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**How Does ERP Implementation Affect
Information Exchanging Costs and Employee
Motivation? – *A Case Study of Gold Mantis Ltd.***

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Abstract

Based on behavior science theory (March & Simon's, 1958) and economic theory (Hedberg, 1981), handling and dealing with information is one of the most important issues for companies. As a result, managers should always consider making the information management process more. This essay focuses on one of the recent information systems – Enterprise Resource Planning (ERP) system and aims to determine its influence on two non-financial perspectives: information exchange costs and employee motivation. A case study in one of the biggest construction and design companies – Gold Mantis Ltd. is performed to test the hypotheses. After t-test and regression analysis, the results show that the ERP implementation has a negative effect on information exchange costs and a positive effect on employee motivation.

Key words: behavior science theory, economic theory, ERP implementation, Information exchange costs, employee motivation.

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1. Introduction

Today, the world economy is rapidly growing. Millions of either small or big companies are funded every single day. Due to March and Simon's (1958) behavioral science theory, the running of businesses in modern companies is all about handling all kinds of information and making decisions. As a result, it becomes a general recognition that information management is very important for a company. In addition, based on the economic theory (Hedberg, 1981), information collection and evaluation may generate costs such as time and efforts. While being under a very intensive and competitive business environment, the old management style which needs countless paper documents to keep information is no longer appropriate. In order to have a more effective and efficient management structure, many companies start to use computer systems to support their management process. During the whole management process within a company, appropriate distribution of components and materials to meet customers' demands has always been one of the most important points to focus on. According to such a need, material requirements planning (MRP) was developed.

Over a period from its introduction, MRP has been extended from a relatively simple material control system to become a major information system capable of meeting most of the needs of one or more manufacturing plants (Wight, 1984). As a logical consequence, manufacturing resource planning (MRP II) started to appear as a "higher level version" of MRP. MRP II extends the database which may be useful for the companies' major activities and the extension helps managers with decision making. MRP II tends to link together manufacturing, engineer, marketing, finance and management, but it still cannot fully integrate all the functional divisions. Such a weakness prevents MRP II from being an enterprise-wide system (Yusuf, 1998). MRP II works well in manufacturing companies. However, other companies also would like to improve their management systems. Thus, enterprise resource planning (ERP) was initiated.

Since the early 1990s, many firms around the world have shifted their information

technology (IT) strategy from developing information systems in-house to purchasing application software such as enterprise resource planning (ERP) systems (Hong and Kim, 2002). An ERP system is a system that includes different information from different departments within a company and manages them together in one way. In comparison to the past, when companies still used different standards for information recording, information exchange between departments is quite complex. The use of ERP system is far easier for management. Until now, the ERP software market has already become one of the fastest growing markets in the software industry (Prasad, 1999).

From a practical perspective, companies in different industries or even different departments within a company may have rather different management styles. Therefore, changing the original management system companies were using in the past to a new ERP system is a big decision that needs to be made with caution. Although there are many successful examples reported by companies that have already adapted an ERP system in their daily management process, risks should be considered as well before implementation.

Two main perspectives of considerations should be taken seriously while planning ERP implementation. On one hand, users may have difficulty implementing an ERP system, since understanding the operational logic in the unfamiliar modules is not very easy. Park, Suh and Yang (Park et al., 2007) have pointed out the main reasons why organizations need to spend a substantial effort in convincing its employees of the practical value of ERP systems and educating them in their proper use: the difficulty of understanding and the lack of knowledge about this system. To do so, many efforts may be spent during the ERP implementation process and such spending is also a type of cost for the company which may offset the positive effects of ERP. As a result, many of them failed to perform as expected after using the ERP system. On the other hand, the implementation of ERP system is expensive. As a result, most of the implementing companies are the ones that do financially better and have larger size than the others in their industries. The costs of buying the ERP system and installment are only a small part of the “ice-berg” because main costs of implementing the ERP system are usually related to its implementation consulting fee, training and education costs and historical information importing costs. Once the ERP system has been implemented, it is extremely difficult for a company to go back because huge amount of money is needed

during the implementation process and once the money is spent, it becomes sunk costs. For the companies who failed in implementing ERP, the most painful thing for them is not only the loss of capital invested in ERP packages and countless payments to outside consultants, but also the loss of major portion of their business (Prasad, 1999).

One question people may ask after they understand the potential risks of ERP system usage is: if it is so expensive to implement ERP system and there are so many risks to consider, why do companies still want to change their management system into ERP? The answer is that the ERP system allows all kinds of businesses and the data following those businesses to be recorded and updated within one system so that they can be under unified management. Obviously, after the implementation of ERP system, the productivity of the company will be improved because of the reduction of information exchange costs among either departments or different levels of managements.

Since the ERP system is in itself a useful management system with a lot of potential benefits to companies, many scholars and researchers have analyzed the practical potential and use of ERP system. To better understand the ERP system implementation process, a six-stage model proposed by Kwon and Zmud and later mentioned again by Palaniswamy (2001) is used to understand the contextual factors that have influence on ERP implementation. The researchers studied three types of ERP systems – viz. SAP, Baan and Oracle ERP. The results showed that the six-stage model is indeed followed by the ERP implementation. Gefen (2002) tried to study one of the most crucial, lengthy and costly aspect in the successful implementation of ERP system – customization. In Gefen's (2002) study, surveys are distributed to ERP customization clients and after that, examined how vendors and consulting companies nurture clients' trust to encourage engagement success. The result showed that clients' perception of engagement success with the company could be influenced by their trust. Furthermore, when the company tries to meet the clients' expectations, the clients will give more trust to the customization company. In contrast, if the customization company performs against the clients' expectations, less trust will be given.

Other than topics related to the ERP system structure and the factors which may affect its implementation, researchers are also interested about the relationship between ERP implementation and firm performance. There are mainly two streams of researchers' opinions

about ERP influence on firm performance. Poston and Grabski (2001) suggest that firms which have adopted the ERP system appear to get efficiency gains in some areas, but they also face increased costs elsewhere. The increased costs seemed to offset the gains. As a result, they did not give a clear opinion whether ERP brings a greater firm performance or not. Harris (1994) thinks there is no relation between IT investment and financial performance, which is often referred to as the productivity paradox.¹ Based on his opinion, some researchers did further research and found out that delineating between IT investment and non-innovative uses of IT could offer clarity in this regard (Dos Santos et al., 1993). To conclude, a group of researchers believes that ERP implementation will not enhance firm performance. On the other hand, another group of scholars provided some evidence showing firm performance will rise by using the ERP system. By doing a case study for Korean firms, Jong-Hun Park, Hyun-Ju Suh and Hee-Dong Yang (2007) concluded that the implementation of ERP will enhance organizational performance when the organization has a reasonable absorptive capacity for understanding ERP systems. In addition, Palaniswamy and Frank (2000) also found all the companies in their study realized enhanced manufacturing performance from the implementation of ERP systems. Despite those “fully-agree enhancement opinions”, Hunton et al. (2003) mentions that firms that have adopted the ERP systems exhibit a stable improvement in financial performance in the years after the adoption comparing to those firms that do not adopt.

While a lot of literature focuses on the effect of ERP system implementation on firm performance, only a limited amount tried to comprehend how the ERP system influences factors that may have an effect on firm performance. According to the behavior science theory and economic theory (March & Simon, 1958; Hedberg, 1981), the management of information is very important to a company, so an effective and efficient information system like ERP can save not only time but also efforts for the company. This paper contributes by filling a part of the gap by exploring the answer of two questions:

“How does ERP affect information exchange costs?” and

“How does it affect employee motivation?”

¹ The productivity paradox was analyzed and popularized in a widely cited article by Eric Brynjolfsson, which noted the apparent contradiction between the remarkable advances in computer power and the relatively slow growth of productivity at the level of the whole economy, individual firms and many specific applications.

Based on theory and earlier research, I formulated my hypotheses as:

- 1) the use of ERP will cause lower information exchange costs within the firm
- 2) the implementation of ERP will lead to a higher employee motivation

I did a case study on one of the biggest construction and decoration company in China – Suzhou Gold Mantis Construction Decoration Co., Ltd. (in the rest of the paper, named Gold Mantis Ltd.) to test my hypotheses.

Gold Mantis Ltd. is a construction and decoration company founded in 1993 in Suzhou, in Jiangsu Province of China. Gold Mantis has a total registered capital of 50 million and in the year of 2006, it has become the first listed company in Shenzhen stock market among all of the design and decoration companies in China. After Gold Mantis was listed on the stock market, it started to use ERP system at the beginning of 2011. To determine whether the ERP implementation caused a difference in information exchange costs and employees' motivation, I used both a t-test and a regression analysis to check the reliability of my two hypotheses. A survey is distributed to employees of five marketing departments who started to work in Gold Mantis Ltd. in the year 2008 (3 years before the ERP implementation) or earlier and are still working in this position now. There are 152 employees in all of those marketing departments and 144 of them participated and answered the questions in my survey. After a first screening based on the condition "start to work for Gold Mantis Ltd. in 2008 or earlier", 111 employees are qualified to be included in the case study. The results show that after the company adopted the ERP system, the information exchange costs have been reduced due to a more efficient information exchange system (less time is needed) and the employees' motivation are significantly higher than before. Therefore, both H1 and H2 are accepted. More details will be shown in the later parts of this paper. Since different studies show that there is a high percentage of failure of ERP implementation and many researchers have tried to find the reason (Hawari & Heeks, 2010), my study provides a part of the answer by checking two of the overall firm performance related factors' positive/negative reaction in response to the usage of ERP.

The next section provides a literature overview and theoretical basis for hypotheses

development. Section 3 gives detail information about Gold Mantis and section 4 explains the method I have used to test my hypotheses. Survey results will be discussed in section 5. 6 and 7 will give conclusion and limitations, as well as future study directions. I made my acknowledgement in section 8.

2. Theory background and hypothesis

2.1 What is a computer information system (IS) and why is it important?

Before stepping into the “age of internet technology”, companies use paper documents to record and exchange their operating information relating to their daily business. However, the shortcomings of paper documents are the impossibility of modification, re-layout, searching or indexation once the information is written down in a static medium; duplication and distribution is very expensive; keeping and getting the paper works is also quite costly (Francois, 2003). After the widespread of electronic communication, especially since 2000, the use of paper works in the office started to decrease and exchanging information through computational technologies became more and more popular (The Economist 2008). This is not only due to the fast development of IT industry, but also because of the generation shift; young people are more inclined to read information on a full- colored interactive display screen (The Economist 2008). A computer Information System (IS) is a system which can process or interpret information by composing computers with people who use them (D’ Atri et al, 2008). Sometimes this term is only used to refer to specific computer software used for database running or to refer to some of the computer systems in a narrow perspective.

Data information can create firm value under competitive business environment (Shutao D. et al, 2009). March and Simon’s (1958) behavior science theory point out that the businesses in modern companies are all about handling information and making decisions. This laid the foundation for the vital position of information for a company. Furthermore, due to the economic theory (Hedberg, 1981), proceeding information may generate costs such as time and efforts. As a result, managers pay a lot of attention to the improvement of

information management because this can save the company's costs. How long does it take for the manufacturer to produce each product? Do they have the potential to be more efficient? What are the sales goals this year and how much have they already achieved until now? How to set an appropriate goal for next year? These are all questions which the managers have to ask themselves everyday because managers need these data information for decision-making.

Due to the commercial availability of computing technologies, a growing number of companies start to implement their own information system. This means that most of the important data information will be entered in a unified system so that managers and employees can easily access them. With the implementation of information systems, it has become the main way for companies to rely on for their daily operation, strategy planning and decision making (Yu E., 2004).

2.2 Traditional information systems and ERP system

A lot of informational products are designed by system development companies and most of them are used for unified information management (Chen, 1976). To satisfy various requirements from different companies in different industries, the techniques used for information modeling are not only limited to a small range, in other words, variety of modeling schemes, notations and even languages are used while system designers are encoding information products. But there are some most widely used techniques such as Entity- Relationships (ER) modeling (Chen, 1976), Integrated Definition for Function Modeling (IDEF0) (NIST, 1993) which is based on the Structured Analysis and Design Technique (SADT) (Ross and Shoman, 1977), and the Unified Modeling Language (UML) (Rumbaugh et al., 1999). Basically, the operational principle of information systems is using computers, which are able to store and process huge amount of information within a short period of time and deal with them accurately. While the business data is entered into the computer system by employees during their daily work, with the help of within-company internet connection, managers and employees can easily get whatever information they need as soon as possible. Moreover, as long as any of the data is changed due to some reason such as market price fluctuation, managers in the company can know this fast through the

information system and make price adjustments (Oh & Lucas, 2006).

However, there are limitations of traditional information systems. Because of the utilization and technology differences between departments, or between subsidiaries of a company (Hall 1962; Van de Ven and Delbecq 1974; Draft and Macintosh 1981; Draft 1986), it is not possible for them to use the same type of information system model. As a result, the so-called integration of information within company is actually just integration among several subsidiaries or departments which are doing similar type of businesses (Hasselbring, 2000). There are still several kinds of models in one company, so when subsidiaries or departments running different businesses want to exchange their internal information, the cost of communication is still quite high and the efficiency may be low. As we all know, companies never give up searching for systems which can improve their effectiveness and efficiency and to bring them more benefits. So, after the limitations of “old fashion” information systems are exposed under their eyes, different approaches start to be used for integration or interoperability at various levels (Yu E., 2004). Enterprise resource planning (ERP) systems offered integrated package solutions for companies with many levels of operational style and allow the information exchange among subsidiaries and departments with different business processes. The ERP implementation at the business level becomes possible since the adoption of blueprints process from a single vendor starts (Curran and Keller, 1997). When it is necessary, the disparate conceptual models used in a company will be mapped across by a technique called meta-modeling.

