

# **Towards a Framework of Enterprise Integration: Linking Quality Management, Organizational Learning and Information Technology**

**Jiunn Chieh Lee<sup>1</sup>**

<sup>1</sup> Department of Information Systems and Operations Management, The Auckland Business School,  
The University of Auckland, Auckland, Private Bag 92019, Auckland 1001, New Zealand  
jc.lee@auckland.ac.nz

## **ABSTRACT**

This paper proposes a framework that can be used to explain and improve enterprise integration practices. It draws on the traditions of quality management and organizational learning to understand how implementation of advanced information technologies such as enterprise resource planning and customer relationship management may be explained and improved. Enterprise systems implementations at two subsidiaries of two separate large conglomerates are used to illustrate this framework. In particular, it is posited that quality management and organizational learning principles and practices are essential for successful advanced information technology implementation. This is because advanced integrative information technologies like ERP and CRM are in essence process management tools and are evolving to become knowledge management tools.

**Keywords:** Enterprise Resource Planning, Customer Relationship Management, Quality Management, Organizational Learning

## **1. INTRODUCTION**

Enterprise integration underlies e-commerce, enterprise resource planning, customer relationship management and other advanced uses of information technology to create business value [1-3]. Despite the proliferation of literature on e-commerce, the social and organizational aspects of enterprise integration are not well understood. Also, holistic approaches in enterprise integration research are rare. This paper aims to contribute to our existing understanding of e-commerce by proposing a framework that links organizational learning, quality management practices and the use of advanced information technologies such as enterprise resource planning and customer relationship management. The use of the framework will hopefully facilitate actions that create business value through the implementation of advanced information technologies. The theoretical framework has been derived from existing frameworks of organizational learning and quality management [4-12] and information systems implementation [13-15]. An assumption here is that information technology adoption would lead to better organizational effectiveness if it facilitates 1) practices that improved the quality of the product and services provided by the firm and 2) organizational learning.

Both quality management and organizational learning have been touted as approaches to improve organizational effectiveness [16-18]. While the link between quality management and organizational learning has been suggested by various authors [4, 9, 19], the nexus between information technology implementation, quality management and organizational learning is less pronounced.

## **2. THEORETICAL FRAMEWORK DEVELOPMENT**

The framework has undergone three stages of development in the last eight years. First, it was developed to understand the link between organizational learning and quality management. The first stage of development involved a post-positivist qualitative and quantitative multi-level in-depth case study [20] of two organizations (herein called Netweb and Stark) that were fully owned subsidiaries of two multi-billion dollar (US\$) conglomerates. The first stage was conducted between early 1995 and early 1997. Then, the framework was adapted to understand the impact of information technology on the linkage between quality management and organizational learning in theoretical research in late 1998. Currently it has been recently adapted to understand the impact of advanced information technologies specifically enterprise resource planning and customer call center management (a subset of customer relationship management systems). The last stage involved a study of Stark within the wider context of the conglomerate to which it belonged using ethnographic approaches [21] in a multi-level multi-functional manner, and revisiting the evidence collected in phase I.

Netweb was a firm in the service industry and deployed advanced information and communicational technologies. The staff education levels of Netweb were comparatively high in relation to Stark. On the other hand, Stark was a manufacturing firm in a comparatively low technology industry. While Netweb experience high turnover rates being in a high tech industry, employees of Stark worked with the same company for relatively long periods, some even for decades. Netweb and Stark are summarized next.

Name	Netweb	Stark
Service/ Manufacturing	Service	Manufacturing
Technology	High	Low
Staff Turnover	High	Low
Staff Education	High	Low

**Table 1 - Stark differences between two firms studied**

The following table summarizes the fieldwork conduct of Phase I and Phase III. Note that Phase II involved only a theoretical adaptation of the framework developed in Phase I to account for the impacts of information technology implementation.

Phase I (positivist case study)	No of org. levels studied	Number of Interviewees	Surveys	Other sources
Stark (focused on MaxCo ET site of Stark)	5 levels (From Stark CEO to Machine Operator)	7 (Note: repeat interviews were conducted for some)	Organizational Learning Survey Learning Org. Profile	Observations, Meetings, documentation, informal conversations
Netweb (focused on the National Call Center)	5 levels (From Netweb CEO to call center operator)	10 (Note: same as above)	Same as above	As above
<b>Phase II</b>				
<i>Theoretical development. No field work in this phase</i>				
Phase III (ethnography)	No of org. levels studied	Number of Interviewees	Surveys	Other sources
Stark within context of the wider Solteria conglomerate	9 levels From former CEO of Solteria to Stark Truck Driver.	69 (Note: repeat interviews with many respondents)	Not applicable.	As above

