

1 INTRODUCTION

According to a market study conducted by Gartner Research, ERP software demand in China increased by 29% in 2006 (Pang et al, 2006). In fact, many enterprises in China have recognized the strategic importance of ERP in their rapid developments. Keda Industrial Co. Ltd. (600986: Shanghai Stock Exchange), a manufacturer of large-scale machinery in China, was such a company. Keda produces and sells machinery for processing ceramics that are mainly used in construction. In August 2005, Keda successfully deployed SAP as their ERP solution, a mere five months after forming an implementation team. The project quickly paid off through lowered inventory and reduced operation and management costs. This success was all the more remarkable given the fact that an estimated over 80% of ERP implementation efforts in China failed (Zhang et al, 2003). Dr. Fan Zhu, the Vice General Manager of Keda, while utterly satisfied with the project outcome, could not help but wonder if the project success was the result of good practices that he could model future implementation projects after, or, just pure luck.

2 COMPANY OVERVIEW

Founded in 1992 by Lu Qin, with an initial capital on only 90 thousands CNY, Keda began as a small manufacturer of ceramics machinery in Shunde of the Guangdong province. At that time, the ceramics machinery industry was dominated by European companies. By modeling its business after these market leaders, Keda enjoyed rapid growth in the local Chinese market in the mid-90's and emerged as a major player in the industry, being recognized as one of the top 500 national machinery manufacturers in China, top 10 building materials machinery enterprises in China, among other acknowledgments and achievements. By early 2000's, Keda had surpassed many competitors to become a world leader in building materials machinery, second only to SACMI of Italy (www.sacmi.com). Keda became a listed company on the Shanghai Stock Exchange in 2002, and in 2007, it reported a net profit of more than CNY 93 million, up from CNY 32 million in 2004.

Today, just 16 years since it was founded, Keda has more than 2000 employees and its product offerings include ceramics machinery, energy resource machinery, stone machinery, and building materials processing machinery. Keda also offers complete plant design and technical consulting services to ceramics and stone processing machinery. Keda's business as a whole relies on several key business functions, such as the research and development, purchase of raw materials and parts, inventory management, production that comprises of many assembly lines and workshops, logistics, and sales and marketing that connect the firm with its extensive customer base, which comprises mainly of construction materials providers from both the domestic and foreign markets. With these, Keda continues its "pursuit of perfection" through "endless innovation" in the global market.

Innovation, in fact, has been Keda's emphasis, in many aspects. In terms of product innovation, Keda rolled out the first 3200 tons pressing machine in China in 1999. In 2005, three of the ten new machinery product offerings were even considered world's first. Perhaps more remarkable was Keda's commitment to innovation for not just its products, but its business as a whole. In 2003, the company set up the national enterprise post-doctoral workstation, where post-doctoral scholars were invited to work. Their research areas included the business's supply chain management, human resource management, and so on. Keda also invested more than CNY 45 millions in setting up the ceramic engineering test center that committed to research and development in state-of-the-art technology. Through innovation, Keda established itself not just as a leader in market share or revenue, but also in product technology and management efficiency and effectiveness.

3 DRIVERS FOR ERP

Things, however, were not all good. The company continued to face competition from local and foreign companies, who challenged Keda in many fronts. To retain its leadership position and to continue growing its business, Keda needed to stay innovative with product development, business management and operation, and to be more informed about production, sales, and most importantly the customers when making decisions, or as Zhu put it,

“In managing the enterprise, our most important task is to provide the needed information for every decision maker every step of the way in the decision making process.”

A common challenge that an enterprise like Keda faces has to do with raw materials and parts. As mentioned above, Keda's production is characterized by low volumes and high customization, which consequently lead to frequent and scattered demands for a large number, but not necessarily large quantity, of raw materials and parts. Some of these parts are common across different products, but most cannot be reused in different products. This makes purchasing decisions, or simply keeping track of the quantity purchased and used, difficult as the number of raw materials and parts used increases. This also has other repercussions, as Zhu explained,

“Before ERP deployment, due to the mess in material management, the cost of a product was unclear, and costing was based on experiences. It was not clear how much profit or loss the sale of a product resulted in, and it wasn't clear where in the product or the production process contributed to that profit or loss. That made it difficult for us to price our products, too.”

