.022 | 1.103 | .699*** | .858 | |
| Corporate Performance | 4.667 | 1.308 | .623*** | .681*** | .911 |

†Square root of the AVE on the diagonal.
*p < 0.05; **p < 0.01; ***p < 0.001.

The first model presents a direct path from IQ to the corporate performance (see Fig. 2). $R^2$ measures the relationship of a latent variable's explained variance to its total variance. Values of approximately 0.670 are considered substantial, while those around 0.333 are considered average, and those around 0.190 are considered weak (Chin, 1998). Figure 2 shows a moderate level of 0.388 for corporate performance, and the first model accounted for 38.8% of the variation in the corporate performance construct.

The significance of path coefficient can also be seen from Figure 2, showing the results of the standard path analysis, which indicates that IQ has a very significant and positive influence on corporate performance, the standard path coefficient of which is 0.623. In summary, hypothesis H1 is supported by the results of the empirical analysis (the t-value for the path coefficient is statistically significant at the $\alpha = 0.05$ level).

The second model shows operational capability playing a mediation role between IQ and corporate performance (see Fig. 3). Four different models emulating the four-step method by Baron and Kenny (Baron & Kenny, 1986) were made to test the mediation relationships. Each model had:

(1) a direct path from IQ to corporate performance;
(2) a direct path from IQ to operational capability;
(3) a direct path from operational capability to corporate performance; and
(4) a direct path from IQ to corporate performance, and an indirect path from IQ to operational capability then from operational capability to corporate performance.

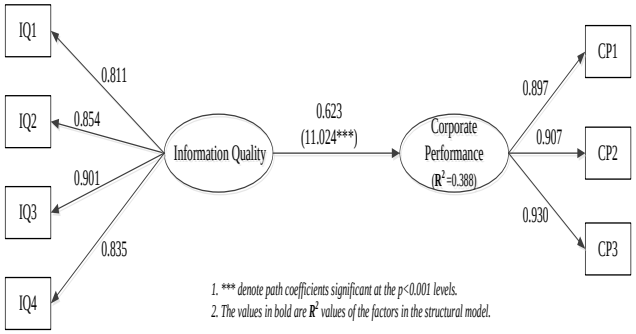
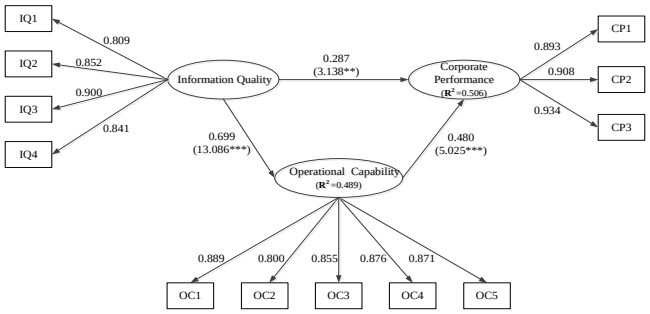



Fig. 2 Model 1 direct effect –Beta for the path and $R^2$ for the variable

Mediation exists if the coefficient of the direct path between the independent variable and the dependent variable is reduced when the indirect path via the mediator is introduced into the model. The direct path is measured without the mediator in step 1 above (see Fig. 2), and with the mediator in step 4 above (see Fig. 3). The standardized beta of the direct path was 0.623 in step 1 and 0.287 after the operational capability was introduced as a mediator. The indirect path of IQ to operational capability and from operational capability to corporate performance was 0.699* 0.480 = 0.336. The amount of the relationship between IQ and corporate performance accounted for by the mediator was 0.336, representing 53.93 percent of the direct effect. The significance of the mediation effect was assessed using the Sobel test. The z-value for the indirect path in step 4 above was 4.675, $p < 0.001$. In summary, hypothesis H2 was thus supported , and this means that the relationship between IQ and corporate performance will be mediated by operational capabilities.




*1. ** and *** denote path coefficients significant at the p<0.01 and p<0.001 levels, respectively.*
*2. The values in bold are $R^2$ values of the factors in the structural model.*

Fig. 3 Model 2 Betas for the paths and $R^2$ for the variables

## 5. Conclusions

This study aimed to examine the possible causal relationships among IQ, operational capabilities and corporate performance. First, the direct relationship between IQ and corporate performance was presented. Second, a mediating relationship was proposed between IQ and corporate performance, with operational capabilities acting as the mediator.