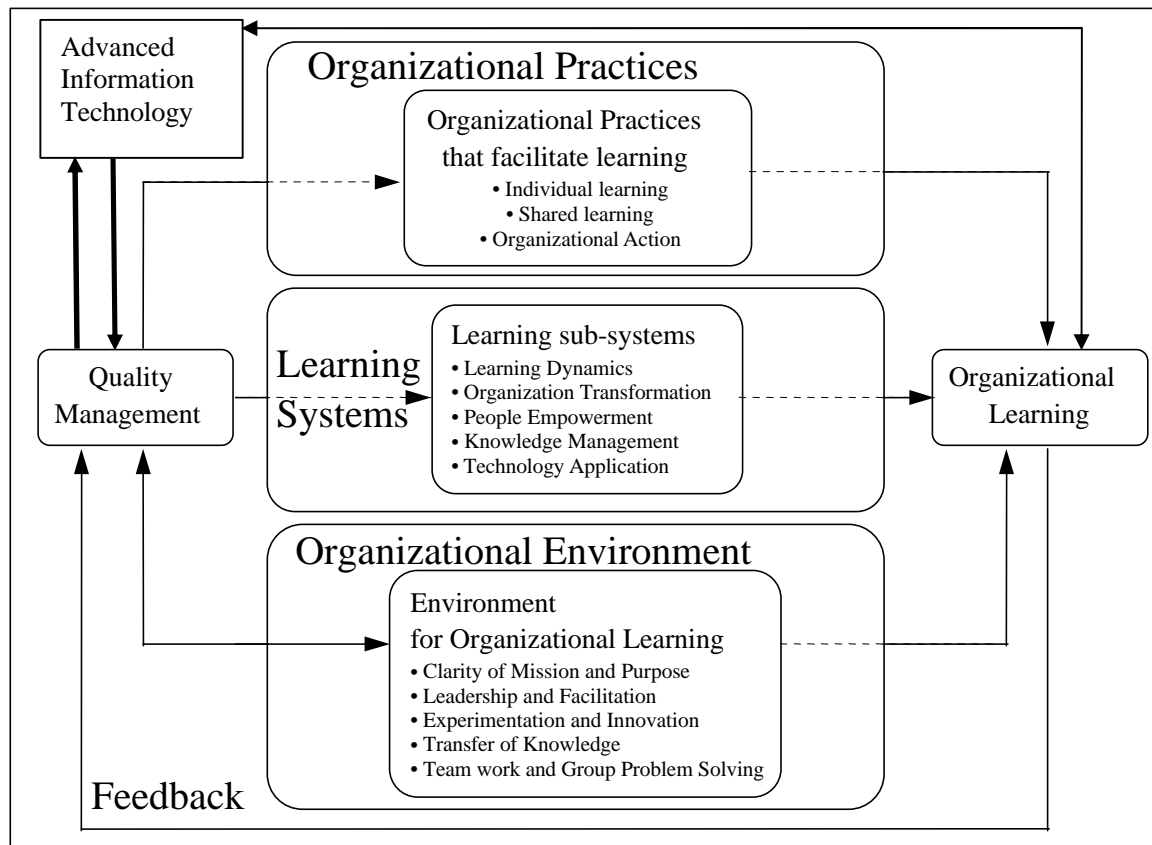
**Table 2 - Summary of conduct of fieldwork for Phase I, II and Phase III**

From the table above, while efforts in Phase I involved testing a framework linking quality management and organizational learning, the critical ethnography in Phase III helped the author understand in a deeper manner the social and organizational aspects of enterprise systems implementation. This offered a very rich background against which to develop, question and extend theory [22]. For example, in phase III, over 40,000 pages of documentation were collected at Stark. Access was given to privy viewpoints that could not easily be gained using any other method except very in-depth case study methods (or ethnography). It should

be noted that Phase III started off as an interpretive ethnography to understand information technology-enabled enterprise integration. Constructs being studied were at that time ill-defined in the literature. Hence, ethnography was necessary.

The organizational learning survey (OLS) [10-12] and Learning Organization Profile (LOP) [7, 8] mentioned in previous table were instruments designed by other authors. They were among the few available instruments at the time the research was conducted (mid-1996 to early 1997) that assessed how the characteristics of an organization was in line with a learning organization [e.g., 17, 23]. It was not applied in phase III because the purpose of phase III was to achieve a deep understanding of the impact of enterprise resource planning on organizations. Moreover, Phase III began with the use of interpretive methods. Thus the use of survey methods was ruled out in phase III. Also, using a positivist framework at the start of the phase III was deemed inappropriate.

