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ERP Implementation and Cultural Issues: A case study

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ABSTRACT

Business Process Reengineering (BPR) is defined as the fundamental rethinking and radical redesign of business processes. Implementing an Enterprise Resource Planning (ERP) system involves reengineering the existing business processes to accommodate the best practices adopted by these software packages. It is also suggested that an awareness of cultural differences, both at organizational and national levels, is critical to ERP success. This paper reports on a study of BPR through ERP implementation in two Chinese medium sized manufacturing organizations. The selected organizations are the same size and have implemented the same type of ERP systems to reengineer their business processes. One of the companies is a state-owned company and the other is a private organization. The findings suggest that business processes can only reflect technical aspect from socio-technical view. Other two subsystems, human system (eg, culture, motivation, communication, willingness to change) and management system are equally important to contribute to overall organizational performance.

*Keywords***:** Culture, ERP, BPR

INTRODUCTION

ERP systems – the Software packages

The key to the successful implementation of any ERP software package in an organization is a fit between the ERP system and the organizational processes it is there to support [1], [2]. It is important to remember that ERP systems, although promise to integrate all processes in an organization are still packaged software solutions rather than customized systems. As such, they come with built-in assumptions and procedures about organizations' business processes. The ERP assumptions and procedures, under the title of 'best practices' seldom match exactly with those of the implementing organization's existing processes [3].

ERP – The implementation

Business organizations traditionally designed their own computer systems to fit their specific organizational processes and requirements. ERP systems, although offering the option of customization, are very difficult to change to completely match existing business requirements. Basic customization means to provide the basic parameters for the system to enable the system to respond to the present organizational structure. Any change beyond the basic customization has proved to be very costly and usually result in the loss of technical support by the vendor. In fact, many researchers and practitioners have suggested that it is easier and less costly to change the business processes to match ERP systems rather than *vice versa* [4], [1]. Thus, any ERP implementation not only is a large scale software deployment exercise but it is usually accompanied by large scale organizational change [1], [2]. Consequently, a key issue in ERP implementation is how to find a match between the ERP system and an organization's business processes by appropriately customizing both the system and the organization. There have been different frameworks suggested in the past to find the best match between the ERP systems and the organizations [5],[3], [6]. A significant number of ERP implementation projects undertaken in the 1990s overran time and cost budgets. In most of these cases the reasons for overrun were often related to integrating the package with other application environments. This was not usually a technical issue but related to different applications that were never intended to collaborate. Most of these packages were and are with few exceptions designed with an inward focus. Yet many organizations deliberately chose what they referred to as 'best of breed' meaning they were choosing the modules with the most relevant functionality, little realizing that to make the modules actually work together was likely to be a major effort which in itself might compromise the functionality of each module because of a lowest common denominator effect [7]. As it was suggested by some authors eg, [3] ERP systems work on the basis of some assumptions regarding the business processes and the market in which the organization operates. Some authors suggest that ERP modules should simply be thoroughly and correctly translated into the other language such as Chinese, including user interfaces, reports, and user help files [8] for the system to be successful. Others suggest that ERP systems are designed for rule-based, mature economies rather than relation-based governance like China [9]. The adoption of ERP systems in India for example has resulted in a very painful transition and adaptation period, while the benefits have not been immediate or tangible [10], and [11]. In fact in some cases the benefits have been perceived to be much less when compared to the massive cost [12].

What most of the authors believe to play a key role in a successful implementation of an ERP systems in an Asian country is the need for business process change during the implementation of these systems eg, [13], [14].

BPR - Business process is composed of business process chain (BPC) and its associated aspects, such as resource, economic, organization, information and decision aspects. Reengineering BPC involves eliminating non-value-adding activities, making activities concurrently executed as much as possible; rethinking and redesigning supply chains [15], [16], and [17]. A key premise of ERP systems is the underlying "best practice" which reflects preferred data and process models as well as organizational structures [18. Usually organizations redesign their business processes to cater for these reference models to take full advantages of ERP systems through BPR. Table 1 displays changes in an organization when it embarks on BPR.