### 5.1 Theoretical implications

The results (Table 4) shows that the correlation coefficient between IQ and corporate performance is 0.623 and reaching a significant level (***p < 0.001). Thus, IQ has a significant positive correlation with corporate performance. It means that if the IQ of enterprise applications is higher and the corporate performance is greater. The correlation coefficient between IQ and operational capabilities is 0.699 and reaching a significant level (***p < 0.001). Thus, IQ has a significant positive correlation with operational capabilities. It means that if the IQ of enterprise applications is higher and the operational capabilities of an enterprise are greater. The correlation coefficient between operational capabilities and corporate performance is 0.681 and reaching a significant level (***p < 0.001); thus, operational capabilities has a significant positive correlation with corporate performance. It means that if the operational capabilities of an enterprise are higher and the corporate performance is greater.

As the hypothesized antecedent of corporate performance, IQ has a significant path coefficient with regard to corporate performance. This implies that the level of IQ in the enterprise applications has a significantly positive influence on corporate performance (b = 0.623), and similar findings have been reported in other studies (Setia et al., 2013). Therefore, if enterprises can provide high-quality information for their staff, then this may enhance their corporate performance. This research thus suggests that enterprises should provide accurate and well-formatted information outputs (including the outputs on screens and in reports) for their staff, as well as keep all the information up-to-date in order to enhance corporate performance. This means that enterprises should aim to provide more relevant and accurate information to users, and ensure that it is complete and easy-to-understand (Gorla et al., 2010).

Based on the results of testing the mediating effects of operational capabilities, it was found that IQ has a direct influence with regard to enhancing corporate performance (b = 0.287); moreover, operational capabilities are also indirectly interrelated in terms of improving corporate performance (indirect effect is 0.336), and similar findings have been reported in other studies (Ahmed et al., 2014; Jiang et al., 2015; Wu et al., 2010). This shows that IQ determines the quality of the outputs an information system produces, while the degree of operational capabilities determines to what extent organizational activities are performed efficiently and flexibly with the minimum wastage of resources. Therefore, firms should aim to provide high-quality information to their staff to help them perform organizational activities efficiently and flexibly, thus enhancing corporate performance. Coltman and Devinney (2013) further indicated that operational capabilities can still be a source of competitive advantage. The importance given to operations impacts the development of the related capabilities, as well as the firm's overall performance, and hence top managers should make it known that they see these functions as important. Pérez-Aróstegui et al. (2015) also stated that the ability to acquire information about markets and customers can improve the abilities of firms to adapt to changes in the environment and thus to improve their competitive position amongst competitors who are less informed and therefore slower to adapt. This research thus suggests that enterprises should do the following: modify and extend their business processes in order to gain unique positions in the market; be more flexible to adjust processes to cope with unexpected variations in the components and material inputs, and unexpected demand for manpower; adopt newer and better practices, and reconfigure (combine/release) resources to respond to market changes; and enhance their operational capabilities in order to increase corporate performance.

### 5.2 Managerial implications

Based on the underpinning lens of resourced based view, this study investigates the relationships among IQ, operational capabilities, and corporate performance. Extending resourced based view, enterprise applications are regarded as complementary resources that enhance the value of other organizational resources and capabilities (Tippins & Sohi, 2003).

The results show that the IQ of the enterprise applications will positively influence corporate performance. This

finding supports the work of Chavez et al. (2015), who found that IQ provides relevant information for the identification, prevention and solving of problems, which are generally associated with performance improvement. Therefore, in order to raise corporate performance, enterprises must derive a method to enhance the IQ of enterprise applications. Moreover, information completeness, information accuracy, information format, and information currency constitute the construct information quality. Thus, a net positive effect from these factors will result in a positive effect on operational capabilities and corporate performance. These enterprise applications should provide complete, accurate, well formatted, and timely information for better operational capabilities, and then corporate performance will eventually be put into effect. Only when the information is high quality, readily accessible, accurate and relevant, would these enterprise applications be perceived useful (Chavez et al., 2015).