The ERP system is developed for the purpose of integrating the flow of information throughout the whole company (Yusuf et al., 2004). That means, even for the subsidiaries and departments running different types of businesses or having different working processes, the ERP system will make it possible to share all this information and managers can include all information into their decision making. One of the most important advantages of the ERP system is that as a technological artifact, it bundles materials and symbolic properties in some socially recognizable form (Orlikowski, 1992). A socially recognizable form is easier to understand and as a result, it is also easier for subsidiaries and departments to communicate with each other by exchanging inside information in the ERP system. By implementing the ERP system, the only thing they need to do is filling the daily business data in a specific form,

no. No adjustment needs to be done by employees themselves so that less time is spent on extra work.

2.3 Issues need to be considered before ERP implementation

There is no doubt the efficiency of information transfer will be higher after ERP system implementation. However, efficiency is not the only dimension top managers consider about a new information system before they decide to install and implement it through the whole company. Even for normal people who do not have enough knowledge about company management, they know everything has two sides. While the implementation of ERP system brings a company faster reaction either to its customers or to its mistakes (wrong decision making), a lot of costs and complex issues related to the company's business should be carefully considered.

As mentioned by Prasad et al. (1999), except the large amount of money needed to be paid for buying the information system, actually more problems follow after the system is purchased. Usually, the implementation of a new information system is not only about the system itself (new system replacing old system), but also about people who are going to use the system.

Firstly, the company managers should think about how to persuade employees to accept the ERP system instead of the old system. Usually, employees are unwilling to change because of their fear to a shift in power, the need to learn new skills and the stress of having to join a new team (Kegan & Lahey, 2001). If the managers simply make it compulsory for employees to use the ERP system, they may feel they are not respected and have less motivation to work for the company. Since employees are the "blood" of a company, demotivated employees may have negative effects on company's daily business (Fey & Pavlovskaya, 2000). Such a bad influence can easily offset (at least part of) the positive effect generated by higher efficiency caused by ERP implementation.

Secondly, it costs a lot for a company to give training to all of its employees explaining how the ERP system works and how they can use it (Motwani et al., 2005). This kind of cost is difficult to estimate because the learning abilities are quite different between different

employees. For example, higher-level department managers with higher education background may learn faster than lower level employees with lower education background (Steyn, 2004), and younger employees may learn faster than older employees. The result for different levels of learning ability is that the company may have to give more training classes to employees with lower learning ability and less training classes to with higher learning ability. Since the number of trainings is uncertain, the training cost is hard to be forecasted before it happens. Furthermore, there are new employees hired by the company during the year and all of the new employees need to be trained as well. Especially for big companies, employees and managers turn-over is quite normal. As a result, the training costs are continuous and expensive.

Thirdly, the implementation of the ERP system may have influences on the company's businesses and whether the influence will be positive or negative is undetectable (Prasad et al. 1999). Any mistakes in fulfilling the forms in the ERP system may cause products costs, prices and other changes. If the top financial analysts use the information in the system to forecast product price of the next period, a small mistake can ruin the whole business by losing the market.

As discussed above, managers need to consider a lot before they decide to replace the company's old information system by the ERP system. Even small pitfalls may lead to the failure of ERP implementation.

2.4 Factors affecting the failure or success of ERP implementation

While attracted by the advantages and benefits which may be brought to the company by ERP system, many companies suffered a lot from the failure of ERP implementation because of their lack of thought (Parr and Shanks, 2000). In Majed's (2000) report, 70% of ERP implementations cannot get the expected result they want to achieve. It is also mentioned in other studies that 40% to 60% high "failures" ranges are classified during ERP implementations (Langenwaller, 2000). The failure of ERP implementations can cause very serious problems such as bankruptcy in companies (Bulkelery, 1996; Davenport, 1998; Markus et al., 2000). Different ERP system users give their different standard while judging

whether the ERP implementation is a failure or not. For example, failures include shut down of systems, partially performing systems, business loss, lowered market price, loss of competitive advantages and so on (Deutsch, 1998; Diederich, 1998; Nelson and Ramstad, 1999). Ptak (2000) claims about 60%-90% ERP system implementation should be treated as failure based on the definition that an implementation that does not achieve a sufficient Return On Investment (ROI) identified in the project approval phase is failure.

Because of the high rate of failure when organizations are implementing ERP system, the continuous explorations of factors which may have an influence on such a failure seems to be reasonable. Figuring out factors causing failure makes it possible for ERP users to avoid them, improve the system and get closer to their business targets. A lot of researches have tried to find reasons which may have influenced the failure rate of ERP implementation. Ala'a and Richard (2010) applied the design-reality gap model to a Jordanian manufacturing firm case study. By comparing the situations before and during ERP implementation, they conclude that gaps between the ERP system design and the reality of the companies' organization are actually part of the reason why ERP implementation fails. Although the same methodology (case study) is used in Ada et al.'s (2005) paper, it starts from a very different angle. An "ERP System Life Cycle" perspective mentioned in Markus et al. (2000)'s research paper is used in their study and helps them to look at all the details happening at different phases of the ERP life cycle. Instead of discussing the gap between system design and real implementation as Ala'a and Richard (2010) discussed in their study, Ada et al. (2005) focus more on the gap between phases of the ERP implementation. With the help of ERP life cycle framework, they drive to the conclusion that fulfilling the knowledge gap among all the phases during the ERP implementation process is one of the main factors which is affecting the system implementation failure rate. For this reason, managers' control and the ERP consultants' effectiveness are especially important because the more efficient they are, the better communication there will be within an organization and the smaller the gap between ERP implementation phases. Also, Ada et al. (2005) suggest the Business Process Reengineering (BPR) should be seriously considered since it is closely related to matching ERP system functions to business processes.

Some researchers attempted to make the factors causing ERP implementation failure

even more specific by doing case studies of companies in different locations. Due to the unbelievable fast speed of accepting the ERP system as main information system, the implementation of ERP in Chinese companies has been exposed under the spotlight many years ago. This also becomes one of the reasons why I chose to do a case study on a Chinese company to search for more details about the ERP system implementation which will be discussed later in this paper. Peng and Nunes (2010) focus their study on post-implementation failure in a Chinese company. By adopting an inductive research design supported by in-depth interviews and participative observation as the main methods of data collection, Peng and Nunes(2010)'s study shows the ERP implementation failure is not only related to the technical shortcomings, but also more importantly attributed to critical issues related to top management, IT professional and system users. These findings are more or less aligned with Prasad et al. (1999) and Ada et al. (2005)'s opinion.

Although accompanied by an extremely high rate of failure, there are companies who successfully implement the ERP system for their daily operation. In the year 2004, Jaideep and Ram (2004) published a paper trying to analyze factors which lead to successful ERP implementation by West Michigan companies. While admitting the ERP implementation is known for expensive input and no obvious implementation achievements, the authors believe that is because the companies did not put enough time and money to focus on training and managing culture-change issues. The business process change theory (by Kotter, 2007, the manager has a responsibility to facilitate and enable change, and all that is implied within that statement, especially to understand the situation from an objective standpoint and then help the employees to understand how to perform while facing the changes.) is used as the base in Jaideep and Ram's study and they did a comparative research of four West Michigan companies which have implemented the ERP system. As they concluded in the research paper, if a company wants to implement the ERP system successfully, the implementation process should be cautious, evolutionary and bureaucratic. Furthermore, careful change management by top management, network relationships and culture readiness are also the supporting factors leading to the success.

Aligned with both business process change theory and Jaideep and Ram's opinion, Li and Sylvia (2005) include top management's support, organization culture and culture

diversity in the 11 critical success factors they suggested in their research. However, Li and Sylvia are not satisfied enough about the reasons found by Jaideep and Ram so they explored more dimensions of factors causing the ERP implementation success. Given their opinions, they think except giving more training to employees, retaining the experiences employee is also very important. Moreover, consultant and vendor support, monitoring and evaluation of performance are also discussed in their study. The most important contribution Li and Sylvia made to the field is that they give the different critical success factors a critical rank. This makes it easier for managers to judge and allocate essential resources which are required by ERP system during the implementation process.

Since most of the research focuses on the explorations on ERP system implementations in large companies in big countries like China and America, some of the researchers start to extend their study field to medium-sized and small-sized companies in smaller countries during later years.

Since there is a relative lack of empirical studies in examining the adoption of ERP system by Greek firms, especially by small Greek firms, Eugenia et al. (2011) did a case study on a small Greek company. The interesting thing is, the factors they found which caused the successful implementation are very similar to what the researchers who have done failed ERP adoption case studies found as factors relating to failure. Both top management support and training programs are indicated as two of the most important factors associated with the success of the particular ERP project. Except those two factors, the authors point out that user involvement can be treated as a predictor of ERP perceived usefulness and whether the ERP system can be well accepted or not (Gyampa, 2007; Wu and Wang, 2007). Although Eugenia et al.'s (2011) case study has shed light to what small companies who decide to adopt the ERP system should consider the most during their ERP implementing process to increase the possibility of success. However, the huge influence of the Greek financial crisis on Greek companies makes the results of this case study less generally applicable to other small companies. Nevertheless, because of the similarities of their findings comparing to the former literature I have mentioned in the former paragraphs, it is reasonable to believe that both top management support and employee training are factors which have quite strong effect on the result of ERP implementation.

2.5 ERP implementation and firm performance

Since my research questions are related to the impact ERP implementation has on two firm performance related factors, two streams of researchers' opinions about ERP influence on firm performance are discussed here. Poston and Grabski (2001) suggest that firms adopting ERP exhibited efficiency gains in some areas, but increased costs elsewhere seemed to offset such gains. As a result, they did not give a clear opinion whether ERP brings a greater firm performance or not. Harris (1994) believes there is no relation between IT investment and financial performance, which is often referred to as the productivity paradox. Based on his opinion, some researchers did further research and found out that delineating between IT investment and non-innovative uses of IT could offer clarity in this regard (Dos Santos et al., 1993). To conclude, such a group of researchers believe that ERP implementation will not enhance the firm performance. On the other hand, another group of scholars provide some evidence to show firm performance will rise by using the ERP system. By doing a case study for Korean firms, Jong-Hun Park, Hyun-Ju Suh and Hee-Dong Yang (2007) hold that the implementation of ERP will enhance organization performance when a reasonable absorptive capacity for understanding ERP systems exist. In addition, Palaniswamy and Frank (2000) also find that all the companies in their study realized enhanced manufacturing performance from the implementation of ERP systems. Despite those "fully-agree enhancement opinions", Hunton et al. (2003) mention that longitudinal financial performance of firms that have not adopted ERP systems will be significantly lower than ERP-adopting firms.

2.5.1 Information exchange cost

While further exploring which factor of business running process dose ERP has its influence on helping it to affect the firm performance, I have found a less mentioned factor: information exchanging costs in some of the former literatures. As mentioned by researchers, information exchange cost usually occurs in two ways. First, in decentralized companies, decision makers belong to different departments, different subsidiaries and located in different places may be undesirable or impossible to share all the information they have

because except competitors, they also have to compete with their colleagues (Goldman and Zilberstein, 2003). Further, exchanging information may cause costs related to required bandwidth. During the exchanging process, there is risk of revealing it to competitors. Secondly, in big companies, departments do not stand alone by themselves. Instead, because the whole company should be taken as a team, a lot of information needs to be shared among different departments to ensure good cooperation. In Fensel et al.'s (2001) paper about ontology, they discussed about several weaknesses of information and knowledge management without web net: difficulties of searching needed information in tons of information from different departments; reading weakly structured text documents is time-consuming. Also, going through a long "approval" process is time-wasting. For example, in normal situation, if the finance department wishes to get all the data last year from the sales department, the manager of the finance department has to fill in an application form and hand in to the management center, after the form has been signed and sealed, it will be returned to the finance department and then the manager is able to get the data from sales department with that form. Such a complex process may take three days or even longer and during the time period in which the department waits for the data, many things can happen. In case an important decision is delayed or the annual report deadline is missed because of this, it is possible that the whole company will bear a huge loss. This is the cost of inefficient information exchange. Given these two situations for information exchange cost to occur, I will focus on the second one.

Today, because of the complexity structure of big firms, the costs for different departments and different levels of employees to exchange their knowledge and inside information becomes more expensive. Obviously, this situation will cause a high management cost and a lower net profit. Kerr (1988) mentions about the "islands of automation" by studying a lot of individual units and their respective headquarters. In his research, each of the individual unit has a different platform of information system. Using a standard information system like ERP can alleviate such problems and enable the smooth transfer of data among those units. Prasad (1999) pointed out the implementation of ERP system will be especially useful for global and international companies because it is integration function. Usually, international companies have many subsidiaries and

manufacture factories all over the world, each subsidiary or factory's management structure and information may be different because they have been adjusted to fit the local market and culture. This makes it very difficult to integrate all subsidiaries' business information together so that the top management in headquarter can have an overview of the full picture of the company. By using the ERP system, all information are inputted in the same form and the system can make related information change at the same time even when a single sales number changes. In this way, the communication between parent company and subsidiary companies, as well as the information exchange among subsidiaries will be very efficient.