Combining the previous studies under a interpretive hermeneutic lens [24], allows one to conduct meta-studies that enrich current existing frameworks. Here, positivist frameworks are interpreted through an interpretive lens within the current context and applied to derive rich insights. This is because every act of research involves a double hermeneutic [cf. 25]. (Even positivist frameworks have to be reconstructed and reinterpreted within new context every time they are applied [cf. 26]). From this process, an updated framework is derived that involves data of previous case studies and ethnographies being reinterpreted within a new framework presented in the next diagram. It is posited that advanced information technologies are involved in a structuration process of organizational practices, learning systems and the wider organizational environment for organizational learning. Also, quality management initiatives that are facilitated by information technologies (especially those that enable better process management capabilities such as customer relationship management and enterprise resource planning) impact on organizational practices, the learning systems and organizational environment for learning. The extent that information technology facilitates the linkages between actions that positively impact on the creation, maintenance and enhancement of organizational practices, learning systems and organizational environment that are conducive to organizational learning, is the extent that IT implementations may positively impact on organizational effectiveness and success. (The concept of success is dependent on who, when and how it is measured [27]. The author considers success to be related to the ability of the firm to implement information technologies to facilitate organizational learning. Also the framework has some overlaps between the areas of organizational practices, learning systems and organizational environment because they



**Figure 1 - Framework linking information technology, quality management practices and organizational learning**

are not meant to be strictly independent or dependent variables but rather perspectives through which one understands organizational learning.

Organizational practices in the diagram above refer to institutionalized social practices that facilitate the linkages between individual learning, shared learning and organizational action [9]. Learning sub-systems refer to a perspective where several organizational sub-systems constitute a learning organization, namely learning dynamics, organizational transformation, people empowerment, knowledge management and technological application [7, 8]. Organizational environment for organizational learning is comprised of five characteristics: clarity of mission and purpose, leadership and facilitation, experimentation and innovation, transfer of knowledge and, team work and group problem solving [10-12]. Information technology through a structuration process may enable and constrain quality management initiatives that would then impact on organizational practices, learning systems and organizational environment. This then impacts on organizational learning that may also in turn impact the implementation of use of advanced information technologies. The use of advanced information technologies would also impact organizational learning directly through other means.

### 3. ANALYSIS

With Netweb, its call center was recognized widely as one of the best in the country at the time of research. When Netweb's parent company started to expand its activities to another country, it showcased Netweb's call center that had won a quality award that year as the epitome of excellence of its customer service. An examination of the social practices, learning systems and environment for organizational learning reveals that Netweb's context was extremely conducive for organizational learning. Information technology used in this context facilitated the linkages referred above.

In contrast to this, Stark's ERP implementation was not as successful. Although an environment conducive for organizational learning was created at Stark's MaxCo ET site earlier, the overall organization and in particular, its order acceptance and delivery process was far from exhibiting characteristics of a learning organization. The ERP implementation was widely touted as a failure even after two years going live. This could be explained by the lack of the institutionalization of social practices that translated individual learning, to shared learning and eventually effective organizational action. The environment for organizational learning and the learning systems were also not conducive for organizational learning.

In the case of Netweb, the call center that was show-cased had strong Clarity of Mission and Purpose. The mission of the center was clearly defined and employees were clear about the purpose of the organization. There was clear Leadership modeled by the manager of the center who held monthly call center meetings where problems were resolved or escalated to more senior management if they had not already been resolved at the team level. However, with the Experimentation and Innovation, due to the center's emphasis on stability and predictability, there was not much emphasis put on devising new ways doing things. The Transfer of Knowledge was aided by the use of call center management software that recorded each problem that was logged with the center. This enabled all members of the center to view the problems that customers were experiencing and ensure all problems were resolved within the agreed time frames outlined in service level agreements. The environment for team work and group problem solving was facilitated by a team-based structure and rewards system which rewarded the teams as whole rather than just individuals.

The adoption of quality management principles by Netweb as whole institutionalized some of the aspects mentioned above. For example, the principle of Leadership modeling as prescribed by the Malcolm Baldrige criteria was adopted by the center's manager who was also an ardent supporter for Netweb's quality framework that was based on the Baldrige criteria.

With regards to learning sub-systems, Netweb had systems to facilitate Learning Dynamics. Single loop learning was facilitated by the adoption of a standard methodology for problem solving. However, at the senior executive level, organizational defensive routines hindered double loop learning [28] in the organization. With Organizational Transformation, the importance of being a quality oriented organization and a learning organization was understood and strongly supported by Netweb's senior management team. People Empowerment for learning was encouraged where managers and non-managers worked together to solve problems together. On the transfer of knowledge, Netweb's call center staff would store solutions to customer problems as quality system procedures so that important knowledge is coded, stored and made available to those who need and use it. Finally, Netweb among other things used Lotus Notes to manage group processes such as project management, team process and meeting management (an example of Technology Application to support organizational learning).