These changes occur in terms of organizational structure, people's responsibility, management systems and organizational culture.

Changes in	**Traditional organization**	**Re-engineered organization**	***Organizational Elements***
Organizational structure	Hierarchical	Flat	*Organizational Structure; Management*
Work units	Functional departments	Process teams	
Nature of work	Simple task	Multi-dimensional work	*Skill*
Employee roles	Controlled	Empowered	*Management; Leadership; Responsibility*
Managerial roles	Supervisors	Coaches	
Executive roles	Scorekeeper	Leaders	
Value system	Protective	Productive	*Culture*
Job preparation	Training	Education	*Skill*
Promotion criteria	Performance	Ability	*Management*
Performance Measurement	*Activity (inputs)*	*Results (outputs)*	

Table 1: Characteristics of redesigned organization (a modified version of work by 19 and 15)

Enterprise systems like any packaged information system, universally valued, it is not used in a culture vacuum. The cultural differences is suggested to contribute to a high failure rate of ERP implementation [20]. ERP systems function, as suggested by some authors such as Brehm *et al.* [3], on the basis of some assumptions regarding the business processes and the market in which the organization operates. Cultural "fit" with ERP systems might be a problem in Asia, because the reference processes model underlying most ERP systems is influenced by European or U.S. industry/business practices, which are different from those of Asian countries [21]. As organizations are encouraged to reengineer their business processes to match "best practice" in packages, there can be significant problems associated with the reengineering of local practices and processes [22]. So, an examination of the cultural differences between China and western countries is an important issue in the study of BPR and ERP. There seems to be a misfit between Chinese culture and the embodied assumptions in packaged information systems (23; and 24). For the purpose of this article, the definition of Chinese Culture refers to a society influenced by Confucius [25]. Some of the Confucian traditions include: an orthodoxy conscious tradition, a culture-conscious tradition, a morally conscious tradition, a socially conscious tradition, and a 'this-worldly' conscious tradition [26]. Table 2 summarizes some features of Chinese culture which conflict with the philosophy of applying IS.

Strategy Making	Using informal information and personal knowledge
Employee Empowerment	Poor employee empowerment
Information Release and Share	Selective; encourage stability and suppress message of radical; Information is personal asset of managers
Pattern of Communication	Socially-oriented and situation-centred; personal and information
Management System	Centralized
Leadership	Autocratic tendency; higher power distance
Organizational Behaviour	Individualism; Person trust

Table 2: Characteristics of Chinese Culture which is misfit with Adoption of IS [23]

In addition, Chinese culture values family connections and protecting relationships (saving face) which is one of major barriers to change in China [27]. When ERP and BPR phenomenon are examined in China, all these factors should be taken into consideration.

THEORETICAL FRAMEWORK

The adopted framework is based on contingency theory, activity theory and socio-technical theory. "Contingency theory is guided by the general orienting hypothesis that organizations whose internal features best match the demands of their environments will achieve the best adaptation" [28]. It can be used to examine interrelationships among environmental variables, organizational structure, technology and organizational performance [29]. "Fit" is an important assumption underlying contingency theory, which means that the better the "fit" among contingency variables , the better will be the performance of the organization [30]. The aim of this theory is to identify as many relevant internal and external influencing factors as possible, in order to achieve the "best fit" between the organization and the environment as long as all these elements are aligned or congruent [31]. In this study, the contingency model was used to examine the interactions and "fits" between factors of the environment, organization, ERP adoption and BPR. In the contingency model, the activity theory is to view the adoption of the ERP system as a tool to undertake BPR. Activity theory evolved from the cultural-history school of psychology [32]. The key principle is that human activity is object-oriented and is mediated by cultural means, tools and signs, and can be understood only within the context of the historically evolving society [33]. As an artefact, ERP software provides an integrated IS platform for an organization. According to Sujan *et al.*[33] , artefact mediation represents "a historical

accumulation and transmission of social knowledge". When organizations embrace ERP systems, they have to consider the difference between the embedded "social knowledge" and the assumptions of the users' contexts.