Some researchers also suggest that the higher the communication and interaction among the various team members, higher the performance of the team (Alavi and Keen, 1989). Rockart and Short (1994) discuss the importance of time efficiency for new products development and existed products' delivery. As organizations recognize to work as teams in charge of projects rather than as individual functional units, information must be passed through the entire organization to make sure each of the team or department gets the information they need. Although not a lot of research papers study the relationship between the ERP implementation and information exchange cost, researchers do mention that information delivery and exchange costs can be reduced by keeping data available when they are recorded in the system in other study fields such as health and medication (Frisse and Holmes, 2007). So, I suggest the same story in normal commercial companies: information exchange cost can be lower when data is recorded immediately and available to everyone working in the company. The use of ERP system combines different database types under traditional information system into one so that the information exchange process among teams and departments becomes less troublesome and costly. Based on the theoretical arguments above, I infer my first hypothesis as:

H1: The use of ERP will lead to lower information exchange costs within the firm.

2.5.2 Employee motivation

Except its effect on information exchange costs, the implementation of ERP may also have some influence on other aspects of a firm such as employee motivation. A company is formed by employees. These people are the ones who are working for the company every day, from top managers to lower level assistants, they know every single detail about the company and we can say the future of a company is actually handled by employees. Gerard and Dan (2006) did a research about employee engagement in a company. They point out that an engaged workforce can make a company competitive comparing to other companies. They focused on finding the elements which may influence employee engagement and tried to discover the relationship between employee engagement and organizational performance. As shown in the paper results, engaged employees seem to be more productive than disengaged ones. But what is employee engagement? Tim Rutledge (2009) defines employee engagement as: employees are attracted to and inspired by their work. This makes them put all their efforts into daily job and stay enthusiastic all the time. Once the employees prioritizes the company's future and are motivated to improve the company, it is obvious that the company's performance will be enhanced.

Due to the strong relationship between employee engagement and firm performance found by former researchers, it should be very important to know whether the employees are happy with their working environment. The concept of working environment contains a lot of dimensions. For example, culture of the company, management structure, colleague relationship and working technology are all elements which build up the working environment. In his paper, Daniel (1985) indirectly mentioned a negative relation between technology uncertainty and employee satisfaction by referring to Whetten (1978)'s finding: uncertainty was positively associated with role conflict and ambiguity.

Since Slocum and Smis (1980) defined technology as predictability of transformation of inputs into outputs, the information system used by a company should definitely be included as a part of technology because it helps to turn the data information input into the company's output goal. As a newly developed information system, ERP enhances the accuracy and efficiency of information sharing. In other words, after the data is inputted into the ERP

system, it will be adjusted automatically depending on the company's business. Such a character makes it clearer and less uncertain for the company's output number. Going back to Whetten (1978)'s research, the less uncertain a technology is, the more possible the employees will be satisfied. Combining Smis and Whetten's findings, I infer that the ERP implementation may have a positive effect on employee satisfaction.

While we discuss about employee satisfaction, another word may come up to our mind naturally is motivation. From the year 1950, a lot of researches have been done and the findings showed that no strong association appears between satisfaction and motivation (Brayfield & Crockett, 1955; Podsakoff & Williams, 1986). However, during the past three decades, some researchers start to integrate satisfaction and motivation together. Edwin and Gary (1990) tried to tie motivation and satisfaction together in their study and found out that when people are satisfied with the goal given to them or the job they are going to do, they are likely to put more effort into it. If they feel dissatisfied about their work and goal to achieve, the opposite situation will occur. As a result, due to the possible relationship between ERP implementation and employee satisfaction, we can further infer that employee motivation may also be affected by the ERP implementation.

Scholars hold various opinions on this topic. The available anecdotal evidence would seem to suggest that ERPs are more often associated with increased concentration of control and the decentralization of responsibilities without vesting much greater control, autonomy and discretion in the hands of workers. The links between control, autonomy and discretion and employee empowerment, motivation and commitment are well-established (Walton, 1985; Foy, 1994; Spector, 1996) and are often thought to be a key feature of improved organizational performance that can allegedly be achieved through increased employee participation (Applebaum and Batt, 1994; Kochan and Osterman, 1994). Since ERP system causes an automated, standardized and more routine reporting and analyzing process for employees, which decreases the level of discretion, control and autonomy, it is more likely that lower employee motivation, employee satisfaction and commitment may result. However, it is widely claimed that ERP encourages cross-cutting work relationships across departments and functional boundaries (Taylor, 1998) which may conduct more encouragement or support to employees working as teams. As such, the motivation of employees in those teams may be

enhanced. Later in Richard Hall's (2002) paper, he mentions that the ERP did not appear to enhance the autonomy or control of the teams. Moreover, he finds out while further teamwork development would enhance autonomy, the ERP implementation normally tended to enforce central planning which could make employees de-motivated. Compounding the prior research opinions above, I found that there are more researchers who support the idea that ERP implementation may have positive effect on employee motivation than ones who do not. Using the literatures I have found which linked the working environment, employee satisfaction and employee motivation together as supplements, my second hypothesis is as follows:

H2: The implementation of ERP will lead to a higher employee motivation.

As mentioned from the beginning of this sub section, the employees are very important to a company's business, so whether the employees are motivated is closely linked to the success of the company. I made my second hypothesis to look into the link between ERP system and employee motivation based on some of the ideas from former studies. because I believe it is very necessary for companies to know whether the ERP implementation will bring the company more benefits than harmful factors or not. Since not a lot of studies are done about this specific topic, the answer I find through the case study can also contribute to fulfilling a little bit of the literature.

3. Case study background

Suzhou Gold Mantis Construction Decoration Co., Ltd. (in the rest of the paper, we call it Gold Mantis Ltd. for short) is founded in January, 1993. It is a professional decoration company that mainly focuses its business on interior and also gets involved in building curtain walls, producing furniture, designing landscapes and installing electrical equipment at the same time. During the past 11 years, Gold Mantis Ltd. retains its champion position in the

construction and decoration industry of China. Meanwhile, it is the first decoration company that became listed in Shenzhen Stock Exchange Center as Famous Chinese Trademark. In the year 2012, the company was awarded as the Top 50 listed companies in Asian-Pacific area by Forbes Magazine of America.

Being the leading company in Chinese construction and decoration industry is not that easy. Decentralized management and low level of standardization are common problems in the decoration industry. As a result, the management ability more or less becomes the “bottle neck” which may limit the speed of companies’ development. While facing the intensive competition within its industry, Gold Mantis Ltd. tries hard to make improvements every year not only by designing and producing better products, but also by adjusting and completing its management strategy and information system. After many years’ endeavor, other than making innovations in management strategies by achieving the concept of “benchmarking” and “bundle business”, Gold Mantis Ltd. also achieved information management standardization by keep updating its information system to the newest ones. It is the first Chinese decoration company which carries information management through the whole management process. To follow the stream of rapid development of information age, at the beginning of 2011, just after the Gold Mantis Ltd. was listed in Shenzhen Stock Exchange Center, it started to use the Enterprise Resource Planning as its new information system. By doing so, it solves the low efficiency problem existed through the standardization process management and made information circulation sharing possible.

Gold Mantis Ltd. is definitely a suitable subject of my case study for two reasons. On one hand, they have mentioned that the implementation of ERP system improved the executive power by making the communication among the departments faster and clearer in their annual reports in recent years. This makes it seems more likely that our first hypothesis can be proved because usually, faster and clearer communication may cause a lower information exchange cost. Seizing this clue, I want to dive into a deeper perspective to see whether the ERP implementation has a negative effect on information exchange cost. On the other hand, Gold Mantis Ltd. is a company which cares a lot about its employees. As they show on the company webpage, one of their business philosophies is that they want to be worth relying on by the employees in the company and motivate employees to achieve

self-realization. Such a business philosophy makes it very important to know how employees' motivation is affected by a new information system.

Despite this, there are countless big companies which are suitable for my case study so the readers may still be confused about why I picked Gold Mantis Ltd.. I chose Gold Mantis Ltd. for my case study also for other reasons. As mentioned earlier in this part, China is becoming prominent as a country where huge amount of companies start to adopt the ERP system, so it will be meaningful to figure out how ERP works in Chinese companies. Furthermore, although Gold Mantis Ltd. is not an international company, it is one of the biggest design and architecture companies in China and its subsidiaries are all over China. Because China is a very big country and there are huge differences between culture and market environment across different places in China, the ERP implementation in Gold Mantis Ltd. will face the same advantages and disadvantages as in some international companies. And last but not least, I have my own channel to retrieve get all the data I need about the company for this case study.

4. Methodology

4.1. Data collection

I will test my hypotheses by doing a t-test and see whether ERP implementation has a significant influence on information exchange cost and employee motivation. To satisfy the requirements of doing such a test, two main bodies of information are needed. First, I would need the data which can appropriately represent the information exchange cost. Here, the phrase "information exchange cost" is actually not a terminology which is mentioned a lot by former researchers, so the literature I can find for representing this factor is very limited. Goldman and Zilberstein (2003) pointed out that sometimes managers belong to different departments within a company may be reluctant to exchange all the information they have because of inside competition. Such a reluctant attitude can cause costs related to required bandwidth and the risk of revealing important information to outside competitors. Fensel et al.

(2001) think that a long process of information exchanges (especially when companies use paper text documents to record) among employees is time-consuming. Furthermore, as suggested by Zajac and Olsen (1993), more opportunities and gains will be achieved through enhanced information acquisition and exchange as an inter-organizational strategy. I decide to focus on the information exchange cost on “time-consuming” part mentioned in Fensel et al.’s (2001) paper. Since long and unnecessary information exchange process may be a waste of time and cause a loss for company, I represent information exchange cost by how much time it costs for employees to exchange their information with other department. The data will be collected by asking the employees in Gold Mantis Ltd. to fill in some questions in the first part of my survey.

The second part of information I need for my study is a scale or score which can show employees’ motivation. It is not easy to measure employee motivation because it’s quite an abstract concept relating to employees’ feelings, which is a spiritual issue (Locke, 1978). Although there is lack of studies that test the level of employee motivation, a lot of researchers have built up surveys to measure employee satisfaction and involvement in their current jobs (Spector, 1985; Rousseau, 1977). During the past three decades, some researchers started to dig into the link between employee motivation and satisfaction. While trying to tie motivation and satisfaction together in their study, Edwin and Gary (1990) found out that people are more likely to put effort in their work when they are satisfied with the goal given to them or the job they are going to do. If they feel dissatisfied about their work and goal to achieve, the opposite situation will occur. That means, employees may feel more motivated when they are satisfied with their current job. Based on such a connection between employee satisfaction and employee motivation, I chose to measure employee satisfaction as a substitution of employee motivation. I searched for some surveys that are designed to measure employees’ satisfaction and picked the survey questions that can help me to test my hypotheses to form my own survey. The employee satisfaction measurement part will be included in the second part of my survey and the scores will also be collected through the distribution of the survey.

After doing the t-test, I will go one step further – using a regression model to control some of the factors that may affect the influence of ERP on both information exchange cost

and employee motivation. I get the value of my control variables by including personal information questions in the last part of my survey. More details about those control variables will be discussed in 4.4.

4.2. Time period and sample selection

The employees who will answer my survey are limited within the five marketing center of Gold Mantis Ltd. Employees working there should be the ones who need the newest information and need to be motivated most because they communicate with the company's customers directly every day and this will have a huge influence on the company performance. Furthermore, the employees in marketing centers are the ones I can reach easily, which makes my survey result more guaranteed. I distributed the survey to all of the employees in these marketing centers, 152 people in total. 144 replied with an answer. The 8 who did not reply due to objective reasons such as being away for official business and studying abroad.

Meanwhile, since Gold Mantis Ltd. is a construction and decoration company and not a lot of programs can be finished within a short period in this industry, I have to consider the impact of ERP implementation in a longer time period. Also, Hayes et al. (2001) pointed out that it may take several years for the benefits of ERP adoption to accrue. So following Poston and Grabski (2001)'s research, I decide to check the influence of ERP implementation within at least a 3-year period. Since my research question is related to the difference between information exchange cost/ employee motivation before and after the ERP implementation, to make the data comparable, only employees who start to work for Gold Mantis Ltd. at least three years before the ERP implementation and still stay in the company are qualified to do my survey. Gold Mantis Ltd. adopted the ERP system as its new information system at the beginning of year 2011, so in the last part of my survey, I controlled the employees' statements to satisfy this requirement by including the question "How long have you been working for the company?" in my questionnaire. Employees who started to work in Gold Mantis Ltd. in the year 2008 or earlier are my survey targets. There are 144 employees answered the survey, and after the constriction, only 111 remain.

