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NARUMON SRIRATANAVIRIYAKUL, MATHEWS NKHOMA, HIEP PHAM

Kinik-Thai: Material Requirement Planning System[1]

Implementing MRP sounds like a good decision but would it really solve my business problems?

Pairoj Asawachaisopon, founder and Managing Director of Kinik-Thai Company Limited, a joint venture company with Kinik Company Limited in Taiwan, reflected as he went through various brochures and other information the MRP salespersons had handed to him. Material Requirement Planning (MRP) had been around for quite a while and Pairoj had heard many success stories about how it had helped manufacturing factories save cost and operate at a more efficient level. On the other hand, a few companies did not benefit from MRP but, instead, suffered from a high turnover of employees and did not achieve their expected return on investments.

Thoughts about choosing and implementing MRP came to Pairoj from many sources. The growth in the number of the company's employees made it difficult for him to keep track of all employees, especially during the peak seasons when a lot of employees had to work overtime. With time attendance machines alone, there was no guarantee of the accuracy of the employees' working records and there often were mistakes in calculating the wages during the preparation of the monthly payroll.

Although the demand for the company's products was quite predictable due to advance orders from customers, there usually were issues of fluctuation of raw material prices throughout the year, not to mention the calculation of fixed cost and overhead expenses.

A dedicated programmer was hired to develop a system to help control and monitor staff attendance, payroll, accounting, inventory etc. The employees' reactions were not positive—they did not wish external parties to be aware of intradepartmental issues. The process of developing a customized system was very time consuming and requirements were constantly changing. At the same time, limited data sharing between departments often prevented clear and transparent information flow.

Pairoj had heard of several well-known international MRP and ERP packages. However, the cost to implement an international ERP system, namely SAP, Oracle, etc., was too high and there was no guarantee that the improvement in operations would meet the expected Return on Investment (ROI). Hence, less expensive local MRP packages seemed to be a better option at this point.

Pairoj wished he had more time to consider his options but given the increasing pressure from his competition, he felt he had to make this difficult decision by the end of this financial year.

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The Grinding Wheels Industry

Used and developed mostly by the manufacturing industry, grinding wheels and their uses were not well known by the general public. Despite this lack of awareness, they played an important role in precisely shaping metals and other materials, producing high-quality surface finishes.

Grinding wheels, made of bonded natural or synthetic abrasive minerals shaped into wheels, had been used for almost 200 years, with sandstone being the earliest abrasive used to smoothen and sharpen the flint on axes (Cengage, 2002). Emery, a natural mineral containing iron and corundum, was also used to cut and shape metals in the early nineteenth century until its unstable quality called for a more reliable abrasive material. In time, manufacturers were able to develop synthetic minerals that led to the production of the so-called superabrasives, namely synthetic diamonds and cubic boron nitride, whose hardness is only second to synthetic diamond itself. Grinding technologies continued to advanced, with a seeded-gel aluminum oxide having just been introduced.

The bond holding the abrasive grains of the wheel together was no less important than the grains themselves and, thus, has been constantly refined throughout the evolution of grinding wheels. In the early 1840s, the bonds originally contained rubber or clay. The introduction of a vitrified or glass-like structure took place in the 1870s. Using vitrified bond as a mix in the grinding wheels proved be expensive. Another alternative was to use resinoid bond instead. Kinik-Thai focused on producing these resinoid bond-grinding wheels.

The size of grinding wheels ranged from less than .25 inch (.63 centimeter) to several feet in diameter. The wheels also came in different shapes: flat disks, cones, cups, cylinders, or wheels with a profile cut into the periphery, just to name a few. Grinding wheel specifications, grades, and dimensions varied depending on the intended use and the specific nature of the industry.

Current Global Market

The demand for industrial products was the main driver of sales for the abrasive industry, especially grinding wheels. The industry was quite concentrated with 85 percent of its revenue being made up by 50 companies, notably Grindwell Norton (India), 3M (US), Noritake (Japan), and Tyrolit (Austria).

The top 15 markets for manufacturing abrasive grinding wheels of natural or synthetic materials and other abrasive products, segmented by city as of 2009, was led by New York, which accounted for 5% of the global market, followed by Paris, Los Angeles, Chicago, and China's Shanghai and Beijing (Parker 2008). In 2011, world supplies of exported millstones and grinding wheels were dominated by Europe and Asia, which together supplied more than 86 percent of the export market, led by export power houses such as Germany (15.09 % of world), Japan (13.72% of world), Italy (9.52% of world), Austria (8.47% of world), and The United States (8.47% of world) (Parker, 2011). For the import market, the leading regions were also Europe (52.88% of world) and Asia (22.41% of world) (Parker, 2011f). The biggest target markets for imported millstones and grinding wheels were Germany, the United States, France, Italy, etc. (Parker, 2011). Some Asian countries also made the top list, namely China, South Korea, Taiwan, Thailand, India, Malaysia, Hong Kong, and Singapore (Parker, 2011f).