Also observed was a suboptimal utilization of resources and facilities. Reusable materials and parts were often scrapped; precious machine time of key facilities was often wasted idling at times. Zhu illustrated,

“For example, we had a key facility for production. We had someone time its usage in a week using a stopwatch. We were shocked when we learnt that it was only in production 24.6% of the time!” (Compared with over 90% utilization in a Japanese competitor)

Moreover, Keda's rapid growth was not without consequences. For instance, competition from local and abroad prompted Keda to diversify its business and product lines. Keda's commitment on R&D in turn resulted in a greatly expanded product offering. The single plant mode of production could no longer cope with the highly diversified business lines and production functions. This prompted Keda's shift from single plant to multiple plants in 2004. By expanding its operation to multiple plants, it outgrew its existing Manufacturing Resource Planning (MRP II) system's capabilities. Keda's MRP II system at that time, CAPMS developed by Beijing Riamb Software IT Co. Ltd., did not support such multi-plant operations. Adding to the demise was the fact that Riamb ceased maintenance support for the system due to an internal restructuring of the software company. It seemed, to continue its success, Keda needed to rethink its IT, and it needed to do that quick.

4 COMPUTERIZATION AT KEDA

Keda's first take on computerization started in 2000. As a member of the IT department at that time recalled,

“At that time, there was no strategic goal. Others were doing it, so we decided to jump in as well. Since there was really no planning or even particular objectives, the IT projects were not particularly effective in solving the company's problems, and the use of the systems at that time was less than satisfactory.”

Beijing Riamb's suspension of support for the MRP system in 2003 did not help either. That was when Dr. Fan Zhu came on board as the head of the IT department. After briefly getting acquainted, he quickly realized that a computerization initiative would need to align constructively with the company's strategic goals. Zhu said,

"Our goal is to be the world leader. Such goal cannot be attained by simply increasing labor hours. It requires a well established structure and system ... including computerization as a mean. Computerization is an auxiliary tool that helps [Keda] to achieve its goals and develop its business."

What Zhu also realized was the fact that to harness the power of this tool, the computerization initiative had to be carefully planned. With that in mind, he decisively ordered a halt to all ongoing IT projects. All resources and efforts were then put into working out a comprehensive and far-sighted five-year computerization plan. This plan would address the short term needs as well as the long term strategic goals, in order to propel Keda forward. In devising such a plan, Zhu had the help of Benjun Zhang, who has now become the head of IT department.

"When working out the plan, we focused on how much investment was needed and in what kinds of systems, what our objectives were, what hindrances the company was facing, why we need computerization, and what problems we were targeting to solve." Zhang said.

One can easily imagine the complexities in working out such a plan. An assessment of status quo and a market analysis were first conducted. Existing problems were identified, and together with the business requirements collected from various levels of management, a set of objectives was set out. These objectives were then prioritized based on their urgency and how well they align with the company's strategic goals. Potential solutions for the requirements were also considered. Throughout the plan, top management provided the high level direction, the long term vision, or as Zhang put it,

"... He (The Board Chairman) has a good vision ... wherever he is in the world, he wishes to be updated with the company's operation using a laptop computer, instead of relying on the reporting from the financial manager."

This planning effort lasted six months. The result was an encompassing plan that included the implementation projects for Enterprise Resource Planning (ERP), Product Data Management (PDM), Office Automation (OA), Manufacturing Execution System (MES), Customer Relationship Management (CRM), and Supply Chain Management (SCM) solutions, in phases. (See Exhibit 1.) Also in the plan were detailed analysis of each project regarding its objectives, expected investments and benefits, feasibility in terms of factors such as staffing and technology, risks, and alternative solutions. According to the plan, the ERP implementation project was a priority, and had to go first, and be completed by end of 2005. Time was critical.