4.3. Survey design

4.3.1. Measurement of Information Exchange Cost

There are three parts in my survey and 22 questions are included. The first part contains 9 questions which are related to the employees' opinions about the ERP system. 4 of them are designed to test my first hypothesis. While designing the first four questions, I used a "BEFORE-AFTER" construction to make sure that the answers of those questions are comparable. Question 1 and question 2 can be taken as one big question about the time employees in the marketing centers spend on getting necessary information from other departments in Gold Mantis Ltd and both of the two questions are multiple choices. Among them, question 1 is related to the time spent before the ERP implementation and question 2 is related to the time spent after the ERP implementation. Since I want my survey to represent the most real and practical situation in Gold Mantis Ltd., I went to the company and had a short interview with Di Ji, the manager of No. 3 marketing center. As Di Ji told me, under most of the situations, it takes no more than one week for employees in each marketing center to get the information they need. That means in normal cases, the other departments can give the marketing centers feedback due to their requirements within one week. So I divided the answer of these multiple choices into different scales: within one day, within two days and within one week. However, what we have discussed above is the normal situation and even manager Di Ji said "but I cannot deny that there may be exceptions, sometimes some of the departments are just too busy to reply to our marketing centers within one week and this really holds us back during the process of our project construction". To include such kind of exceptions in the answers, I add the choice D: more than one week as one of the answers.

To make it possible to present different answers in my t-tests, I replaced each answer choice with a score: within one day is scored as 1; within two days is scored as 2; within one week is scored as 3 and more than one week is scored as 4. The reason for setting up such a scoring system is because in my hypothesis, a shorter time of information exchange means a lower cost and longer time of information exchange means a higher cost. So a lower score is matched with shorter time period and higher score is matched with longer time period.

Similar to question 1 and question 2, question 3 and question 4 are about how long it takes for employees to get feedbacks about different projects from other departments in the company before and after the ERP implementation. The answers are split using the same scale as the first two survey questions. The purpose of question 3 and question 4 is that except the general business information exchange, I also want to focus on more specific information exchange about the design and construction projects between the marketing centers and other departments because that is more related to the company's professional area. The rule of scoring is the same as what I did for question 1 and 2.

4.3.2. Measurement of Employee Satisfaction

From question 5 on in the first part to the end of second part of my survey, these questions are designed in purpose of testing my second hypothesis. While answering question 5 to question 9, employees have to respond to how good or bad they feel about the new ERP system and how happy they are with their recent jobs. The answers of these five questions will be measured on a 7-point scale (from *strongly disagree* to *strongly agree*, Koys, 2001; Hong & Kim, 2002). Basically, the items I measured in my survey are based on surveys in former literatures about employee satisfaction (Spector, 1985; Chi & Gursoy, 2009) and some standard employee satisfaction measuring surveys. But for the reason that what I need to measure is employees' attitude toward the ERP implementation instead of their job as a whole, I replace the word "job" or "work" in those surveys I mentioned above by "ERP system" or "ERP implementation". Since the employees' feelings about their own jobs are also important and may have an influence on their attitude to the ERP system, I include the item "overall, I feel satisfied with my job" as the last item in the first part of my survey. To make it easier in the analysis part, I give scores from "1" to "7" to participants who choose from "strongly disagree" to "strongly agree". Through the whole survey, only question 5 to question 9 are not asked in BEFORE – AFTER form, so the answers to these questions cannot be used to do a t-test or run a regression. I take these answers as additional evidence which can help me to answer the hypotheses.

The second part of the survey is more related to the employees' attitude to their current

jobs as a whole. In this part, I combine the employee satisfaction measurement with the effect ERP implementation may have on such a satisfaction measurement. Similar to the first four questions in part one, the BEFORE – AFTER form is used again to make comparison between the employees' attitudes toward their job before Gold Mantis Ltd. adopt the ERP system and their attitudes afterwards.

Huge amounts of research have been done about the employee satisfaction, so I measured the employee satisfaction by evaluating different items which are mentioned to be closely related to the satisfaction. Due to earlier literature, employees who are satisfied are more likely to stay on the job and spend more time doing extra work (Organ, 1987) and to the opposite, those who are dissatisfied are more likely to put less effort (Fisher & Locke, in press). From another angle, Locke (1965)'s study showed the bond between goal setting and employees' degree of satisfaction and this may have influence on the overall productivity. Further, the relation between employee satisfaction and customer responses was discussed in Brown and Lam (2008)'s paper by doing a meta-analysis. After careful consideration, six items are measured in part two: (1) time spent on tasks, (2) chance to meet target quotas and goals, (3) overall productivity in getting the job done, (4) possibility of going beyond what is expected of employees to make customers happy, (5) ability to respond quickly and courteously to fulfill customers' needs and last one, (6) overall quality of work. Employees in the marketing centers are required to compare themselves with an average employee in their positions and rate their own productivity and quality of the work during the answering process.

The answers in part two are also measured by a 7-point scale. However, different from the question 5-9 in part one, I use the percentages to divide the 7 levels in this part. While comparing themselves with the others in the whole company, employees were asked to measure their own working efforts by putting themselves on seven different levels: (1) upper 5%, (2) upper 10%, (3) upper 20%, (4) upper 30%, (5) middle 50%, (6) lower 30%, (7) bottom 20%. Aligning with the way I dealt with the answers in the first part, while employees make their choice, they will get a score for each choice. By choosing the "upper 5%", one will get a "7" and to the opposite, by choosing the "bottom 20%", a "1" will be given. For each employee who answer the survey, I will take the average score of the 12 answers (from

question 10 in part one to question 15 in part two, each question has two answers: BEFORE, AFTER) to run the t-test.

4.3.3. Personal Information

The personal information part is included for two reasons. The first reason is that I need to know whether employees who have answered my survey are qualified to be included in the result analysis in this thesis. As I mentioned in the sample selection section, only employees who started to work for the Gold Mantis Ltd. from the year 2008 (three years before ERP implementation) or earlier and are still working for the company now are qualified. To see how many survey answers I get back can be used to test the two hypotheses, I put the question “When did you become an employee of Gold Mantis Ltd.?” in the last part of my survey. For employees whose answers are year 2008 or earlier, their answers will be taken as qualified and for the others, the answers will be recognized as invalid.

The second reason of including survey questions about personal information is to control some other factors which may have influences on employee motivation except the ERP implementation. Gender, age, health condition, education level, marital status, management responsibility and job tenure are asked in the survey to help me determine the value of control variables in the regression model.

4.4. Regression Model

After the t-test, I want to go one step further and look at the influence ERP implementation has on employee motivation after I control some other factors which may have effects on the relationship between them. The regression model is as follows:

$$EM = \alpha + \beta ERP + \gamma_1 FEMALE + \gamma_2 AGE + \gamma_3 HEALTH + \gamma_4 EDUCATION + \gamma_5 MARRIED + \gamma_6 MANAGER + \gamma_7 TENURE + \varepsilon \quad (1)$$

The independent variable in the regression model is employee motivation and I will use EM to represent it for short. The data that will be used are the average scores I collected from

the survey. The dependent variable in this model is ERP implementation and it will be mentioned as ERP in the model. I included it as a dummy variable – $ERP = 0$ for all survey answers of BEFORE questions (before ERP implementation) and $ERP = 1$ for all survey answers of AFTER questions (after ERP implementation).

Except the dependent and independent variables, I include some control variables in the regression model to see if those factors will affect the relationship between ERP implementation and employee motivation while testing my second hypothesis. Because Clark (1997) has done a study about the job satisfaction before, I refer most of the control variables in my regression model to the ones Clark (1997) mentioned in his former paper.

Using objective standards, women get worse jobs and are paid lower than men (Clark, 1997). However, despite the reported stress on women (Argyle, 1989; Clark and Oswald, 1994), they consistently report higher job satisfaction scores than do men. So following these former research, I suggest that the gender of employees could have an influence on their job satisfaction which somehow represents the employee motivation while testing my second hypothesis. In Clark (1997)'s paper results, the relationship between age and job satisfaction tends to be U-shaped. A good health condition is consistently related to higher job satisfaction. However, beyond our expectation, higher education level is negatively related to job satisfaction. Such a result can be caused by a lot of reasons. For example, when employees have higher education level, they may have higher expectations on their work (Hagenaars, 1986; Ross and Reskin, 1992) and this can result in greater disappointment and dissatisfaction. On the other hand, Sloane et al. (1995) pointed out that higher-educated employees are more likely to suffer from educational mismatch. Marital status is occasionally related to job satisfaction due to Clark (1997)'s study and as he analyzed, managers are more likely to feel satisfied with their jobs. Additionally, when an employee has longer job tenure, he or she is more likely to be satisfied with job security and the use of initiative.

Since in my case study, the employees who did the survey are all working in the same department in the same company, a lot of external factors are already limited. For example, I chose Gold Mantis Ltd., a listed design and construction company to be my case study object, which means I do not need to consider the effect of industry. In addition, culture difference and nationality are not necessary to be taken as control variable because all of the Gold

Mantis Ltd.'s marketing departments I distributed my surveys to are located in Suzhou, Jiangsu Province, and all the employees in these five departments are from China. After careful consideration, the control variables I put in my regression model are as follows:

- *FEMALE*: Dummy variable. When the respondents are females, the variable equals to 1 and when the respondents are males, this variable equals to 0.
- *AGE*: The age of the employees at the moment they answer the survey. To keep it private for each employee who answers the survey, the survey question about age is asked in a multiple choice form. The answers are divided into six ranges: under 20, 21-30, 31-40, 41-50, 51-60 and above 60. To make the regression simple, each range is presented in a score: under 20 is scored as 1, 21-30 is scored as 2... above 60 is scored as 6.
- *HEALTH*: Dummy variable. Comparing to people at the same age, the respondents are asked to classify their own health as excellent, good, fair or poor. For respondents who answer excellent and good, HEALTH equals to 1, else, HEALTH equals to 0.
- *EDUCATION*: Dummy variable. Categories: Doctor, Master, Bachelor and below Bachelor. When below Bachelor, this variable equals to 0 and else, equals to 1.
- *MARRIED*: Dummy variable. If the respondent is in a married status, the value of the variable equals to 1, else, the value is 0.
- *MANAGER*: Dummy variable. If the employee is a manager, MANAGER equals to 1, if not, MANAGER equals to 0.
- *TENURE*: Number of years spent in current job.

5. Results

5.1. Data Overview

5.1.1 Time to get Information and Feedbacks

Among the 144 surveys I have collected in total, 33 of them are excluded from the qualified data to answer my hypothesis because those participants joined the Gold Mantis Ltd.

after year 2008. As a result, 111 qualified surveys are left.

While taking an overview of the answers about the time employees need to get information from other departments, we can see that before the ERP implementation, most of the employees (54 of 111, 48.65%) choose “within two days” (scored as 2) as their answer and for the rest of them, 10 (9.00%) choose “more than one week” (scored as 4), 38 (34.23%) choose “within one week” (scored as 3) and only 9 (8.11%) choose “within one day” (scored as 1). After replacing these answers with the matched scores, the average score for “Time to get information before ERP” is 1.96 which is very close to 2 (within two days) for all of the 111 survey results. The way I match different options of each survey question is shown in Table 1. That means, most of the employees think they can get the information they need from other departments within two days before the Gold Mantis Ltd. adopt ERP system. When being asked about how long it takes for them to get feedbacks from other departments before ERP usage, 55 (49.55%) of the participants choose “within one week”; 39 (35.14%) choose “within two days”; 13 (11.71%) choose “more than one week” and only 4 (3.60%) choose “within one day”. The average score for “Time to get feedbacks before ERP” is 2.19, which is also very close to 2 (within two days). Getting information and feedbacks within two days is not a long time and such an average score shows the Gold Mantis Ltd. is doing quite well in controlling the information exchange cost even before the ERP implementation.

Comparing to the answers to questions about information exchange cost before ERP implementation, the time employees need to complete their information exchange seems to be shorter than they need before the company use the ERP system according to my answer collection. For the time employees need to get information, 70 participants out of the 111 (63.06%) choose “within one day”. This is not only an obvious raise in number of participants, but also a raise in total percentage comparing to the 9 (8.11%) before ERP. Among the rest of the 111 employees, 34 of them (30.63%) choose “within two days”, 7 of them (6.31%) choose “within one week” and none of them (0%) think they still need more than one week to get the necessary information.

Table 1

Question No.	Options	Matched Score
Q1, Q2, Q3, Q4	Within One Day	1
	Within Two Days	2
	Within One Week	3
	More Than One Week	4
Q5, Q6, Q7, Q8, Q9	Strongly Disagree	1
	Disagree	2
	Somewhat Disagree	3
	Neither Agree nor Disagree	4
	Somewhat Agree	5
	Agree	6
	Strongly Agree	7
Q10, Q11, Q12, Q13, Q14, Q15	Bottom 20%	1
	Lower 30%	2
	Middle 50%	3
	Upper 30%	4
	Upper 20%	5
	Upper 10%	6
	Upper 5%	7
Q17 (Dummy)	Male	0
	Female	1
Q18	Below 20	1
	21-30	2
	31-40	3
	41-50	4
	51-60	5
	Above 60	6
Q19 (Dummy)	Fair/Poor	0
	Excellent/Good	1
Q20 (Dummy)	Below Bachelor	0
	Doctor/Master/Bachelor	1
Q21 (Dummy)	No	0
	Yes	1
Q22 (Dummy)	No	0
	Yes	1

For the feedback part after ERP implementation, a big reverse appears while looking at the answers: 49 of the participants (44.14%) choose “within one day”; 48 of them (43.24%) choose “within two days”; 14 (12.61%) choose “within one week” and similar to the part

regarding information acquirement, 0 (0%) choose “more than one week”. Overall, there is a jump in percentage for people who choose “within one day” and “within two days” after the adoption of ERP for both ways I chose to present the information exchange cost. The overview of the survey results can be seen in Figure 1 and Figure 2.