RESEARCH METHODOLOGY

The main types of enterprises in China are state owned, private and joint venture. State owned enterprises (SoEs) are more traditional, while private and joint ventures are more modern but share some common features. The two selected companies both belong to manufacturing sector. Characteristics of research questions determine which research method should be used [34]. Case study approach is used in this research. BPR efforts are strongly related to many contextual factors and influenced by culture, so this method is appropriate to examine phenomena under its real environment [35]. According to Benbasat *et al.* [36], case study is suitable to study information systems in a natural setting. Case study could take on some types in terms of epistemology: interpretivist, positivist and combination of the two [37]. This research adopts interpretivist epistemology, which assumed that "our knowledge of reality is gained only through social constructions such as a language, consciousness, shared meanings, documents, tools and other artifacts" [38]. In this research, case study information came from documents, interviews and direct observation. Documents in the cases include ERP implementation memo, recorded transcripts of interviews on ERP and descriptions of several business processes.

The research involved collection of background information on these companies followed by interviews with the supervisors and the heads of the relevant departments in these companies. The interviews used open ended questions to collect information regarding the steps in the selected business process in each of these organizations. Then semi-structured interviews were used to collect data. The interview protocol consists of three parts: basic information about the company, ERP application in the company and BPR's efforts.

CASE STUDY

Table 3, summarizes some general information on the two case organizations.

	MachinCO	**TelCo**
Industry Sector	Manufacturing (Machinery)	Manufacturing (Telecom Systems)
Ownership	SoEs	Joint
Employee	1200	4000
Turnover (2004)	US$ 90 million	US$ 2 billion
Employees Educational Background	Medium level (300 employees received diploma degree or above)	High level (73 % employees got bachelor degree and above)
Structure	Traditional Hierarchy	Matrix Structure or Mix of vertical and flat structure. Vertical feature is dominating.
IS adopted	PDM, ERP, KBS, MES	PDM, ERP, Purchasing systems

Table 3: Basic Information about Case Companies. PDM means product data management; KBS is knowledge base system and MES refers to manufacturing execute system.

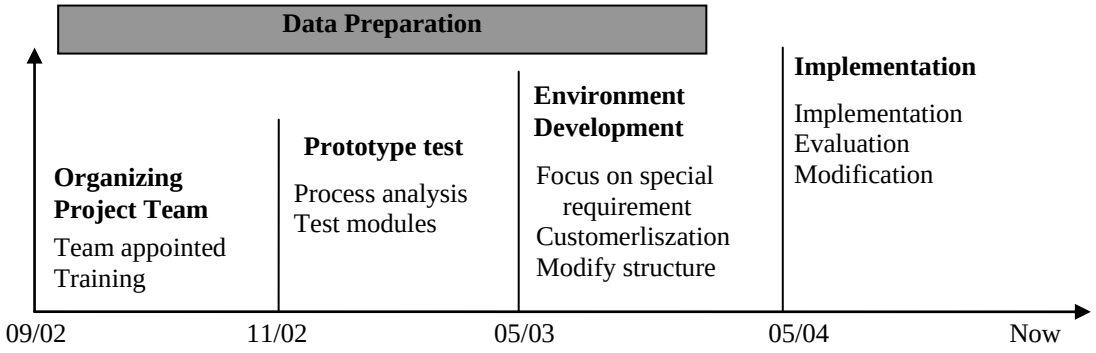

Figure 2: ERP Adoption Process in MachinCo

MachinCo through bid and case investigations of other corporations, Forth Shift ERP system was employed. Forth Shift is a brand of ERP system specialized in medium and small manufacturing enterprises in China. The enterprise applications are designed to help small to midsize manufacturing plants streamline their business processes and improve efficiency. The end result is increased profitability through reductions in overall inventory levels, higher inventory turns, faster cash collection, and improved on-time delivery performance. The adopted modules are production, storage management, purchasing, planning and order processing units. An ordinary department: information central department is charge of implementation of the system. ERP project is shown in figure 2. TelCo adopted well-known software package SAP R/3 systems. In the first stage, it