Current Southeast Asian Market

Asia has always been a big player in both the grinding wheel export and import markets. Although still overshadowed by more developed countries such as Japan, China, South Korea, and Taiwan, which together represented almost 90 percent of Asia's 2011 millstones/grinding wheel export revenues, quite a few Southeast Asian countries made the list: Thailand, Indonesia, Singapore, Philippines, Malaysia, and Vietnam (Parker, 2011e). The major Southeast Asia importers in 2011 were Thailand (8.52% of Asia),

Singapore (6.78% of Asia), Malaysia (5.59% of Asia), Indonesia (3.17% of Asia), and Philippines (1.04% of Asia) (Parker, 2011e). The majority of the imported products in Southeast Asian countries came from within Asia, particularly Japan and China (Parker, 2011e). At the same time, the destinations of the exports from Southeast Asian countries were all within the region (Parker, 2011a, 2011b, 2011c, 2011d). Indonesia, Malaysia, and Thailand all mainly exported to Singapore and vice versa; there was very little, if any, room for other countries (Parker 2011a, 2011b, 2011c, 2011d).

Kinik-Thai

Kinik-Thai was one of Thailand's leading manufacturers and exporters of high quality grinding and trimming machines that met higher international standards such as Japanese Industrial Standards (JIS), ISO 9001: 2008, and EN12413. Kinik products were among the most widely accepted and applied throughout the world.

Company Background

Kinik-Thai produced resinoid bond cutting and grinding discs, vitrified bond wheels, and mounted wheels, under the worldwide "Kinik" brand. The factory was located in Prachinburi, Thailand with almost 400 employees, occupying production area of more than 15,000 square meters. It was accredited by Thai Industrial Standard (T.I.S.1230: 2537), ISO 9001: 2008 and met the criteria of EN12413 Standard. Its sales office was located in Bangkok under the name Kinik-Sales (Thailand) Co., Ltd (see Exhibit 1 and Exhibit 2).

Kinik-Thai was first established in 1995, with 90 employees working in 5 departments—Sales, Administration, Warehouse, Production, and Logistics—and registered capital of 3.3 million USD. The company imported raw materials and produced grinding discs and wheels, originally catering to the domestic market. With 16 years of experiences, Kinik had become known as one of the largest and highest quality abrasive products manufacturers in Thailand with the annual production capacity of over 50 million pieces and average annual sales of 400 million Thai Baht. Sixty percent of its capacity was for export throughout Southeast Asia, South Korea, and the Middle East, while the remaining product was sold domestically. All products had been covered with Global Liability Insurance excluding USA/Canada. Most customers were grinding wheels wholesalers and distributors.

Because the company was a joint venture with Taiwan, there was no need to look for new customers. Since Taiwan's labor and other overhead cost were higher than those of Thailand, Kinik headquarters in Taiwan had decided to relocate factory equipment to Thailand for Kinik-Thai to operate under the model of profit sharing and royalty fees.

The selling point of Kinik was the wide range of specifications and customizations available for its grinding wheels, making the products unique and thereby making it difficult to find comparable products in the market. Through the company's quality control process, when a particular lot of products did not meet its exacting standards they would be taken out and destroyed for safety reasons.

Competition

In Thailand, three big manufacturers dominated the grinding wheel industry: a Japanese company called Mitsui Grinding Technology (Thailand) Company Limited, Saint-Gobain Abrasives (Thailand) Limited, and Kinik-Thai itself. With the same amount of production capacity, Kinik-Thai focused on Southeast Asian market whereas other companies focused on Europe, Japan, and USA. Therefore, Kinik-Thai was considered the number one grinding wheel supplier to the Southeast Asian region as well as being known as one of the leading tailor-made grinding wheel manufacturers.

Other smaller players included FSK (Thailand) Company Limited, Dia Resibon (Thailand) Company Limited, Fulong Industry Company Limited, Noritake Company Limited, and Fusun International Company Limited. Most manufacturers in Thailand came from Japan and China.

The Need for Information Systems

Kinik-Thai started by recording transactions and developing manufacturing plans manually. At the time, Material Requirement Planning (MRP) systems were still relatively new and most accounting software in the market did not meet the specific needs of the grinding wheel industry, as well as the particular needs of Kinik-Thai.