However, the average score for “Time to get information after ERP” is 1.94 and the average score for “Time to get feedbacks after ERP” is 2.19. Comparing with the average scores of 1.96 and 2.19 before ERP, the difference is small. Later in this section, a t-test will be performed to discuss the influence of ERP implementation on information exchange cost in a deeper and more detailed angle.

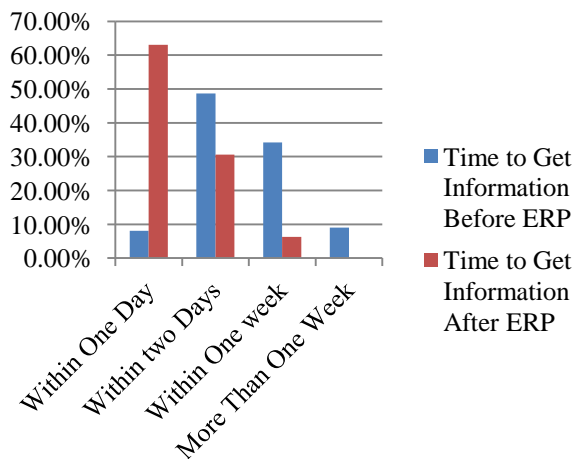


Figure 1

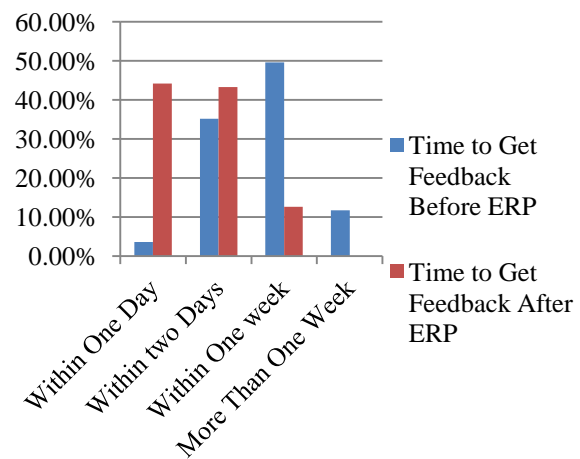


Figure 2

5.1.2 Employee Motivation Analysis

11 of the survey questions related to the employees’ job satisfaction are used as a measurement, representing the employee motivation (EM) both before and after the ERP implementation. These questions are divided into two types: to get employees’ opinions about the ERP implementation and their working environment, a 7-point scale is provided to them so that they can choose the one which fits their thoughts best; to make the employees judge themselves on working performance, BEFORE – AFTER form questions with a complete different 7-point scale. Both of the 7-point scales have been explained in details in 4.3.2 and a clear glance of matched answer options and scores are also shown in Table 1.

Questions 5 to 9 gather the participants' opinions about how they think about the ERP system and their recent jobs as qualitative measurement to help answering my hypotheses. Among all, 23 participants strongly agree with that the ERP system is very convenient and 83 of them either agree or somewhat agree with this statement (55 agree and 28 somewhat agree). So more or less, almost all of the participants (106 out of 111) think that the ERP implementation helps them with their work. Furthermore, most of the employees believe that the adoption of ERP system has a positive effect on both themselves and the Gold Mantis Ltd. There are 81 participants who chose "Strongly Agree" or "Agree" to the statement "I feel happy to be trained to use the ERP system because it is a skill updating" (22 strongly agree and 59 agree), a big percentage to count. Over half of the participants believe that their company business went well since they use the ERP system.

Comparing to those quite positive answers regarding ERP's effectiveness and efficiency, the employees' answers toward ERP's influence on fairness seems to be a little bit surprising. There is a big gap between the employees' opinions on this question: they choose either "Agree" or "Neither Agree or Disagree". As shown in the results, only 29 participants agree with the idea that after using ERP, their work performance is more fairly judged. The rest of the 111 employees (73.87%) feel there is no difference in the judgment of their work performance after the ERP implementation. However, the way employees think about the ERP's fairness effect does not change their feelings of satisfaction on their jobs after the ERP is adopted by the company. 15 employees strongly agree with the statement that "I feel satisfied with my job", 66 employees choose "Agree" and 24 employees choose "Somewhat Agree". That is a 94.59% agreement. No one picks the options on the "disagree side" (strongly disagree, disagree or somewhat disagree) and only 6 employees remain neutral by choosing "Neither Agree or Disagree".

Although the survey results of the questions above can already reflect the employees' positive attitude to both ERP system and their job, the score provided to match the answers are not comparable because those questions are all asked under "after ERP" situation. As a result, the data from answers of questions 10 to 15 which are in a "BEFORE – AFTER" form (two answers for each question, one for before ERP implementation and the other for after) become the key for a t-test.

Usually, employees' working performance is judged by their managers or the company's evaluation system. Such an evaluation shows the employees how satisfied their boss feels about them and is also a proof of their ability to work. However, to the opposite, how the employees judge themselves reflect part of their job satisfaction and motivation. According to my survey results, only 2 of the 111 participants judge themselves as the top 5% in their productive hours during the working process comparing to their colleagues before the Gold Mantis Ltd. use the ERP system. Besides, 8 participants evaluate themselves as upper 10%, 16 participants think they are at upper 20% and 25 think they are at upper 30%. It is very interesting to see that most of the employees (60 out of 111, 54.05%) are quite neutral while judging themselves, so they choose "Middle 50%" to be their answer. But after the ERP implementation, the situation changed. There is a big increase in the number of participants who evaluate themselves as performing better than average (from 51 to 104, increase by 103.92%). The answers for the question asking about the overall productivity are quite similar to what we discussed above.

Except the productivity, I also include self-evaluation questions about meeting the targets, customer satisfaction and overall work quality in my survey and all of the answers are concluded in Table 2 in details. For each option, there are two sets of columns under it – the one on the left shows the situation before ERP and the one on the right shows the situation after ERP. Further, there are two small columns for each set: the number of participants who choose that option and the percentage of the total. Since nobody ever chooses the option "Bottom 20%", it is not shown in the table.

From Table 2, we can see that the numbers of employees choosing the option "Upper 30%" for all of the 6 questions relating to self-judgment stay quite stable after the ERP implementation comparing to the numbers before. However, for the rest of the options, either a significant growth or decrease exists. The numbers of employees who judge themselves at upper 5% level, upper 10% level and upper 20% level increase while the number of employees who think they are just performing at an average level (Middle 50%) decreases. This means after the Gold Mantis Ltd. use the ERP as its information system; more employees in the Marketing Departments believe that they perform better at work. The results of these questions aid to confirm the "incomparable" answers to former questions which

Table 2

	Upper 5%				Upper 10%				Upper 20%				Upper 30%				Middle 50%				Lower 30%			
	BF ERP		AF ERP		BF ERP		AF ERP		BF ERP		AF ERP		BF ERP		AF ERP		BF ERP		AF ERP		BF ERP		AF ERP	
Productive time spent working on the tasks assigned	2	1.80%	7	6.31%	8	7.21%	20	18.02%	16	14.41%	30	27.03%	25	22.52%	47	42.34%	60	54.05%	7	6.31%	0	0.00%	0	0.00%
Meeting target quotas and goals	1	0.90%	8	7.21%	12	10.81%	28	25.23%	18	16.22%	33	29.73%	33	29.73%	34	30.63%	47	42.34%	8	7.21%	0	0.00%	0	0.00%
Overall productivity in getting the job done	2	1.80%	12	10.81%	16	14.41%	23	20.72%	19	17.12%	31	27.93%	26	23.42%	38	34.23%	48	43.24%	7	6.31%	0	0.00%	0	0.00%
Beyond customer's expectation	2	1.80%	10	9.01%	12	10.81%	21	18.92%	17	15.32%	34	30.63%	30	27.03%	38	34.23%	49	44.14%	8	7.21%	1	0.90%	0	0.00%
Respond quickly and courteously to fulfill customers' needs	2	1.80%	10	9.01%	11	9.91%	22	19.82%	15	13.51%	35	31.53%	41	36.94%	38	34.23%	42	37.84%	6	5.41%	0	0.00%	0	0.00%
Overall quality of work	3	2.70%	11	9.91%	13	11.71%	27	24.32%	18	16.22%	28	25.23%	37	33.33%	37	33.33%	40	36.04%	8	7.21%	0	0.00%	0	0.00%

show the employees' positive attitude towards ERP and their job. Like what I did to deal with other question answers, a matched score is given to each option and the average score of 6 answers for every employee is used for the t-test.

5.1.3 Control Variables

Participants are required to provide some personal information in the last part of the survey because the matched scores of their answers are included in my regression model as control variables. Due to the answer summary, more male employees participate this study than female employees. Among the 111 participants, 71 of them are male and only 40 of them are female. Most of the employees in these five marketing departments are between 31-40 years old (53 out of 111) and nobody younger than 20 or older than 60 years old is working in the departments. Further, 84.68% of the employees are married. Such a high percentage may be related to the Chinese culture because the age of getting married for Chinese people is younger than for people from western countries. Moreover, companies are more willing to hire married employees and this situation is even more obvious for female. Except 8 participants, all the employees who answer my survey believe they are in an excellent or good health condition. As a dummy control variable, MANAGER equals to 1 if the participant is a manager, or else, it equals to 0. 33 out of the 111 participants are at manager's level.

While doing basic analysis, I have an interesting finding: less than half of the employees have a bachelor or higher education level. Most of those higher educated employees are younger (21-30 or 31-40) than the ones who have "below Bachelor" education background. This can be explained by the changing of Chinese parents' attitude towards the education level over the past two decades. For the children born before 1980, their parents believe that the main goal of going to school is to learn knowledge and skills which can help the children to find a stable job in the future. So whether a child can go to the university is not that important. Since the tuition fee in the university is very expensive for normal families, a lot of children choose to go to college or technical school. However, the situation has been changed after 1985. Parents started to realize that a higher education

level can help their children to get a better job than others and what's more, if a child can go to top 211 schools (for example, Beijing University and Qing Hua University) in China, his or her parents will feel very face. Then parents began to send their children to good universities at all costs. As a result, the average education level goes up.

Last but not least, as an important control variable, TENURE is not asked directly in the survey but it can be calculated by using the equation $TENURE = \text{the year join Gold Mantis Ltd.} - 2008$. After the calculation, more than half of the employees have been working in the company for 10 years or more. There are 7 employees who have already stayed in Gold Mantis Ltd. for 20 years or longer and the longest tenure is 22 years.

5.2 Information Exchange Costs

I use the t-tests to check whether the ERP implementation has an impact on information exchange costs in the marketing departments of Gold Mantis Ltd. The information exchange costs are transferred and represented by the time period it takes to communicate with other departments in the company. For each employee who participated in my case study, two sets of questions have to be answered: the time they use to get information related to the design program from other departments in Gold Mantis Ltd. and the time they need to get feedbacks from others outside the marketing departments when they need some ideas and suggestions. There are two questions in each set, and the two questions are essentially the same. The only difference is that one of them asks about the time employees need before ERP implementation and the other asks about the time they need after the implementation. With such a design, I received 111 pair of answers, which enables me to do the t-tests.

5.2.1 Getting Information from Other Departments

Four different scores are matched to each answer (1, 2, 3 and 4). The higher the score, the longer it takes for employees to get information. To prove my first hypothesis, which states "The use of ERP will cause lower information exchange costs within the firm", the t-test result should show a significant decrease in information exchange costs after the

company adopted the ERP system. Based on Fensel et al.'s (2001) paper, a long information exchange process can result in a waste of time and cause losses of a company. So what I want to see is that the implementation of ERP significantly shortens the time employees need to get information from other departments. Otherwise, H1 will be rejected.

The results of t-test on “time to get information” are shown in Table 3.

Table 3

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	111	2.441441	.0731694	.7708871	2.296437	2.586446
1	111	1.432432	.0581191	.6123223	1.317254	1.547611
combined	222	1.936937	.0576603	.8591196	1.823302	2.050571
diff		1.009009	.0934429		.8248512	1.193167

diff = mean(0) - mean(1) t = 10.7981
 Ho: diff = 0 degrees of freedom = 220

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 1.0000 Pr(|T| > |t|) = 0.0000 Pr(T > t) = 0.0000

Each answer from the employees is taken as an observation in the t-test. Because there are 111 employees answering this set of questions relating to the time to get information and two questions are included in one set, it is shown in the table that there are 222 observations in total. Due to the results, we can see that $P = 0.0000 < 0.01$, meaning there is more than 95% chance that the time employees spend on getting information from other departments before the ERP implementation is different from the time they spend after the ERP implementation. The mean of the scores participants get before ERP is 2.44. However, after ERP, the mean is 1.01 lower than before (1.43). As explained in former sections, the lower the score, the shorter the time they need to make the information exchange. Looking at the Table 3, we can clearly see that the time it takes for employees in marketing departments to get information from other departments becomes significantly shorter after Gold Mantis Ltd. adopted the ERP system.