5 CHOOSING A VENDOR

"The ERP project kicked off in August 2004. Vendor assessment was conducted. We invited both local and foreign software vendors to visit our company for detailed assessment ... through these visits, we also aimed to let the middle and top management learn more about computerization and ERP in general." Zhang recalled.

From the get-go, it was clear Keda would not be developing the system in-house. Information technology was not perceived as a core competency of the company and accordingly, building a large team for such development was not favored. Instead, professional consultants and experienced vendors were to be leveraged, as Zhu explained,

"Enterprises need to be clear about their core businesses and competencies. For instance, we could have developed in-house our own ERP system, but would not be very smart. Why

reinvent the wheels when others have gone the same routes? Outside of our core business and competency, for anything we need, we prefer renting or buying existing solutions.”

Keda thus went ahead and contacted twenty software vendors from both local and abroad. These included Kingdee, Lima, Tianxing, and several vendors for SAP, among others. These vendors were invited to visit Keda, and through these visits, they would briefly study the needs of the company, demonstrate their software packages and how they would satisfy those needs, share their past experiences, and discuss other implementation issues. However, Zhu did not stop there. He decided to take on a more proactive role and, in turn, visited existing clients of these vendors. Zhang explained,

“We visited their existing clients, as we felt that only what we saw must be real. In these referrals, vendors would likely put forth their most successful cases, and through comparing the uses of their respective solutions in real production environment in the industry, we had a much better idea what suited us.”

In these visits, Keda gained insights about not only the vendors, but also possible complications in the implementation process; these insights proved valuable later in the implementation process, as they allowed Keda to avoid the same mistakes committed by others, as Zhu observed,

“After visiting several enterprises, we made a rather interesting observation: their IT departments were basically the only ones working on the ERP projects. They were churning out reports, workflows, etc, things we thought were outside the scope of an IT department.”

Based on these encounters, Keda short-listed 9 vendors to respond to a Request For Proposal (RFP). This RFP specified the exact needs of the company and standardized the vendors' responses which in turn allowed for comparisons of their products on the same ground, namely, how the particular modules of their packages would fill which particular needs of the company. These 9 vendors presented their proposals, one after another, in a three-day period. Zhu made sure senior management, including the director himself, was involved in this selection and negotiation process. After the presentations by the vendors, they would rate them according to how well the vendors satisfy the needs of the enterprise and align with the management's strategic goals. However, the reason for their involvement was much deeper, as Zhang explained,

“Through these presentations, we got a feel of what senior management was excited about. If he would not even attend these meetings, then his so-called support for the project remained superficial, and project implementation would be difficult. On the other hand, if they were interested, they would raise questions on the spot, after all, this is his enterprise and his 10-million yuan project.”

Finally in October 2004, SAP emerged as the winner. According to Zhu, SAP was chosen for various reasons. For one, SAP's ERP solution was considered sophisticated and feature-rich. For instance, unlike the company's existing MRP solution CAPMS, SAP ERP was capable of supporting complex operational processes across multiple production plants. For another, being one of the industry leaders, continual and reliable support and maintenance could be expected. Moreover, with more than 35 years' worth of experiences and more than 40,000 client implementations, SAP had a proven track record of successful ERP implementations. In particular, SAP was adopted by SACMI, a major competitor of Keda and the industry leader.

6 ASSEMBLING THE TEAM

“There were three main roles: the key users, the consultants, and the IT officers. The key users were at the core, consultants acted as coaches, and IT officers provided support, supporting the consultants and key users in their tasks. Success or failure hinged on the key users, since they dictated the future workflow. IT provided merely support; IT officers would not know how the production workflow should be,” said Zhang.

With the ERP solution vendor on board, Zhu proceeded to assemble the rest of the project team. Another external party, Digital China Management Systems Ltd., was recruited in a consulting role. Together with various stakeholders within Keda, such as the senior executives, key persons from all departments involved, and all members of the IT department, the project team was officially formed in March 2005. In recruiting departmental representatives, Zhu made sure vital figures in the departments, like departmental managers or main operational staff who had thorough understanding of the operations and needs of the departments, were involved. He had an interesting philosophy,

"In assembling the project team, we insisted that the top dogs of the various departments be involved. Also, we tried to pick those who were deemed indispensable by the department. We relied on how vehemently departments opposed to the particular person's involvement in the ERP project to judge how indispensable he was."