Since on-the-shelf software could not be customized and did not meet all the company's requirements, a programmer, Somchai, had been hired to develop tailor-made software to handle Kinik-Thai operations. The process of developing software had proven very time-consuming, taking 3 years based on the requirements gathered from each department heads (see Exhibit 3).

The First Module: Accounting and Inventory

The system developed by Somchai was first designed to handle the accounting and inventory aspects of the operations. It was used to record incoming raw materials through purchase orders, invoices, and outgoing finished products as they were dispatched to customers, a process originally done through fax.

The Second Module: Payroll

Kinik-Thai operation ran one shift daily from 8.00 am to 5.00 pm. Although staff normally started and finished working at the same time, some of them had to work overtime during peak seasons. Since 80 percent of employees were in the Production Department, the management of payrolls regarding overtime wages was complicated.

Time attendance machines were installed because payroll was based on the staff's actual working hours. However, additional security guards had to be hired to monitor the clocking in and clocking out of the workers to ensure accuracy.

The Latest Module: Procurement Simulation & Sales

The system was further developed to support the simulation of complicated tasks and processes, including a model to calculate the cost and amount of raw materials needed to manufacture different lots of specified grinding wheels. For example, when the system analyzed small orders that required many different types of raw materials and/or complicated procedures, it would automatically generate more fixed cost. This simulation was also used by salespersons when accepting orders and quoting prices to customers.

System Implementation

During the early stages of adoption of the new system, most of the staff did not respond very well. They indicated that external parties would not understand the process and rationale behind intradepartmental activities. To address this issue, one of Kinik-Thai's management strategies had been to rotate assistant managers and supervisors every year, allowing them to understand the big picture of the operation and to facilitate clearer and more transparent information flows. Also, this enabled employees to share their knowledge and skills. This policy had turned the situation around, ensuring perceived fairness among all the employees, and the staff's attitude had improved. The system was first used for inventory purposes, specifically for procurement and sales.

Through the customized software, the overall production had become more efficient and the long-term return on investment had been met despite the development expense and the cost of setting up the hardware and infrastructure.

Challenges and Limitations of the System

Since the demand for grinding wheel products constantly changed, there was an issue of modifying the system to meet the increasing variety of product demands, especially in the raw materials used for certain customers, as well as for manufacturing processes where the mixture of the bonding for each customer was considered a trade secret. Pairoj needed to make sure that only a small number of staff could have access to this information.

The current system had limitations in term of integrating with suppliers as most of them upgraded to well-known ERPs such as SAP and Oracle. Moreover, by relying on one programmer, when there were problems with the system and Somchai was away the production had to be held and caused the loss to the company. In addition, the system was not fully automated so certain functions were still being handled manually. Therefore, it was very common for the staff to overlook at certain things such as forgetting to check the balance of the stocks, inventory, or even the standard quality of the products.

"*One programmer alone will not do as it is very time consuming to modify each module of the system as well as making sure that the system is secured and timely serve its purpose,"* Pairoj mentioned. *"That is when I am thinking of upgrading the system to MRP."*

Material Requirement Planning (MRP)

In highly competitive environments, manufacturers often had to rely on order-driven pull strategies to meet consumers' demands. They also needed to develop a variety of products continuously in order to attract and maintain their market shares as well as to differentiate themselves. This led to the challenge of developing more complex and extensive specifications when manufacturing products, especially where particular lines of products had a high percentage cost of raw materials. In such settings, industrial organizations needed to control and monitor their use of raw materials in order to save as much cost as possible through planning activities, such as making sure the production process strictly followed the Bill of Materials (BOM).

With Material Requirement Planning, or MRP, the monitoring process was made possible through the use of information systems to plan and control the usage of raw materials and packaging. According to Abdinnour-Helm et al. (2003) , MRP was the earliest computerized information system for operations management and was the origin for today's Enterprise Resources Planning (ERP) systems. Sagbansua (2010) defined MRP as:

> a computer-based system designed to organize the timing and ordering of the dependent demand products. The demand for raw material and components of the final product are calculated by using the demand for the final product and determined how much and in what quantity to order from these components and raw material, considering the production and lead times and counting back from the delivery time of the product.

MRP systems helped manufacturers ensure the availability of materials, components, and products for planned production and for customer delivery, as well as maintaining the lowest possible level of inventory (Volman et al., 1992).

MRP was first invented by Allen J. Rembert (1992) and was designed specifically for users who manufacture and sell products that have a wide variety of options. In particular, MRP system provided two key features. The first feature allowed the user to define items, which uniquely characterized the product for

the purposes of a customer order, purchase order, and work order. The second unique feature of MRP system was the application of user-defined formulas, which determined the quantity and/or size of a part based on the selected options. Thus, MRP allowed users who manufacture and sell a number of styles a wide variety of options without a correspondingly high maintenance overhead (Rembert, 1992).