5.2.2 Getting Feedbacks from Other Departments

Except getting the daily business information, employees in marketing departments also need document approvals or comments and suggestions from some other departments during their working process. I have performed a t-test on “time to get feedbacks” to see if the ERP system also has a positive influence on saving information exchange costs by shortening the time marketing departments’ employees need to get feedbacks. To get the data I need, similar form of survey questions are asked as what has already been described in the “time to get information” part. The results are displayed in Table 4.

Table 4

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	111	2.693694	.0686751	.7235367	2.557596	2.829792
1	111	1.684685	.0652369	.6873134	1.5554	1.813969
combined	222	2.189189	.0581771	.8668194	2.074536	2.303842
diff		1.009009	.0947213		.8223318	1.195686

diff = mean(0) - mean(1) t = 10.6524
 Ho: diff = 0 degrees of freedom = 220

Ha: diff < 0
 Pr(T < t) = 1.0000

Ha: diff != 0
 Pr(|T| > |t|) = 0.0000

Ha: diff > 0
 Pr(T > t) = 0.0000

Not surprisingly, the result of t-test on time for feedbacks aligns with what I got in the former t-test: the mean of scores which presenting the answers for “before ERP” situation is significantly higher than the mean of scores which present the answers for “after ERP” situation ($P < 0.01$). With the extremely small value of P, we can confidently infer that the time employees need for gathering the feedbacks from other departments after Gold Mantis Ltd. implement the ERP system has decreased in a very significant level.

Since I have taken both “time to get information” and “time to get feedbacks” as ways to measure information exchange costs in Gold Mantis Ltd., I calculated the average scores of time each employee used to get information and feedbacks and did another t-test so that

I can check H1 from a holistic perspective. The result of average scores of t-test stays the same as the two discussed above. Therefore, my first hypothesis which suggests that ERP implementation lowers the information exchange costs is supported by all of these t-test results.

5.3 Employee Motivation

My second hypothesis is about the ERP system and employee motivation. Not a lot of literature researches directly related to the relationship between employee motivation and ERP implementation are found. However, there are a few clues like Taylor's (1998) paper which guide me to the direction that the ERP implementation may have a positive effect on employee motivation. I used both of the t-test and a regression model to check my case study results. The regression model I use is based on the one used by Clark (1997) in his paper about gender and job satisfaction because I choose job satisfaction to represent as a measurement of employee motivation.

5.3.1 Result of t-test

The method to measure employee motivation has already been explained in details in section 4. I took the average score of the 6 answers for survey questions related to the employee motivation and used that average score to do the t-test. Just like the questions linked to information exchange costs, employees have to give answers under two situations for each question – before ERP and after ERP. So, what we want to see is whether there is a significant difference in the score representing employee motivation after ERP implementation comparing to the score before the implementation. We can see the result by looking at Table 5.

From the table, we can see that after the Gold Mantis Ltd. implemented the ERP system, the score of employee motivation is significantly higher than before. The P value equals to 0.0000, which is way smaller than 0.01 and this makes us surer about H2. While looking at the survey answers, I found that all of the employees who are qualified to be in my case study believe that the adoption of ERP system more or less helps them work better

than before.

Table 5

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	111	3.992492	.0922758	.9721858	3.809624	4.175361
1	111	4.905405	.0922816	.9722466	4.722525	5.088286
combined	222	4.448949	.0719804	1.072484	4.307093	4.590805
diff		-.9129129	.1305018		-1.170107	-.6557193

diff = mean(0) - mean(1) t = -6.9954
 Ho: diff = 0 degrees of freedom = 220

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.0000 Pr(|T| > |t|) = 0.0000 Pr(T > t) = 1.0000

Due to such a t-test result, it seems like the disadvantages of implementing a new information system like making the employees feel less autonomy and reluctant to learn new things did not exist. On the other hand, employees feel highly motivated after using ERP.

5.3.2 Result of the Regression Model

As a result of choosing employees who belong to the same department in the same company as subjects of my case study, a lot of external factors which can have influence on employee motivation have already been limited (industry, location, department etc.). Yet there are still several factors that need to be considered because of their possible effect on employee motivation when I try to focus on the ERP's effect. Following Clark's (1997) paper which points out that women are more likely to be satisfied with their job than men, I based my regression model on his model design and added ERP dummy in the model to see if H2 can be confirmed. Some of the control variables in Clark's model become exceptions because my study objects stay in a small range. As a result, 7 control variables are included in my regression model.

Table 6 indicates that after controlling gender, age, health, education, marriage status,

managerial status and tenure, the ERP dummy is positively and significantly related to the employees' motivation (coefficient = 0.91, $p < 0.01$). This proves that after the Gold Mantis Ltd. implemented the ERP system, employee motivation became higher, thereby confirming my second hypothesis.

Table 6

average_em	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
erpdummy	.9129129	.1180112	7.74	0.000	.6802936	1.145532
gender	-.3195412	.1294218	-2.47	0.014	-.5746527	-.0644296
age	.029898	.0940976	0.32	0.751	-.1555838	.2153798
health	.3022009	.2361373	1.28	0.202	-.1632645	.7676663
education	-.3670395	.1293988	-2.84	0.005	-.6221057	-.1119733
married	-.0562281	.1974364	-0.28	0.776	-.4454076	.3329514
manager	.76103	.1599159	4.76	0.000	.4458095	1.076251
tenure	-.0477243	.0236084	-2.02	0.044	-.0942603	-.0011882
_cons	4.214489	.3508279	12.01	0.000	3.52295	4.906029

*R-squared = 0.3523

Furthermore, education level and the manager position seem to have a very strong influence on employees' motivation. The coefficient for EDUCATION is negative, which means employees in higher education level have lower levels of job satisfaction. Such a result can be explained by Saziye Gazioglua and Aysit Tansel's (2006) paper. Association of higher levels of education with less satisfaction is a surprising but a well-established result (Clark, 1996; Clark et al., 1996; Clark and Oswald, 1996). Clark and Oswald (1996) found that the causal relationship between education and job satisfaction is ambiguous due to difference in expectation between different levels of education. Blanchflower and Oswald (1999) and Clark and Oswald (1996) initially found a positive effect for education. However, this positive effect is temporary; it disappeared once a control for income was used in the regressions. Also, aligned with Saziye Gazioglua and Aysit Tansel's (2006) study, people in more leading positions such as supervisors and managers show a higher level of job satisfaction and motivation.

Opposite to Clark's (1997) study, women showed significantly lower motivation than men in my case study. I think this may be caused by the huge working pressure on women.

Clark (1997) had already pointed out that it is more difficult for women than for men to find a job, however, the Asian culture is very different from Western cultures. In western countries, people will leave if they feel under pressure and unhappy to stay in their working position. But in China, women may stay in their position even when they feel pressure. Because they know once they quit, it will be hard to find another job. Moreover, the percentage of female employees in architecture industry is much lower than male employees because of the extremely busy and heavy work. These are all reasons which may cause the lower satisfaction and motivation level of women in my study.

The tenure has a negative effect on employee motivation in a reasonable significant level in the table. On the other hand, as a control variable, the effect of age is not significant at all. It is quite strange because in common sense, employees who are older should stay in a company for longer. To explain this, the results of previous research relating to tenure and age as individual variables to evaluate job satisfaction are also criticized to be very inconsistent (Bedeian, A. G. et al., 1992). Katz (1980) suggested that the age and tenure may work together as one instead of as two individual variables that influence job satisfaction. White and Spector (1987) suggest the age may affect job satisfaction in an indirect way. To figure out whether there is a correlation between age and tenure while ERP is implemented, further research can be done. The marriage status also seems to be independent from employee motivation. Since in China, the culture and tradition give people quite heavy pressure of getting married before 30, it almost becomes a rule that Chinese people's age is tightly related to marriage status. I believe the unclear relation between age and employee motivation could have influenced the relationship between marriage status and employee motivation.

The health status also seems to be not very related to the dependent variable ($p = 0.20$). This result is different from the result determined by Saziye Gazioglua and Aysit Tansel (2006), which states that job satisfaction is negatively related to people who have health problems. I infer the reason for such difference to be the subjective assessments of employees' health statuses. Since it is not possible to recall the personal health document of each employee in the company, the only way I can use to get to know the employees' health status is by asking them in the survey. However, this method may cause an assessment bias.

5.3.3 Extra Analysis

Apart from doing t-tests and regression, some more subjective survey questions are included to work as additional evidence to support test hypotheses. Regarding whether the participants think ERP system is convenient, an average score of 5.83 (≈ 6) is provided by the participants of the survey from Table 1. The survey is attached in the Appendix and a score of 6 indicates that overall employees agree with the idea that implementation of ERP is convenient for them. The participants also agree that “ERP training is a skill update” based on the survey results. Such a positive attitude towards the ERP training may offset the negative feeling of having less autonomy and reluctance to accept new technology (Kegan & Lahey, 2001; Fey & Pavlovskaya, 2000), which are mentioned in former literature.

It is noteworthy that although the average score of agreement level for the idea “ERP is bringing a fairer rewarding system” is close to 5 (4.65) which represents “somewhat agree”, the truth should not be explained in this way. The percentage of employees who believe ERP system has nothing to do with the fairness of rewarding system (73.87%) is much higher than the percentage of employees who think it has a positive effect (26.13%). As a result, I can infer that among those advantages ERP implementation has brought to Gold Mantis Ltd., an improvement of fairness in rewarding system does not count.

Most of the employees in those five marketing departments believe the company is doing quite a good job after the ERP implementation and 94.59% of them feel satisfied with their recent job. This can be added as one of the reasons why employees’ motivation has been improved after Gold Mantis Ltd adopted the ERP system, which enables me to prove that H2 is true.

6. Conclusion

This thesis aims to propose an interesting question: how does ERP implementation affect information exchange cost and employee motivation? To find the answer to my

research question, I did a case study on Gold Mantis Ltd., a leader company in construction and decoration industry and distributed surveys to employees in the five marketing departments. After gathering all of the surveys and filtered the answers until all of them are qualified to be included in my t-tests and regression model analysis, my findings are as the followings.

Firstly, my hypothesis about the negative influence ERP implementation has on information exchange costs is proven to be true. The time marketing departments' employees need to get business related information and feedbacks from other departments has a significant decrease after Gold Mantis Ltd. use the ERP system. This is a great save in information exchange costs and proves that the use of ERP system will lower the information exchange cost within the company (H1).

Secondly, by doing a t-test and running a regression model using the data collected by counting survey answers, I found the adoption of ERP system has a positive effect on employees' motivation. According to the results of t-test, the participants' working motivation is significantly improved under the "after ERP" situation. To take one step further, I built a regression model which includes the ERP implementation as an independent dummy variable and seven other factors as control variables. The outcome of the regression showed a high credibility of my second hypothesis which suggests that the implementation of ERP will lead to a higher employee motivation. Such a result also aligns with some of the opinions mentioned by Walton (1985), Foy (1994) and Spector (1996) who believe that the ERP may motivate employees by building a more concentrated control without reducing autonomy. Moreover, by running a regression, some factors other than ERP dummy appeared to have influence on the employees' motivation. Being a manager has a positive and significant effect on the score of employee motivation, which means, if the employee is at manager level in the company, it is more likely that his/her working motivation will be higher. Both female employee and the level of education have a negative and significant influence on employee motivation. Therefore female employees have lower motivation than male employees; the better employees are educated, the lower working motivation they have.

Last but not least, the answers to some additional subjective questions helped to

explain some of my study results. Most of the participants in my case study showed their willingness to learn how to use the ERP system because they agree that the ERP is very convenient to use and ERP training is a skill update which may be useful in the future. The positive way employees think about the ERP system explains part of the reason why ERP implementation in Gold Mantis Ltd. caused a higher employee motivation. However, participants did not agree with all of the statements described in the survey. Almost all of the participants think the use of ERP system did not make the company's rewarding system fairer than before. But such judgment to the ERP's influence on rewarding fairness did not have a significant impact on employees' feeling of overall job satisfaction.

In conclusion, the findings above have proved that the implementation of ERP system helps Gold Mantis Ltd. to deal with information in a better way. Such findings align with both the behavior science theory (March & Simon, 1958) and economic theory (Hedberg, 1981) which believe company's information management process is closely related to its time costs and efforts. As a result, the answer to the research question can be contrasted: the ERP implementation lowers the information exchange costs by shortening the time of exchanging information and feedbacks among different departments within a company; meanwhile, it encourages the employees to have higher motivation by making them feel more convenient and satisfied about their jobs. This explains why the ERP works in a positive way in the company as an efficient information system in my case study.

7. Limitation and Future Direction

In my thesis I attempted to study the influence ERP implementation has on information exchange cost and employee motivation. There is an abundance of research papers related to the ERP system. However, not a lot of former researches have studied this specific dimension. This makes my thesis interesting to read but also becomes the main limitation of my case study because I do not have a lot of literature to apply to. What I have done is first introduce the ERP system and its advantages based on the literature I found and then try to link information exchange cost with the ERP implementation. Fortunately, in some

former studies, saving time of information exchange and becoming more efficient are listed as one of the advantages ERP system brings to a company. Despite this, the link between ERP implementation and information exchange cost can be stronger if there are enough direct literature base (research papers which have been done before about the information exchange cost, employee motivation and ERP implementation).