Zhu also made sure every member had a clear idea of his role and responsibilities in the project, as he said,

"I think the definition and assignment of responsibilities were very important issues in the ERP implementation ... we had devoted a great effort on these issues throughout the process."

Exhibit 2 illustrates the team composition and assignment of responsibilities for Keda's ERP implementation project. In brief, top management of Keda would provide overall project direction and to make critical decisions; overall project management would involve project managers from both Keda and Digital China; consulting support would be provided by personnel from Digital China; departmental representatives would oversee the business process redesign and system design aspects; the Information Center would provide all necessary information technology support. In particular, each ERP system module was assigned an owner from the associated department, who was fully responsible for the workflows and operational details of that module. As illustrated by Zhang,

"Throughout the ERP implementation, we emphasized heavily on clear definitions of roles and responsibilities. They [Key users] were the core, consultants acted as coaches, and the IT department was in a supporting role. We could assist them technically but they were to determine how the system should function and what values it should create ... Obviously, the critical success factor lied with the key users."

Besides clearly defining roles and assigning responsibilities, Zhu went to great length to ensure that the project team worked as an integral unit, as he believed that a determined team effort was not only beneficial but essential for project success. For example, as Zhang recalled,

"... the arrangement was for the head of each module to work together at the IT department, with the marketing manager representing the marketing department, purchasing manager representing purchase department, etc ... at one point, their computers were moved to our office and we worked together as the ERP implementation was a crucial matter related to various business units."

This collocation scheme took place from March 8, 2005 to August 1, 2005, and from September 9, 2005 to January 4, 2006. The ERP effort was deemed important enough for all ERP team members to be physically working together. As a result, the departmental managers would only have time to work on departmental tasks after 5:00pm. Not surprisingly, this scheme was met with great resistance.

"There was a lot of resistance to this arrangement. For example, they said if they were to be working with the project team and be away from their offices for 5 months, and their departments continued to function normally, then they should probably all quit since that proved they were of no value to their departments," recalled Zhang.

Fortunately, management's support was on Zhu's side. After reporting to the director about the opposition, he worked with the director to devise an arrangement for reward and punishment in resolution of the issue. Since departmental managers had to work longer hours to keep their

department afloat, they would be compensated with bonuses. On the other hand, if one were to be unsupportive of project work and miss project meetings, he would be assigned to serve at the canteen during lunch hours for a week!

"This arrangement was greatly effective as it somewhat frightened the staff, as no one wanted to be embarrassed. After all, it was the decision of senior management and if anyone really got punished this way, to serve at the cafeteria for a week, his career in Keda would be all but over," said Zhang.

7 IMPLEMENTING SAP

With these, the ERP implementation project in Keda went underway. Numerous changes were involved. Among others, the operation and workflow in many departments were modified and streamlined, and the organization structure also had to be adjusted, in order to accommodate the ERP system. In particular, as-is processes were to be studied and to-be processes were to be designed, and this was a responsibility given to the key users, that is, the departmental managers. According to Zhu, they would write the specific requirements for the system, specifying the inputs and outputs at various points for the particular modules they are responsible for, and the IT specialists would implement those requirements. Also falling on the shoulders of key users was data model specification, as explained by Zhang,

"Data was the main issue. The sheer amount of data was one issue, and the data model was another. We had to devise a data model to support all the operations and workflows, in order to minimize the disturbances after rollout. Since experiences in the operations were needed in this specification, we assigned this responsibility to the key users. Only they are most familiar with the operations and hence they should set the rules."

Much hard work was put into effectuating these changes, for instance, as Tian, the person-in-charge of the materials management (MM) module, recalled,

"Data preparation was the most difficult task. We had spent a lot of time on stock taking and renumbering stock code so as to ensure data accuracy in the new system."