introduced MM (Material Management), SD (Sales and Distribution), PP (Production Planning), PM (Plant Maintenance), FI (Financial), CO (Controlling) and AM (Asset Management). The system integrated the four main business elements: sales, production, supply and financial. Figure 3 displays the adoption process.

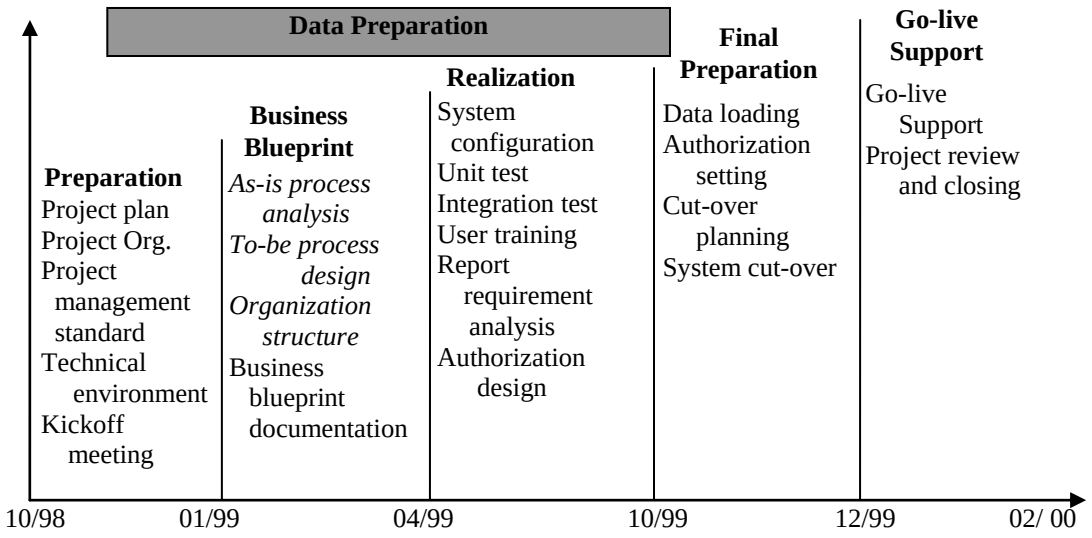

Figure 3: ERP Adoption Process in TelCo.

The business processes can only reflect technical aspect from socio-technical view. Other two subsystems, human system (culture, motivation, communication, willingness to change ect.) and management system are equally important to contribute to overall organizational performance [39].

Purchasing Process In MachinCo - The activities involved in the Purchasing process at MachineCo are displayed in Figure 4 (Appendix). The analysis focuses on steps 1 to 6 which become easier after the adoption of the ERP system because information about the required material for orders, current stocked materials and detailed data about suppliers are integrated. In step 1, the market plan is generated by the planning module of the ERP system according to the currently received orders and product stock levels. This procedure is a complex process based on scientific calculation and prediction. Every product consists of a corresponding BOM, which provides detailed data about its consisting parts and prices. However, because it is difficult to accurately predict market demand, in step 2 the plan produced by the ERP system is modified by users on the basis of their experience in the business environment. In most cases, the inaccurate prediction of market demand requires a manual change in the plan. In China, especially for SoEs, the decision-making process is highly influenced by irrational factors such as politics and "guanxi". Consequently, most SoEs do not have accurate purchasing plans, which make it difficult for their suppliers to predict market demand. MachineCo usually relies on the personal experience of employees and informal information to predict prospective orders. For example, some managers in MachineCo have close personal relationships with the managers of its customers, from whom they can obtain some purchasing plans in advance. Other factors can also influence the change of purchasing plan. For example, if some signs indicate that the prices of raw material such as steel will increase in coming months, which could in turn cause an increase in the price of the parts, MachineCo increases its purchasing level. So step 2 mainly deals with the environmental influence on the purchasing plan. The result of step 2 is the revised market plan.