Organizational practices that facilitated learning were encouraged where for example; a customer logged a problem with the call center. This call is noticed by a customer service representative at the center. He solves that problem and writes a quality system procedure detailing the resolution procedure. So individual learning is then shared. The next time the same problem occurs, the quality system procedure to solve that

problem is applied. Thus there is a linkage between Individual Learning, Shared Learning and Organizational Action. Other practices that facilitated this linkage were weekly team meetings and monthly center meetings where problems and solutions were discussed and workers implemented these solutions.

Contrast this to Stark's call center. It was formed from an integration of the order acceptance and delivery processes of three of Stark's business units: MaxCo, CamCo and Xenon. For CamCo, the call center also merged the order acceptance and delivery processes that were previously localized at the level of each CamCo plant. This call center used an ERP system from a major vendor that was interfaced with a then state-of-the-art expert system for dynamic truck allocation. The dynamic truck allocation system recommended the best truck to delivery the order to the customer. However, due to the lack of Clarity of Mission and Purpose where a conflict of strategic orientations existed between the senior management, the call center did not fulfill its original purpose of ensuring on-time delivery of products. Certain dominant actors occasionally forced large orders from big customers through the system to maintain good relationships with these big customers; causing every order to be late. On Leadership and Facilitation, while the call center manager attempted to facilitate learning, the call center was part of the wider volatile centralized order acceptance and delivery cycle. Overall, there was no clear Leadership across this cycle that facilitated the environment for organizational learning. Experimentation and Innovation were constrained by frequent firefighting of problems Furthermore, the transfer of knowledge across that order acceptance and delivery process was poor. For example, a sales person related to the author how the same problem of how add-ons to the product were not included for the third time in a row for the same customer! Furthermore, the plants that were integrated into the order acceptance and delivery cycle had previously competed against each other on the volume of product delivered. Thus teamwork and group problem solving were not practiced effectively.

With regards to learning sub-systems at Stark's call center, single loop learning was problematic where corrective actions to ensure the processes met their goals were not taken as discussed above in the case of missing add-ons to products. Double loop learning at the strategic level was also hindered. Refer to [29] for further information. Organizational transformation towards a learning organization was hindered by a change in leadership where the new CEO of Stark held different ideas of how best to generate value for the conglomerate that his predecessor. Furthermore, the senior manager who championed the learning organizational movement at Stark had already left. On people empowerment, Stark had a culture of cascading authority and autonomy to the lowest levels practicable. However, the call center impinged on prior established

autonomy and authority structures that involved delegating certain aspects of authority and autonomy to plant managers. Thus there was lack of cooperative behavior between managers throughout the order acceptance and delivery cycle. On knowledge management, although a Quality Improvement Reporting System was in place, it was not used effectively. There was a gap in the link between reporting a problem and ensuring it got fixed. On Technology Application for learning, Stark had implemented ERP, an expert system to assist in assigning the best truck to deliver products and a host of other then advanced information technologies. These supposedly could support a learning system. However, the use of these technologies to support a learning system was hindered due to the lack of overall process management throughout the order acceptance and delivery cycle that could have used data generated from these systems to improve performance.

From an organizational practices perspective, individual learning (such as the sales person discovering a problem described above) was not translated into shared learning (collective procedures and mindset to ensure that this problem does not occur) which is then translated into organizational action (the add-ons to the product for a customer are added and delivered correctly).

#### 4. DISCUSSION

One could suggest that organizational learning is a criterion for effective advanced technology implementation such as enterprise resource planning and customer relationship management. For effective technology implementation, the applications would need to impact on processes to generate business value. However, as practice-based research shows, it is the tacit relationships between people and things that make processes work [30]. Moreover, these tacit relationships are highly contextual. The importance of improving social practices, learning systems and learning environment so that information technology supports linkages between quality management and organizational learning is underscored in this paper.

The areas outlined in the framework provide some key areas that practitioners and academics can focus on to ensure that implementation of advanced information technologies such as enterprise resource planning and customer relationship management contribute to a firm's performance. Theories, methods and tools established in other fields may be adopted to improve implementation success. For example, Argyris' ladder of inference and the left and right-hand column can be used to facilitate double loop learning [29].

#### 5. CONCLUSION

It is posited that quality management and organizational learning principles and practices are essential for

successful advanced information technology implementation. This is because advanced information technologies like customer relationship management and enterprise resource planning are used to support process management [31] and will be increasingly used to support knowledge management. Thus principles, practices, frameworks, theories, methods and tools learnt in the last few decades from previous movements can surely be applied to ensure implementation success of these technologies. This paper has presented evidence to support the assertion that insights generated from the integration of quality management, organizational learning and information technology as illustrated in the framework presented in this paper could be used to explain if not improve IT-enabled enterprise integration success.

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