The results show that the relationship between IQ and corporate performance will be mediated by operational capabilities. That is, if the IQ of enterprise applications is higher and the operational capabilities of an enterprise are greater, corporate performance will be significantly enhanced. Therefore, in order to raise corporate performance, enterprises must derive a method to enhance both IQ and operational capabilities. This finding supports the work of Iqbal et al. (2013) and Lai and Yang (2009), who found that the quality of the information communicated throughout these enterprise applications is the basis for enhancing organizational capabilities. Raschke (2010) further stated that if a firm can be more agile at the process level, its management should also be able to redesign and reconfigure individual business process components, to integrate individual tasks and thus be more capable of responding to the environment. The enterprise applications not only automate many steps in business processes that were formerly performed manually, but can also actually change the flow of information, replacing sequential steps with tasks that can be performed simultaneously (Lai, 2006). Based on this definition, localized firm capabilities represent an enterprise applications' ability to build specific routines for such activities within the business processes (Lorenzo et al., 2012; Setia et al., 2013). Moreover, Ahmed et al. (2014) indicated that operational capabilities are important determinants of differentials in corporate performance. Thus, they suggest that the operations function should be treated with strategic importance because of its greater significance for corporate performance.

### 5.3 Study limitations

Although the findings of this study have a number of meaningful implications for practitioners, there are also certain limitations, as follows. First, this research applied a purposive sampling method and obtained a slightly inadequate number of respondents. Therefore, it is suggested that future research should apply a random sampling method to collect more responses and increase the generalizability of the findings. Second, this research investigated the impact of IQ and operational capabilities on corporate performance in a Taiwanese context, which contains a specific set of societal, cultural and linguistic attitudes and behaviors. Moreover, the measurement scale items used in this study were translated from Chinese to English, which may cause slight variations in meaning. Therefore, future research could extend this study to other regions of the world.

**Acknowledgments**

Supported by National Science Council Taiwan under Grant MOST 103-2410-H-214-003-.

## References

[1] Ahmed, M. U., Kristal, M. M., & Pagell, M. (2014). Impact of operational and marketing capabilities on firm performance: Evidence from economic growth and downturns. International Journal of Production Economics, 154, 59-71.

[2] Baron, R. M., & Kenny, D. A. (1986). The moderatormediator distinction in social psychological research: conceptual, strategic, and statistical considerations. Journal of Penality and Social Psychology, 51(6), 1173-1182.

[3] Bradley, R. V., Pridmore, J. L., & Byrd, T. A. (2006). Information systems success in the context of different corporate cultural types: an empirical investigation. Journal of Management Information Systems, 23(2), 267-294.

[4] Chavez, R., Yu, W., Gimenez, C., Fynes, B., & Wiengarten, F. (2015). Customer integration and operational performance: The mediating role of information quality. Decision Support Systems, 80, 83-95.

[5] Chin, W. (1998). The partial least squares approach to structural equation modeling, in: Marcoulides, G.A. (Ed.), Modern Methods for Business Research. Lawrence Erlbaum Associates, Mahwah NJ, pp. 295-336.

[6] Coltman, T., & Devinney, T. M. (2013). Modeling the operational capabilities for customized and commoditized services. Journal of Operations Management, 31(7-8), 555-566.

[7] Davies, A., & Brady, T. (2016). Explicating the dynamics of project capabilities. International Journal of Project Management, 34(2), 314-327.