Step 3 to step 5 involve complex business rules and calculations, which are automatically conducted by the ERP system. After the revised market plan of required material is input into the ERP system in step 3, purchasing orders for different suppliers are produced automatically and immediately. Step 4 compares the revised market plan with existing stock to determine the purchasing plan. Step 5 is responsible for generating the final purchasing order to be sent to relevant suppliers. In practice, these two activities occur simultaneously in the system. When staff in the purchasing department place orders generated by the ERP system in step 5, they have to take non-technical factors into consideration to change the quantities ordered from different suppliers to some extent. For example, if a supplier's prices are higher than others, accordingly the automatic allocation of the ordered quantity to that particular supplier by ERP system is smaller than others. However, if the supplier has a good personal relationship with MachineCo, the managers in MachineCo change the purchasing process to guarantee the desired share for the supplier. This phenomenon is common in the Chinese business environment, especially for SoEs.

The information update in step 6 occurs when the current information about material and suppliers has changed. For example, if MachineCo identifies a new supplier for a specific part or obtains a lower price for a part, then the new information has to be entered into the system to update the database. The new data has an impact on the cost calculation for relevant products which is based on the cost BOM. All these activities occur simultaneously except when some manual changes are made by users.

The ERP system relieves employees in the purchasing department of trivial and tedious tasks. As a result, employees can focus on value-adding activities such as negotiating with suppliers to reduce prices and monitoring the quality of supplied materials. In this process, the integrated database plays a crucial role in streamlining and simplifying the activities involved. The information on finance, material management, production planning and sales orders is integrated through a shared database in

the ERP system. Employees in purchasing departments have access to the shared database provided by the ERP system to place purchasing orders and make decisions.

Sales Order process in TelCo - Sales order processing in TelCo is depicted in Figure 5 (Appendix). Step 1 to step 9 occur in the marketing department between sales representatives and customers. Sales representatives need information about customers' financial status and the possible delivery schedule of ordered products. Such information is usually provided by the finance and manufacturing departments. After the sales representatives receive inquiries from customers, they check the database for information on customers. For a new customer, they create a new record in the customer database. For existing customers, they skip this step and directly check their current credit level. If a customer's financial status meets the requirements of TelCo, the representatives provide a quotation for the customer. Otherwise, the deal ends. If the two sides reach an agreement on the prices, then the next step is to consider the required product configuration. Then they confirm the delivery schedule and sign a contract. The signs "database" in the above figure refers to the shared database of the ERP system. In ERP systems, business modules such as material management (MM), production planning (PP), financial accounting (FI), and sales and distribution (SD) are integrated. Sales staff needs information about customers' financial status, current available products and possible delivery schedules. Sales staff can access all the information from the shared database in the ERP system as, shown in Figure 5 (Appendix). The "shared Database" displayed in Figure 5 (Appendix) refers to the SAP R/3 ERP system. Sales representatives are authorized to access all the relevant information involved in the order processing. After the signed contract information is confirmed in the ERP system, all the relevant data about the order such as cost and profit, are automatically and immediately generated.