With changes came disagreements, between different module owners, and between module owners and consultants. According to Tian, in resolving these differences, discussions among departmental representatives would first be held in seeking a compromise, and if no such compromise could be reached, the matters would escalate to the project management staff who would make the final call. Zhang added,

"The critical issue was balance; sometimes consultants would give certain advice but key users would advocate alternative proposals. Consensus could not be reached every time ... in those cases, project managers needed to make the decisions. In some cases, the IT department would have to submit a report analyzing the pros and cons of the proposals made by both parties in order to seek a decision from senior management ... As SAP ERP was a well established system, in practice, in the absence of a consensus, we adopted the consultants' recommendations almost 100% of the time, since we were more inclined to adopt the model the system was originally designed for, and changes in the workflow and its management were to be expected."

Implementation thus went on relatively smoothly, and speedily. Zhu again stressed,

"In managing changes, I deemed responsibility assignments the most important. There was no way the IT department alone could have achieved so much ... Take BOM [Bill of Materials] for example. We had over 30,000 products, if each was to have merely 3 levels, we would end up with 90,000 levels to specify; there was no way the IT department alone could do that."

Also instrumental in managing these changes, as Zhu pointed out, was top management support. Indeed, top management support was plenty throughout the implementation project. For instance, in 2005, the board chairman himself was present in five company meetings, four of which dealt with the progress and status of the computerization project. He was also present for some of the regular project meetings, blueprint design briefing, and the project launch ceremony. Zhu explained,

"... reactions of heads of individual modules depended largely on the attitudes of the senior executives; the heads would not oppose to changes if top management had shown their determination."

When asked about his success on securing top management support, Zhu offered his advice,

"You cannot let his [the director's] support remain verbal, but to have it realized in actions. Firstly, he should be involved in the major events, milestones, and decisions making. Secondly, you should report all challenges and difficulties faced in the implementation process promptly, and not wait until the issues have already surfaced, so that you don't appear passive."

With the top management committed to the ERP project, the key users committed to the changes associated. In fact, the focus was then shifted to acclimating users to these changes. Besides involving them throughout the implementation process, staff training was also conducted, in parallel with system testing. Zhang explained on the training program,

"The first level of training was provided to selected key users by the consultants, the selected key users then in turn transfer their acquired knowledge and skills regarding system operations to other users. At the same time, selected key users were responsible for preparing operating manuals for all users."

Moreover, according to Zhang, by conducting system training and system testing in parallel, not only was time saved, but users were also leveraged in identifying system issues. After all, the users of the system would be in the best positions to demonstrate how the system would function, or malfunction, in daily operations. Through testing, users also picked up skills in using the systems, as Zhang commented,

"Testing was training."

8 GOING ONLINE

By August 2005, a mere five months after project team was formed, Keda was ready for system deployment. Time for deployment was carefully chosen to mitigate risk and minimize business disruptions, as Zhang explained,

"Every industry has its peak season and low season. For us, the months of August, September, and October were the low season and pressure on production would be lower. That was why we chose August as the rollout time."

To expedite the entire process, an aggressive "big bang" approach was adopted. Zhang explained,

"We did a rough assessment and did foresee the possible problems immediately after cutover, such as delay or even suspension of production. However, if we were to do a parallel rollout, it might take a month at least to stabilize, during which all data and work needed to be processed and done twice. Given the huge amount of data and the already heavy workload, parallel rollout was not viable and we went for a big bang approach."

Work did not stop at cutover. Problems started to surface and they quickly translated into production delays. While busy fixing the technical problems and circumventing these delay issues, Zhu once again had the top management's assurance:

"We notified the director himself before rollout about these possible delays in production, since the ERP rollout represented a fundamental change in how our staff operated. The director was extraordinarily supportive, and said that he could tolerate ERP affected deliveries in the first year, during which ERP assumed top priority."