Since there is only one main object – Gold Mantis Ltd. enrolled my case study and only employees in the five marketing departments participated to answer my survey for convenient data collection, the result of my study could be influenced because of the small sample. But this shortcoming is more or less made up by the extremely high percentage of survey collecting rate. Further, while considering about other factors which may have influenced employee motivation except for the ERP implementation, I built a regression model which is applied to the model used by Andrew (1997) in his paper and included some control variables to limit such an influence.

The last point of limitation I have to mention is about the timing of survey distribution. As explained in early sections, the aim of my thesis is to determine whether ERP implementation has an effect on information exchange cost and employee motivation. Usually, the best way to do my case study is to distribute the survey once in 2008, which is 3 years before ERP implementation and then again in 2014, 3 years after the ERP implementation, or after so that the employees' answers can be compared to see if the effect of ERP is significant. However, the reality is I started to plan for my thesis topic in 2014 and this makes it impossible to go back to the year 2008 and distribute my survey. Therefore I have designed my survey in a BEFORE – AFTER form. Employees who started to work in Gold Mantis Ltd. since 2008 or earlier and still stay in the company are asked to answer the same questions twice but under two different scenarios – before the ERP implementation and after the ERP implementation. Although such a survey form makes it possible to compare the employees' opinions about information exchange cost and their job satisfaction before and after the ERP system is adopted, the accuracy of their answers could be biased because they answer the questions for two different situations under only one of the two situations (after the implementation).

For future research, I suggest more research to focus on the same topic as mine so that

the literature gap can be filled. Furthermore, it will be very interesting if a company in the same industry as Gold Mantis Ltd. which plans to implement ERP system can be used as a subject of case study. Under such situation, the timing problem I have encountered may be solved – surveys can be distributed before the ERP system is adopted. After the implementation, the same survey should be distributed once again. Then the answers before and after the ERP implementation can be compared to each other and the result of the study can be compared to my case study result to see if the answers to my hypotheses will be the same.

8. Acknowledgements

The answers of my survey are provided by the employees in all of the five marketing departments of Gold Mantis Ltd. I would like to thank Di Ji (manager of No. 3 marketing department of Gold Mantis) and Jianzhen Bai (vice manager of No. 3 marketing department of Gold Mantis) for their help. Their efforts made my survey collection possible. The whole thesis is completed with the help of Dr. K.E.H. Maas and Welten, drs. T.P.M.

Appendix A

This survey is designed for a research study about the ERP system in your company, it contains 20 questions and will take you about 10 minutes to answer them. Please read the questions carefully and give the answers with your fairly consideration which can reflect the most real situation.

First, we would like to ask you some questions about how you think about the ERP system.

1. How long does it take you to get information of other departments in Gold Mantis Ltd. **BEFORE** using the ERP system?

A. Within one day **B.** Within two days **C.** Within one week **D.** More than one week

2. How long does it take you to get information of other departments in Gold Mantis Ltd. **AFTER** using the ERP system?

A. Within one day **B.** Within two days **C.** Within one week **D.** More than one week

3. How long does it take you to get feedbacks about different projects from other departments in Gold Mantis Ltd. **BEFORE** using the ERP system?

A. Within one day **B.** Within two days **C.** Within one week **D.** More than one week

4. How long does it take you to get feedbacks about different projects from other departments in Gold Mantis Ltd. **AFTER** using the ERP system?

A. Within one day **B.** Within two days **C.** Within one week **D.** More than one week

5. I think the ERP system is very convenient to use comparing to the information system I have used before.

A. Strongly Disagree **B.** Disagree **C.** Somewhat Disagree **D.** Neither Agree nor Disagree **E.** Somewhat Agree **F.** Agree **G.** Strongly Agree

6. I feel happy to be trained to use the ERP system because it is a skill updating.

A. Strongly Disagree **B.** Disagree **C.** Somewhat Disagree **D.** Neither Agree nor Disagree **E.** Somewhat Agree **F.** Agree **G.** Strongly Agree

7. I am rewarded fairer for the quality of my efforts after ERP implementation.

A. Strongly Disagree **B.** Disagree **C.** Somewhat Disagree **D.** Neither Agree nor Disagree **E.** Somewhat Agree **F.** Agree **G.** Strongly Agree

8. I believe that the company goes well with the implementation of ERP system.

A. Strongly Disagree **B.** Disagree **C.** Somewhat Disagree **D.** Neither Agree nor Disagree **E.** Somewhat Agree **F.** Agree **G.** Strongly Agree

9. Overall, I feel satisfied with my job.

A. Strongly Disagree **B.** Disagree **C.** Somewhat Disagree **D.** Neither Agree nor Disagree **E.** Somewhat Agree **F.** Agree **G.** Strongly Agree

Next, we are interested in how satisfied you feel about your job and how you believe you perform on the job.

When answering these questions, please compare yourself with an average employee in your position and rate your own productivity and quality of your work. You need to rate your performance twice: first before ERP implementation and then after.

10. Productive time spent working on the tasks assigned to me (Before ERP).

A. Upper 5% **B.** Upper 10% **C.** Upper 20% **D.** Upper 30% **E.** Middle 50% **F.** Lower 30%
G. Bottom 20%

Productive time spent working on the tasks assigned to me (After ERP).

A. Upper 5% **B.** Upper 10% **C.** Upper 20% **D.** Upper 30% **E.** Middle 50% **F.** Lower 30%
G. Bottom 20%

11. Meeting target quotas and goals (Before ERP).

A. Upper 5% **B.** Upper 10% **C.** Upper 20% **D.** Upper 30% **E.** Middle 50% **F.** Lower 30%

G. Bottom 20%

Meeting target quotas and goals (After ERP).

A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%

G. Bottom 20%

12. Overall productivity in getting the job done (Before ERP).

A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%

G. Bottom 20%

Overall productivity in getting the job done (After ERP).

A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%

G. Bottom 20%

13. Going beyond what is expected of me to make customers happy (Before ERP).

A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%

G. Bottom 20%

Going beyond what is expected of me to make customers happy (After ERP).

A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%

G. Bottom 20%

14. I respond quickly and courteously to fulfill customers' needs (Before ERP).

A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%

G. Bottom 20%

I respond quickly and courteously to fulfill customers' needs (After ERP).

A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%

G. Bottom 20%

15. The overall quality of work I that I have done (Before ERP).

A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%

G. Bottom 20%

The overall quality of work I that I have done (After ERP).

- A. Upper 5% B. Upper 10% C. Upper 20% D. Upper 30% E. Middle 50% F. Lower 30%**
G. Bottom 20%

Last, please fill in some of your personal information to help us completing this study.

16. When did you become an employee of Gold Mantis Ltd.? _____

17. What is your gender?

- A. Male B. Female**

18. What is your age?

- A. Below 20 B. 21-30 C. 31-40 D. 41-50 E. 51-60 F. Above 60**

19. How do you classify your own health condition?

- A. Excellent B. Good C. Fair D. Poor**

20. What is your education level?

- A. Doctor B. Master C. Bachelor D. below Bachelor**

21. Are you married?

- A. Yes B. No (This includes never married, widowed, divorced and all the other situations)**

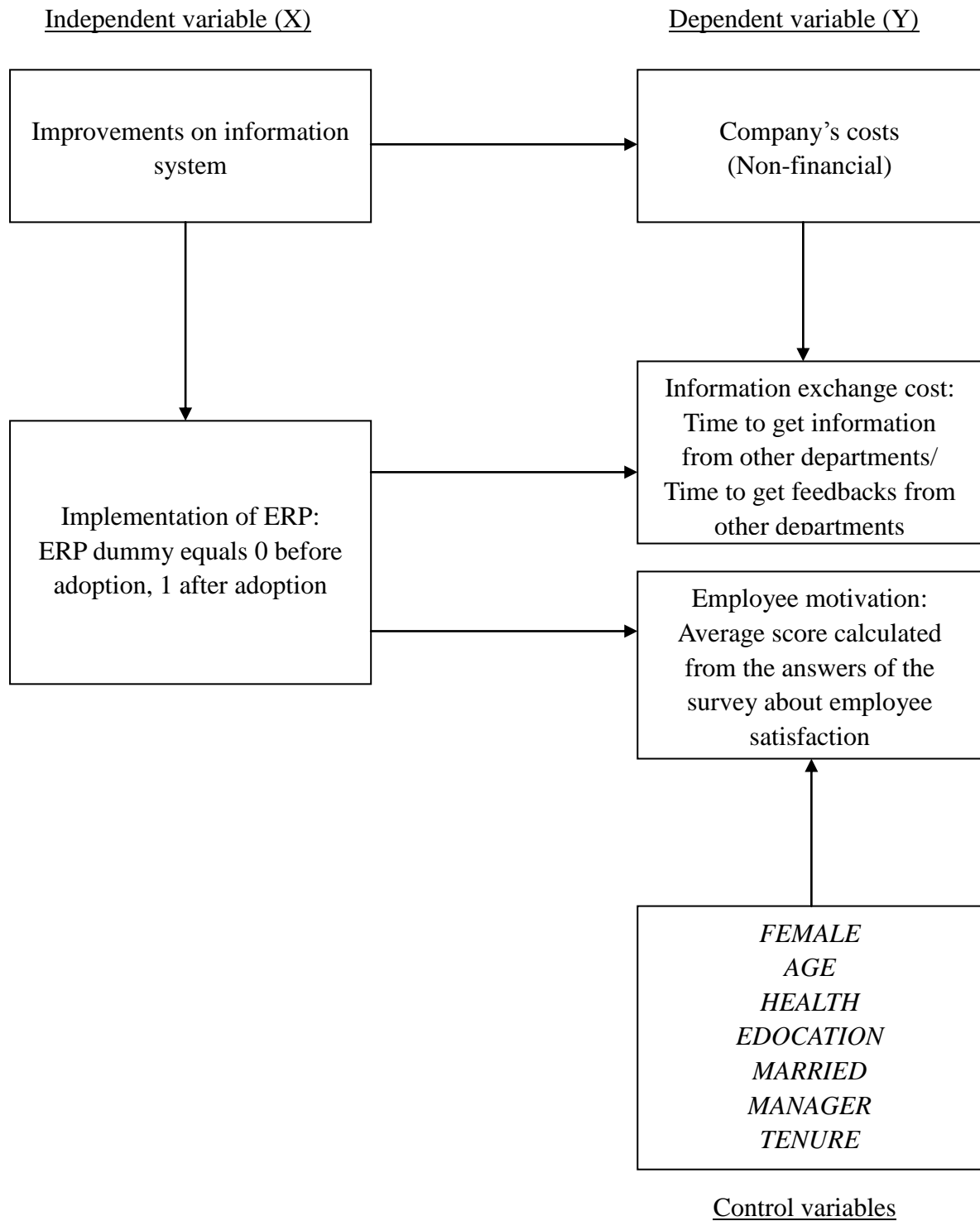
22. Are you a manager?

- A. Yes B. No**

Thank you for your cooperation!

Appendix B

Libby Box:



References

- A., M. (2000). Enterprise-Wide Information Systems: The Case of SAP R/3 Application. . *The Second International Conference on Enterprise Information Systems*, (pp. 3-8).
- Abiot Sinamo Boltana, J. M. (2012). A Successful ERP Implementation in an Ethiopian Company: A case study of ERP Implementation in Mesfine Industrial Engineering Pvt. Ltd. . *Conference on ENTERise Information Systems/ HCIST 2012* . International Conference on Health and Social Care Information Systems and Technologies.
- Alavi, M. and Keen, P. (1989). Business Teams in the Information Age. *Information Society*, v. 4, p. 179.
- Applebaum E, Batt R. (1994). *Transforming Work Systems in the United States*. New York: ILR Press: Ithaca.
- Bedeian, A. G., Ferris, G. R., & Kacmar, K. M. (1992). Age, Tenure and jobsatisfaction: A tale of two perspectives. *Journal of Vocational behavior*, 40 (1), 33-48.
- Brass, D. J. (1985). Technology and the structuring of jobs: Employee satisfaction, performance, and influence. *Organizational Behavior and Human Decision Processed*, 35 (2), 216-240.
- Brayfield, A. H., & Crockett, W. H. (1955). Employee attitudes and employee performance. *Psychological Bulletin*, 52, 396-424.
- Brown, S. P., & Lam, S. K. (2008). A meta-analysis of relationships linking employee satisfaction to customer responses. *Journal of Retailing*, 84 (3), 243-255.
- Bulkeley, W. M. (1996). A cautionary network tale: Fox-Meyer's high-tech gamble. *Wall Street Journal Interactive Edition*.
- C., D. (1998). Softeare That Can Make a Grown Company Cry. *The New York Times CXLVIII (51), 1*, 13.
- Chen, P. (1976). The Entity-Relationship Model: Towards a Unified View of Data. . *ACM Transactions on Database Systems 1(1)*, 9-36.
- Chi, C. G., & Gursoy, D. (2009). Employee satisfaction, customer satisfaction, and financial performance: An empirical examination. *International Journal of Hospitality Management*, 28 (2), 245-253.
- Clark, A. E. (1996). Job satisfaction in Britain. *British Journal of Industrial Relations*, 34, 189-217.
- Clark, A. E. (1997). Job satisfaction and gender: why are women so happy at work? *Labour economics*, 4 (4), 341-372.
- Clark, A. E. (1999). Are wages habit-forming? Evidence from micro data. *Journal of Economic Behavior and Organization*, 19, 179-200.
- Clark, A. E. and Oswald, A. J. (1996). Satisfaction and comparison income. *Journal of Public Economics*, 61, 359-381.
- Clark, A. E., Oswald, A. and Warr, P. (1996). Is job satisfaction u-shaped in age? *Journal of Occupational and Organizational Psychology*, 69, 57-81.
- Clark, A. E., Oswald, A. J. (1994). Unhappiness and unemployment. *Economic Journal* 104, 648-659.