In special cases, however, employees do not follow the above process. For example, if one valuable customer's current financial status does not meet the requirements of TelCo, the sales representatives should report the case to the case manager to make the final decision. Most of the customers of TelCo are its long-term business partners. In most cases, they have reached an agreement about prices and delivery schedules before they place the order. In a few cases, the customers may require non-standard products, which need the validation of feasibility in the engineering department. The above process does not reflect these variances. When TelCo determines the delivery schedule for a specific order in step 8, the purchasing process is involved, as shown in Figure 5 (Appendix). If there is no stocked material for the orders, TelCo has to purchase the essential material in which case the purchasing cycle time has an impact on the delivery schedule.

DISCUSSION

Although MachinCo and TelCo both implemented ERP systems, they achieved different outcomes. The benefits from ERP in MachinCo are not tangible. ERP just streamlines the data flow and all departments can share the real time information. TelCo's new system obviously improves decision making level, reduces the product cost and response time. For example, the cycle time of stock was reduced from 240 days to 70 days. However, the difference in organizational structure and culture, changes in business processes, motivation of adoption, management system and people contribute to this result. The following are a summary of findings of this study:

The study did not find any ERP customization problem in case organizations. ERP vendor customized the software for MachineCo to provide two quality inspection points and TelCo developed an in-house software interface to provide users in the purchasing department with authorized access to the shared database. To sum up, in most cases from the technical perspective, ERP systems are capable of supporting BPR. However, socio-cultural issues such as culture, people and management systems can enable or constrain the extent to which business processes change as suggested in the research framework. The impact of ERP adoption in business process reengineering was significantly obvious in both cases. In the purchasing process of MachineCo, the information on stock level, material, suppliers and sales orders was integrated through the ERP system with which no information exchanging and validating activities occur. Similarly, in the sales order process at TelCo, data on customers, their financial status and possible delivery schedule of ordered products were shared though SAP system. Customer inquiries can be supported with all the essential information using the unified interface. One benefit of the ERP system is to streamline the data flow for a business process.

Fundamental, radical, dramatic changes in business process are widely accepted features of BPR. However, our two case organizations who adopted ERP, did not seek to change their business processes fundamentally or radically. In MachineCo, only limited benefits were achieved. However, it was hard to describe the improvement achieved by adopting the ERP system in TelCo as "dramatic". The main focus in ERP adoption usually is on the change in organizational structure by moving from a function-oriented organization to a process-oriented organization. If the view of BPR is extended to broader aspects: values and beliefs, management, reward systems, job and structure, the changes in TelCo compared to MachineCo were more comprehensive. The obvious reason is the constraints imposed on SoEs in comparison to joint venture or private companies to undertake changes when they adopt ERP systems.

In all influencing factors, "soft elements" and their interaction play a more important role in BPR. However, the interactions could be very complex and it is impossible to state their relationship without sufficient samples. For the two cases, it seems that the ownership and motivation systems have a causal relationship with BPR. It is more difficult in SoEs to undertake BPR than in joint ventures or private companies. Observations suggest that multi-dimensional motivation systems have a more positive impact on business process reengineering than do the traditional single department-based assessment and reward systems. Seeking the causal relationships between these factors through quantitative study could be the direction of future research. When restructuring the business process, the content of jobs and of organisational structures changes for all employees. Changing jobs and structures require changes in management principles and performance measurement systems. These new management principles and performance measurement systems induce change in values and beliefs, which in turn

enable the new business processes. Consequently, as it has been suggested by different authors (e.g. 40) reengineering is not complete until all elements of the business system diamond have been changed and aligned.