User adoption was another issue. According to Zhang, with the system online, workflow and operations dramatically changed, they faced a lot of challenges in the human resource arrangement aspect. Some workshops were unsupportive of the ERP initiative to say to least, since they did not view it as something the enterprise could not do without. In fact, resistance started to surface, once again, as Zhang commented,

"When our ERP system first went online in 2005, some felt that work became more tedious. For example, materials for production now had to be checked in to and out from the warehouse before taking it to the production plant."

He attributed users' resistance to a power struggle brought about by the drastically changed business operations. Zhang explained,

"This resistance mainly stemmed from the redistribution of power following ERP rollout ... Inventory management was decentralized and each workshop had its own inventory. Following the ERP rollout, inventory management was centralized so that resources could be shared and better managed. On the third day after rollout, a workshop manager came to us and said that this centralization was wrong and he needed to set up his own inventory separately once again. Certainly, we said no since that would be in conflict with our ERP workflow. On the fourth day, he shut down the workshop, and the senior executives had no choice but to replace him."

This replacement as a resolution was seen in another incident, as Zhang recalled,

"We had new designs and new production orders every day, and these placed a lot of pressure on the purchase department and its manager. After one month, he could not cope anymore and decided to bypass the ERP system. Senior executives then replaced him."

When asked about the rationale behind such responses. Zhang justified,

"This is how things work in China; when a person is promoted to a new position, he has no conflict of interest with the new system, and is therefore willing to comply. Then everything else is easy, and can be solved by an increase in resources."

That was of course not the only way Keda dealt with the issue. For instance, after system rollout, some were not completely satisfied with system operations and interfaces, and requests for modifications to the system were reflected to the IT department. However, since the users were the original people who specified most of the system operations, Zhu was able to fend off these requests for the time being until system stabilized. He explained,

"After system rollout, they [key users] found problems and demanded changes to the system. However, since they were the one who originally specified the workflow, the inputs, and the outputs, these shortcomings were then their responsibilities. Yes, the system needed to be optimized, but that had to wait and they had to accept and adapt ... Imagine if the IT department were to be responsible for specifying the requirements and system flows, then key users would demand endless changes, causing delays in the project. However, since they were responsible instead, they had no excuses."

Within months, it was clear that the ERP implementation effort was a great success. Data accuracy, including that for production plan and inventory information, was estimated to have improved from 85% to 98%. Better data and information transparency and availability were also observed.

"Information was much more transparent after system rollout, and tracing this information was much simpler through the system. This was in direct conflict of interest with some middle

management. For instance, before ERP, it was very difficult to trace price paid for materials purchased, but after ERP, price analysis could be done conveniently. If price for a material was on a down trend, and your purchase price was getting higher, you have some explanations to do," said Zhang.

These in turn allowed for improved market responsiveness, decreased level of stock, a significantly better product delivery time, and faster monthly financial reconciliation. The result was a dramatic decrease in operation and management cost, and improved efficiency, as Zhang said,

"In early 2005, we were struggling with our machine press production, and production delay was common. At that time, we were producing about 6 machine press per month, and that was under constant pressure from senior management. However, by March 2007, with exactly the same facilities, we were producing over 30 per month. This dramatic improvement in production capacity is attributed to information system in ERP."

Due to the improved dissemination of information, quality of decisions made was also improved, Zhang claimed,

"Before, he [the director] believed that orders from foreign markets would bring high profits, but after ERP rollout, through cost analysis, we realized that while a polishing machine sold for USD 50,000 higher, cost was CNY 400,000 higher! These orders did not bring high profits, and management shifted its focus from developing foreign markets to controlling costs."