- D.H., H. (1994). *Organizational linkages: understanding the productivity paradox*. Washington DC: National Academy Press.
- Daft, R. L. (1986). *Organization theory and design, Second ed.* West, St. Paul, MN.
- Daft, R. L., N. B. Macintosh. (1981). A tentative exploration into the amount and equivocality of information processing in organizational work units. *Admin. Sci. Quart.*, 26, 207-224.
- D'Atri A., De Marco M., Casalino N. (2008). Interdisciplinary Aspects of Information Systems Studies. *Physica-Verlag, Springer, Germany*, 1-146.
- Dos Santos B., Peffer K., Mauer D. C. (1993). The impact of information technology investment announcements on the market. *Inf Syst Res* 1993, 4, 1-23.
- Douglas T. Ross and D. Schoman. (1977). Structured Analysis for Requirements Definition. *IEEE Transactions on Software Engineering* 3 (1), Special Issue on Requirements Analysis, January, 6-15.
- Economist. (2008). Technological comebacks: Not dead, just resting. *The Economist*, 10-19.
- Eugenia Papaioannou, Christos, Costas Assimakopoulos, Christos K. Georgiadis. (2011). A successful development of an ERP system: A case study of a small Greek company. *International Conference on Enterprise Systems, Accounting and Logistics (8th ICESAL 2011) July 2011*, (pp. 11-12). Thassos Island, Greece.
- Fensel, D., Van Harmelen, F., Horrocks, I., McGuinness, D. L., & Patel-Schneider, P. F. (2001). OIL: An ontology infrastructure for the semantic web. *IEEE intelligent systems*, (2), 38-45.
- Fey, C. F., Björkman, I., & Pavlovskaya, A. (2000). The effect of human resource management practices on firm performance in Russia. *International Journal of Human Resource Management*, 11 (1), 1-18.
- Fisher, C., & Locke, E. A. (n.d.). The new look in job satisfaction research and theory. In P. C. C. J. Cranny, *Job satisfaction: Advances in research and applications*. Lexington MA: Lexington Books.
- Frisse, M. E., & Holmes, R. L. (2007). Estimated financial savings associated with health information exchange and ambulatory care referral. *Journal of biomedical informatics*, 40 (6), 27-32.
- G., F. (2003). Paper augmented digital documents. *User interface software and technology, 16th annual ACM symposium*, 51-60.
- G., L. (2000). *Enterprise Resources Planning and Beyond: Integrating Your Entire Organization*. Boca Raton, FL: St. Lucie Press.
- Gazioglu, S., & Tansel, A. (2006). Job satisfaction in Britain: individual and job related factors. *Applied Economics*, 38 (10), 1163-1171.
- Goldman, C. V., & Zilberstein, S. . (2003). Optimizing information exchange in cooperative multi-agent systems. *The second International joint conference on Autonomous agents and multi-agent systems*, (pp. 137-144).
- Hagenaars, A. J. (1986). *The perception of Poverty*. North Holland, Amsterdam.
- Hall, R. (1962). Intra-organizational structure variation. *Admin. Sci. Quart*, 7, 295-308.
- Hasselbring, W. (2000). Information system integration. *Communications of the ACM*, 43 (6), 32-38.

- Hayes DC, Hunton JE, Reck JL. . (2001). Market reaction to ERP implementation announcements. *J Inf. Syst.* 15 (1), 3-18.
- Hedberg, B. (1981). How organization learn and unlearn. In P. & Nyström, *Handbook of Organizational Design*. Oxford: Oxford University Press.
- Heeks, A. H. (2010). Explaining ERP Failure in Developing Countries: A Jordanian Case Study. *Manchester Center for Development Informatics*, Working paper 45.
- Hong, K. K., & Kim, Y. G. (2002). The critical success factors for ERP implementation: an organizational fit perspective. *Information & Management*, 40 (1), 25-40.
- J. W. Slocum, H. Smis. (1980). A typology for integrating technology, organization and job design. *Human Relations*, Volum 33, 193-212.
- J.H. Park, H. S. (2007). Perceived absorptive capacity of individual users in performance of enterprise resource planning (ERP) usage: the case for Korean firms. . *Information & Management*, Vol. 44 (3), 300-312.
- James E Hunton, Barbara Lippincott, Jacqueline L Reck. (2003). Enterprise resource planning systems: comparing firm performance of adopters and nonadopters. *International Journal of Accounting Information Systems*, Vol. 4 (3), 165-184.
- James Rumbaugh, Ivar Jacobson, and Grady Booch. (1999). *The Unified Modeling Language Reference Manual*. Addison-Wesley.
- K., A.-G. (2007). Perceived usefulness, user involvement and behavior intention: an empirical study of ERP implementation. *Computers in Human Behavior*, Vol. 23, 1232-1248.
- Katz, R. (1980). Time and work: Toward an integrative perspective. *Research in Organizational Behavior*, 2, 37-71.
- Kegan, R., & Lahey, L. L. . (2001). The real reason people won't change. *Harvard Business Review*.
- Kerr, S. (1988). Islands of Automation: Networks Emerge to Connect Them. *Datamation*, Mar. 1, 57.
- Kochan T, Osterman P. (1994). *Mutual Gains Bargaining*. Boston, MA: Harvard Business School Press.
- Kotter, J. P. (2007). Leading Change: Why Transformation Efforts Fail. . *Harvard Business Review*, January.
- Koys, D. J. (2001). The effects of employee satisfaction, organizational citizenship behavior, and turnover on organizational effectiveness: A unit-level, longitudinal study. *Personal psychology*, 54 (1), 101-114.
- Li Fang, Sylvia Patricia. (2005). Critical Success Factors in ERP Implementation. *Information Science*, 62.
- Locke, E. A. (1965). The relationship of task success to task liking and satisfaction. . *Journal of Applied Psychology*, 49, 379-385.
- Locke, E. A. (1978). The ubiquity of the technique of goal setting in theories of approaches to employee motivation. *Academy of Management Review*, 3 (3), 594-601.
- Locke, E. A., & Latham, G. P. (1990). Work motivation and satisfaction: Light at the end of the tunnel. *Psychological Science*, 1 (4), 240-246.
- March, J. G. & Simon, H. A. (1958). *Organizations*. Wiley.
- Markus L., Axline S., Petrie D., and Tanis C. (2000). Learning from Adopters' Experience

- with ERP Problems Encountered and Success Achieved. *Journal of Information Technology*, 15 (2), 245-265.
- Motwani, J., Subramanian, R., & Gopalakrishna, P. . (2005). Critical factors for successful ERP implementation: Exploratory findings from four case studies. *Computers in Industry*, 56 (6), 529-544.
- Motwani, Jaideep and Subramanian, Ram. (2004). Successful ERP Implementation by West Michigan Companies. *Seidman Business Review: Vol. 10, Iss. 1, Article 7*.
- N., F. (1994). Empowering People at Work. *Gower: Aldershot*.
- Nelson E. and Ramstad E. (1999). Hershey's Biggest Dud Has Turned Out to be New Computer System. *The Wall Street Journal CIV (85)*, A1-A6.
- NIST. (1993). Integrated Definition for Function Modeling (IDEF0). *National Institute of Standards and Technology*.
- Oh, W., & Licas Jr. C. (2006). Information technology and pricing decisions: Price adjustments in online computer markets. *MIS Quality*, 755-775.
- Organ, D. W. (1987). *Organizational citizenship behavior: The good soldier syndrome*. . Lexington, MA.
- Orlikowski, W. J. (1992). The duality of technology: rethinking the concept of technology in organizations. *Organization Science* 3(3), 398-427.
- P., S. (1996). Perceived control by employees: Ameta-analysis of studies concerning autonomy and participation at work. *Human Relations* 39 (11), 1005-1016.
- Panos Vassiliadis, Christoph Quix, Yannis Vassiliou, Matthias Jarke. (2001). Data Warehouse Process Management. *Information System*, 26 (3), 205-236.
- Parr, A. and Shanks G. (2000). A Model of ERP Project Implementation. *Journal of Information Technology*, 15 (2), 289-303.
- Peng, G. C. and Nunes, J. M. B. (2010). Why ERP post-implementation fails? Lessons learned from a failure case in China. *PACIS, 9th-12th July 2010, Taipei, Taiwan. AIS*, 296-307.
- Podsakoff, P. M., & Williams, L. J. . (1986). The relationship between job performance and job satisfaction. In E. A. (Ed), *Generalizing from laboratory to field settings*. Lexington, MA.
- Poston R, Grabski S. . (2001). Financial impacts of enterprise resource planning implementations. *Int. J Account Inf. Syst.*, 2, 271-294.
- Ptak, C. (2000). *ERP: Tools, Techniques, and Applications for Integrating the Supply Chain*. . Boca Raton, FL: St. Lucie Press.
- R., W. (1985). From control to commitment in the workplace. *Harvard Business Review* 63 (2), 76-85.
- Rajagopal, P. and Tyler, F. (2000). Enhancing manufacturing performance with ERP systems. *Information Systems Management, Volum 17, Issue 3*, 43.
- Richard, H. (2002). Enterprise resource planning systems and organizational change: transforming work organization? *Wiley InterScience* 11, 263-270.
- Rockart, J. F. and Short, F. E. (1994). Information Technology in the 1990s: Managing Organizational Independence. In R. D. Galliers, *Strategic Information Management* (p. ch. 16). Oxford: Butterworth Heinemann Ltd.
- Ross, C. E., Reskin, B. F. (1992). Education control at work and job satisfaction. *Social*

Science Research 21, 134-148.

- Rousseau, D. M. (1977). Technological differences in job characteristics, employee satisfaction, and motivation: A synthesis of job design research and sociotechnical systems theory. *Organization Behavior and Human Performance* 19 (1), 18-42.
- Rutledge, T. (2009). *Getting engaged: The new workplace loyalty*. . Mattanie Press.
- Seijts, G. H., & Crim, D. . (2006). What engages employees the most or, the ten C's of employee engagement. *Ivey Nusiness Journal*, 70 (4), 1-5.
- Shutao D, Sean Xin. X., Kevin Xiaoguo Z. (2009). Information technology in supply chains: the value of IT-Enabled resources under competition. *Information Systems Research*, 20 (1), 18-32.
- Sloane, P., Battu, H., Seaman, P.T. (1995). Overeducation, Undereducation and the British Labour Market. *Mimeo, University of Aberdeen*.
- Spector, P. E. (1985). Measurement of human service staff satisfaction: Development of the job satisfaction survey. . *American journal of community psychology*, 136, 693-713.
- Steyn, G. M. (2004). Harnessing the power of knowledge in higher education. *Education*, 124 (4), 615.
- T., D. (1998). Bankrupt Firm Blams SAP for Failure. *Computer World*, August, 28.
- T., D. (1998). Putting the Enterprise into the Enterprise System. *Harvard Business Review* 76 (4), 121-133.
- Taylor, J. C. (1998). Participative design: Linking BPR and SAP with an STS approach. . *Journal of Organizational Change Management*, 11 (3), 233-245.
- Thomas Curran and Gerhard Keller. (1997). *SAP R/3 Business Blueprint: Understanding the Business Process Reference Model*. Pearson Education.
- Van de Ven, A. H., A. L. Delbecq. (1974). A task contingent model of Work-Unit structure. *Admin. Sci. Quart.*, 19, 183-197.
- Whetten, D. A. (1978). Coping with incompatible exceptions: An integrated view of role conflict. *Administrative Science Quarterly*, Volum 23, 254-271.
- White, A. T., & Spector, P. E. . (1987). An investigation of age-related factors in the age-job-satisfaction relationship. *Psychology and Aging*, 2, 261-265.
- Wong, Ada; Scarbrough, Harry; Chau, Patrick; and Davison, Robert. . (2005). Critical Failure Factors in ERP Implementation. *PACIS 2005 Proceedings*, Paper 40.
- Wu, J. H., and Wang, Y. M. (2007). Measuring ERP success: The key-users' viewpoint of the ERP to produce a variable IS in the organization. *Computers in Human Behavior*, Vol. 23, 1582-1596.
- Yu, E. (2004). *Information Systes (in the Internet Age)*. *Practical Handbook of Internet Computing*, M. P. Singh, ed. 2004. CRC Press.
- Yusuf, Y., Gunasekaran, A., & Abthorpe, M. S. . (2004). Enterprise information systems project implementation: A case study of ERP in Rolls-Royce. *International Journal of Production Economics*, 87 (3), 251-266.
- Zajac, E. J., & Olsen, C. P. (1993). From transaction cost to transactional value analysis: Implications for the study of interorganizational strategies*. . *Journal of management studies*, 30 (1), 131-145.