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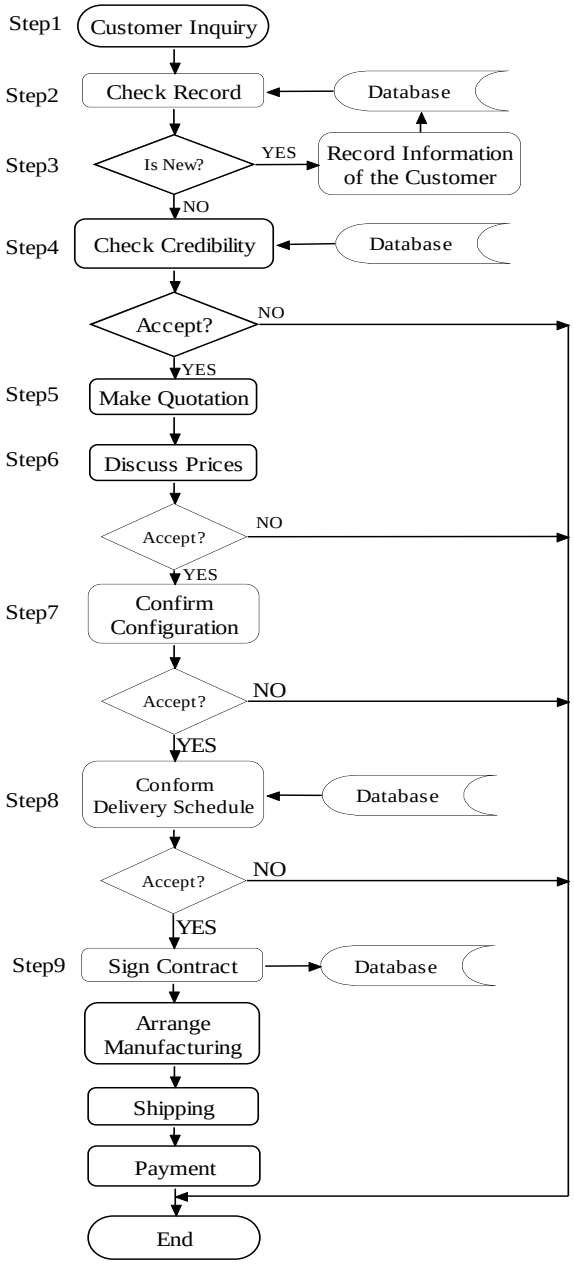
APPENDIX

Figure 4: The Purchasing Process in MachineCo.



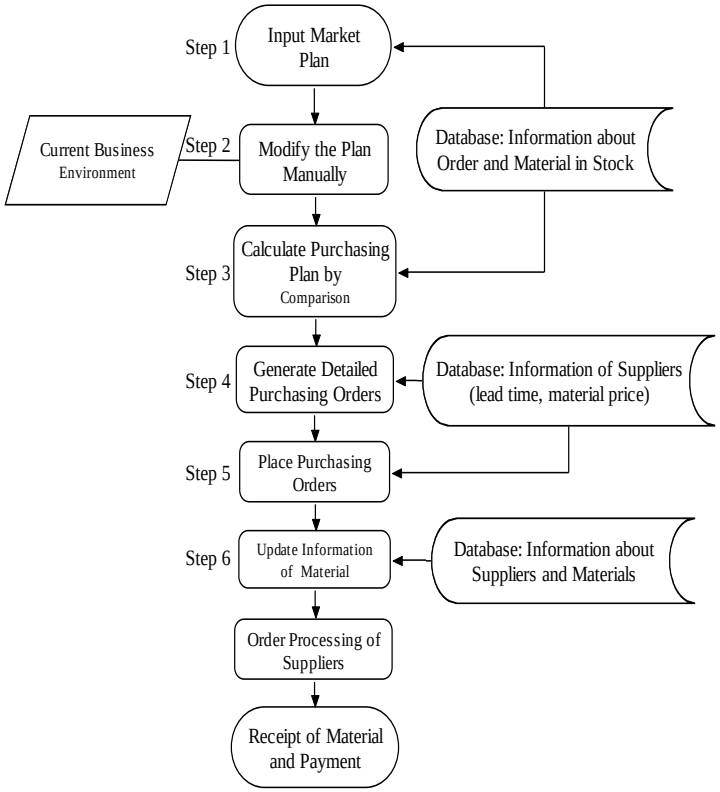


Figure 5: The Shared Information at TelCo.