9 FUTURE OF ERP

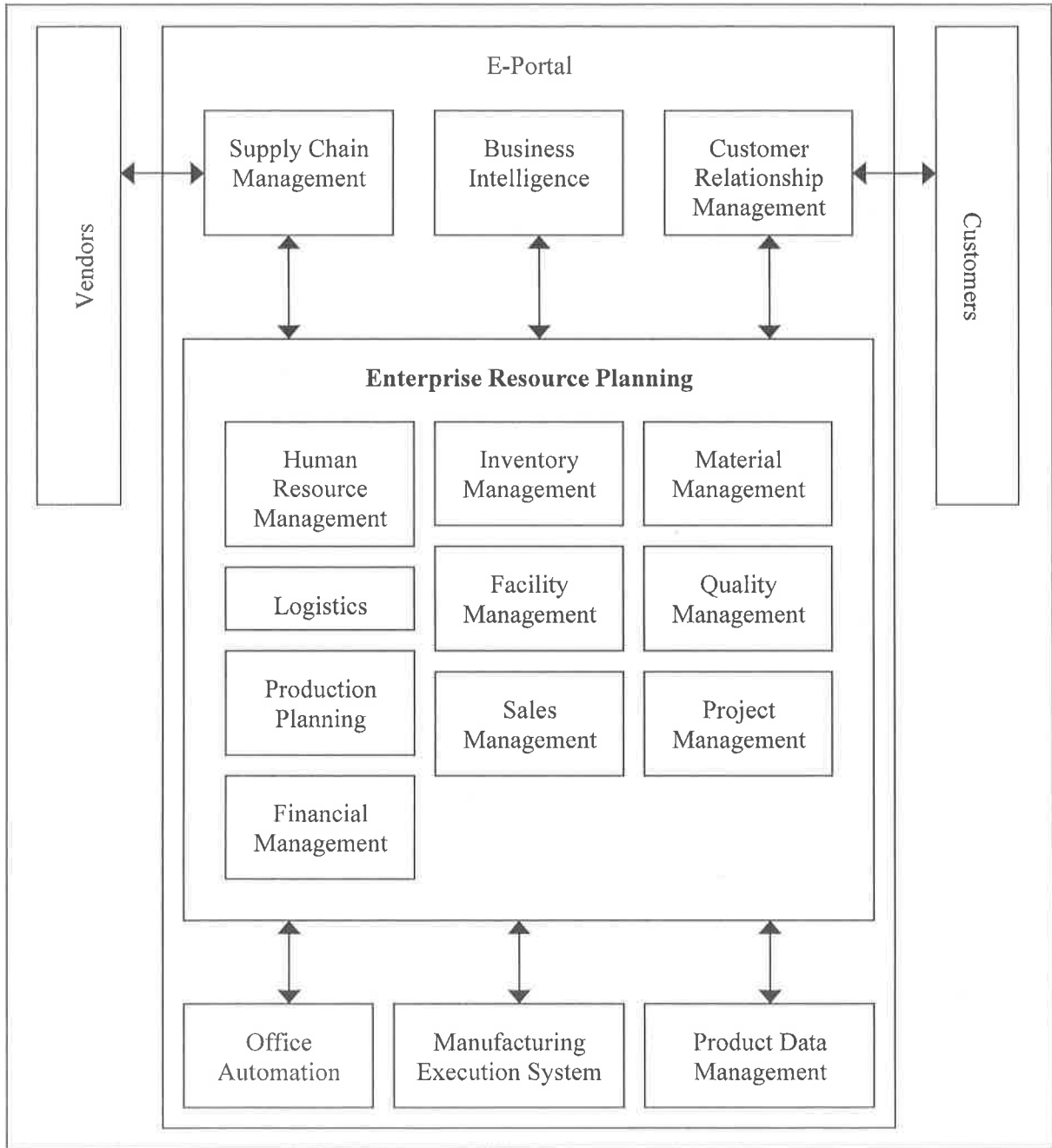
Despite the success of the ERP implementation project, the initiative is a part of a bigger computerization plan that would continue to satisfy the company's information needs and improve the company's productivity through better information management and dissemination for decision making.

"In the future, we would still be optimizing and extending on our ERP system, the 10 modules and beyond. With the Manufacturing Execution System (MES) expected to roll out and be integrated with the existing ERP this year [2008], we foresee a much better monitored and managed production process. Besides improving resources and facilities utilization, we will also be able to tell exactly which stage of production each order is at, together with all other production details."