[8] DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. 1nformation Systems Research, 3(1), 60-95.
[9] Fornell, C., & Cha, J. (1994). Partial Least Squares. Advanced Methods of Marketing Research, R. P. Bagozzi, ed., Blackwell Publisher, UK.
[10] Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.
[11] Ghasemaghaei, M., & Hassanein, K. (2015) Online Information Quality and Consumer Satisfaction: The Moderating Roles of Contextual Factors - A Meta-Analysis. Information & Management, 52(8), 965-981.
[12] Gorla, N., Somers, T. M., & ong, B. (2010). Organizational impact of system quality, information quality, and service quality. The Journal of Strategic Information Systems, 19(3), 207-228.
[13] Hair Jr., J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Multivariate Data Analysis, 5 ed. Prentice Hall, Englewood Cliffs, NJ.
[14] Henseler, J., Ringle, C., & Sinkovics, R. (2009). The use of partial least squares path modeling in international marketing. Advances in International Marketing, 20, 277-319.
[15] Iqbal, R., Shah, N., James, A., & Cichowicz, T. (2013). Integration, optimization and usability of enterprise applications. Journal of Network and Computer Applications, 36(6), 1480-1488.
[16] Jiang, W., Mavondo, F.t., & Matanda, M.J. (2015). Integrative capability for successful partnering: a critical dynamic capability. Management Decision, 53(6), 1184-1202.
[17] Krasnikov, A., & Jayachandran, S. (2008). The relative impact of marketing, research-and-development, and operations capabilities on firm performance. Journal of Marketing, 72(4), 1-11.
[18] Lai, J. Y. (2006). Assessment of employees' perceptions of service quality and satisfaction with e-business. International Journal of Human-Computer Studies, 64(9), 926-938.
[19] Lai, J. Y., & Yang, C. C. (2009). Effects of employees' perceived dependability on success of enterprise applications in e-business. Industrial Marketing Management, 38(3), 263-274.
[20] Lorenzo, O., Kawalek, P., & Ramdani, B. (2012). Enterprise applications diffusion within organizations: A social learning perspective. Information & Management, 49(1), 47-57.
[21] Nunnally, J.C., & Bernstein, I. H. (1994). Psychometric Theory, 3 ed. McGraw-Hill, New York.
[22] Pérez-Aróstegui, M.N., Bustinza-Sánchez, F., & Barrales-Molina, V. (2015). Exploring the relationship between information technology competence and quality management. BRQ Business Research Quarterly, 18(1), 4-17.
[23] Rai, A., Patnayakuni, R., & Seth, N. (2006). Firm Performance Impacts of Digitally Enabled Supply Chain Integration Capabilities. MIS Quarterly, 30(2), 225-246.
[24] Raschke, R. L. (2010). Process-based view of agility: The value contribution of IT and the effects on process outcomes. International Journal of Accounting Information Systems, 11(4), 297-313.
[25] Ringle, C.M., Wende, S., & Will, A. (2005). Smart PLS, University of Hamburg, Hamburg, Germany.
[26] Roberts, N., & Grover, V. (2012). Investigating firm's customer agility and firm performance: The importance of aligning sense and respond capabilities. Journal of Business Research, 65(5), 579-585.
[27] Setia, P., Venkatesh, V., & Joglekar, S. (2013). Leveraging digital technologies: How information quality leads to localized capabilities and customer service performance. MIS Quarterly, 37(2), 565-590.
[28] Shou, Z., Chen, J., Zhu, W., & Yang, L. (2014). Firm capability and performance in China: The moderating role of guanxi and institutional forces in domestic and foreign contexts. Journal of Business Research, 67(2), 77-82.
[29] Tan, K. C., Kannan, V. R., Jayaram, J., & Narasimhan, R. (2004). Acquisition of operations capability: A model and test across US and European firms. International Journal of Production Research, 42(4), 833-851.
[30] Terjesena, S., Patelb, P. C., & Covin, J. G. (2011). Alliance diversity, environmental context and the value of manufacturing capabilities among new high technology ventures. Journal of Operations Management, 29(1), 105-115.
[31] Tseng, S. M. (2014). The impact of knowledge management capabilities and supplier relationship management on corporate performance. International Journal of Production Economics, 154, 39-47.
[32] Wixom, B. H., & Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. Information Systems Research, 16(1), 85-102.
[33] Wu, S. J., Melnyk, S. A., & Flynn, B. B.(2010). Operational Capabilities: The Secret Ingredient. Decision Sciences, 41(4), 721-754.
[34] Youn, S. H., Yang, M. G., Kim, J. H., & Hong, P. (2014). Supply chain information capabilities and performance outcomes: An empirical study of Korean steel suppliers. International Journal of Information Management, 34(3), 369-380.
[35] Yu, W., Ramanathan, R., & Nath, P.(2014). The impacts of marketing and operations capabilities on financial performance in the UK retail sector: A resource-based perspective. Industrial Marketing Management, 43, 25-31.
[36] Zhou, Z. K., Yim, C.K., & Tse, D.K. (2005). The Effects of Strategic Orientations on Technology- and Market-Based Breakthrough Innovations. Journal of Marketing, 69(2), 42-60.

**Shu-Mei Tseng** is a professor in the Department of Information Management at I-Shou University, Taiwan. She received her Ph.D. in the Department of Industrial and Information Management at National Cheng Kung University, Taiwan. Her works have been published in International Journal of Information Management, International Journal of Production Economics, Journal of Knowledge Management, Expert Systems with Applications, Industrial Management and Data Systems, Journal of Enterprise Information Management, International Journal of Quality and Service Sciences, Journal of Retailing and Consumer Services, and Management Research News. Her current research interests

include knowledge management, information technology management, customer relationship management, and service quality.