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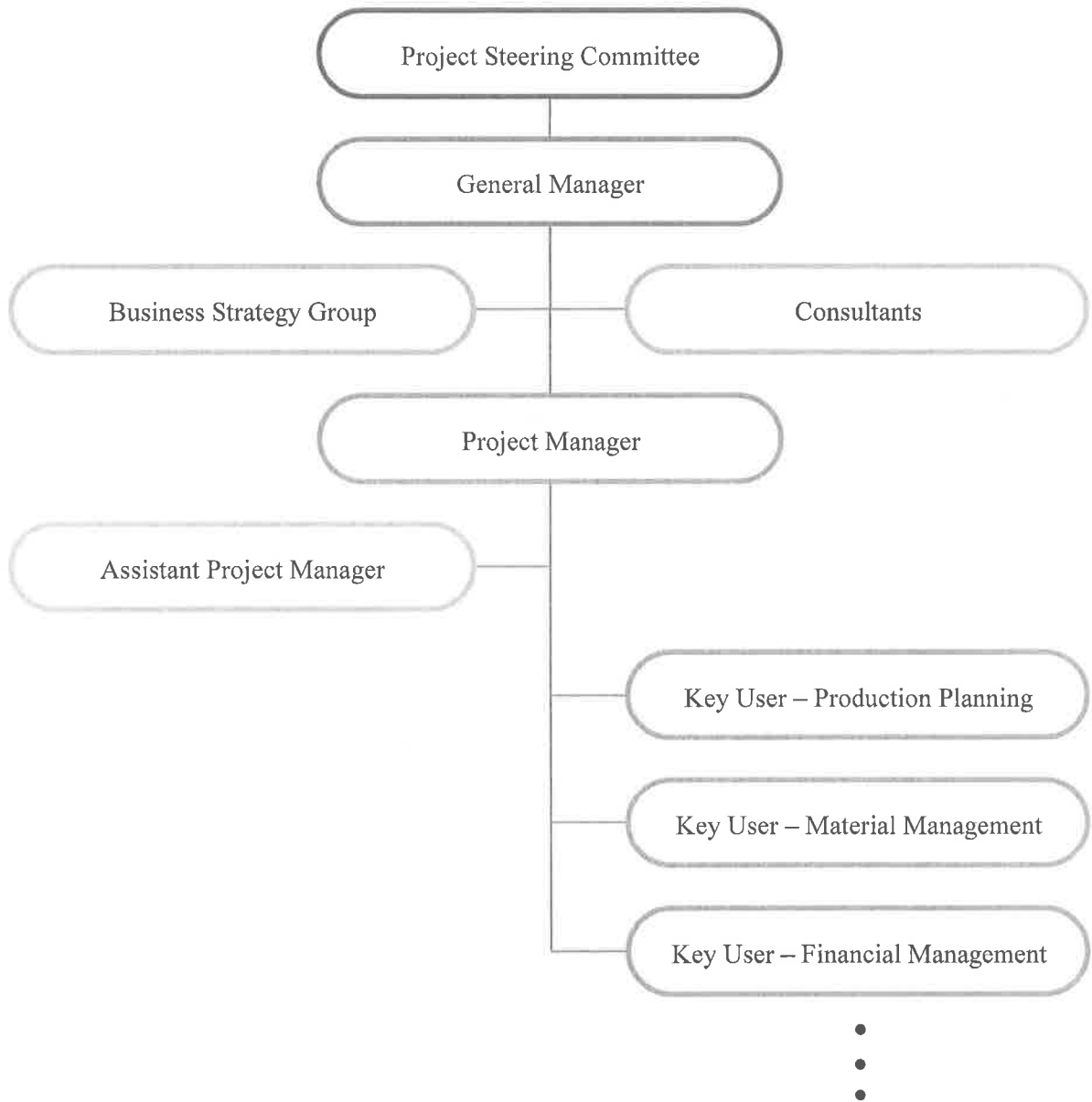
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Exhibit 1 Computerization Plan in Keda



Source: Keda Industrial Co. Ltd.

Exhibit 2 Keda's ERP Project Team Structure



Source: Keda Industrial Co. Ltd.