MRP worked through facilitating the information flow throughout the organization. The process started upon receiving purchase orders from the sales department. The manufacturing department would then check the raw materials required for the orders, based on the BOM, and develop production plans through MRP system. If there were enough raw materials, the system would reserve the raw materials so they would not be used for any other new orders. If the system found that raw materials were not available or sufficient, it would send an alert message and automatically generate purchase requisitions (PR) for the purchasing department. At that point, purchasing department would have to consider lead-time and balancing time, cost, and source of the raw materials. When the raw materials arrived, warehousing would need to retrieve PRs from the system to record the receipt of the products. Then, the accounting department would check and update raw materials in inventory records.

When the production started, the stock level of the raw materials would be deducted. The costs involved in producing one lot of product would be recorded in a job order (JO) and the waiting status updated to "to be sold". Once the sales department retrieved the finished products to sell, MRP system could also generate an invoice and record the credits. The accounting department would then proceed to collect payments from customers and the process went on.

MRP could also be used for the purpose of organizational knowledge management, facilitating sharing company procedures such as Bill of Materials (BOM), warehouse management, procurement, etc. Most MRP systems allowed executives to view real-time performance summaries through a dashboard accessible by the Internet. Moreover, MRP systems based on core logistics concepts, such as Lot-for-Lot (L4L), Economic Order Quantity (EOQ), Re-order Point (ROP), could be the basis of an effective Just-in-Time (JIT) system.

Local MRP Suite

Due to the higher price of international MRP suites, most Small and Medium Enterprises (SMEs) in Thailand opted for local MRP systems, which also provided a Thai language interface. The products evolved from computerized accounting software. Where SMEs using their own software usually struggled was when it was close to auditing time at the end of financial years. After more than 8 years of observing the progress and growing customer base of these providers, however, Pairoj decided to invite representatives from one such company, Manu2005, to propose its MRP systems.

Manu2005

Manu 2005 was developed by Manusoft International, a Bangkok-based company specializing in distributing industry management programs, including both MRP and ERP projects, for industry. The company was a market leader with modern technology and the primary objective of supporting the local business, keeping it progressive and bringing it ahead of its international counterparts. Manusoft focused on analysis, research, and developments for the advancement of the industry, taking into account the industry's problems and organizational changes. Manusoft valued professionalism, honesty, punctuality, efficiency and quality, and customer's trust.

Manu2005 featured various modules that could help to support Kinik-Thai, including Bill of Material & Procedure, Order & Forecast, Production Plan & Open Job, Purchasing, Inventory, Production Control, and Costing, as well as acting as a Data Manager

Product highlights from Manu2005 included:

- User Support Function real-time status of core functions such as production, demand, job requirements, and purchasing orders.
- Advance notification to ensure timely management of material and product.
- Alerts when there was a lack of raw materials/products, non-moving materials, or barely-enough materials.
- OEE (Overall Efficiency Equipment) Function to ensure efficiency of all divisions (teamwork), usage tool-machine-man, productivity, waste quantity, time management, etc.
- Loss & Loss Analysis Function to manage product, material, process loss, based on product quantity, and values. Loss analysis also helps to reveal causes of loss and provide suggested solutions to production problems.
- Costing Function -- process costing for work-in-process, job orders, etc.
- Various output formats -- Synthesized output, data analysis, reporting, inspection with immediate on-screen display.
- Reports Function produced reports and analysis on sales price, sales quantity, cost, product quantity, material-labour-product loss, production plans, etc.
- Inspection and control Function constantly checked for errors in the data and finds source of problems immediately.
- Manual or auto Planning allowed flexibility for open job, production plan, usage plan, operating plan, purchase material plan, delivery plan, distribution of material with all-time inspection of productivity.
- Purchase Function allowed automatic Purchase Order generation and support in complex production (multi-level of BOM, material calculation).

Risks in Implementing MRP

According to Sumner (2005), there are four categories of risks involved in the successful implementation of the Enterprise Resources Planning (ERP) project, the upgraded version of MRP. These four risks are technology, organization, people, and project size. Although MRP system is a lot smaller, the process of implementation is very similar. Pairoj was concerned mainly about technology and people. One of his main worries was the complexity of the application. As the new system will be more complicated, staff may be reluctant to use or may make mistakes on the system unintentionally or even intentionally. Staff may also be resistant to change as they do not see the importance of the new system and may ignore the trainings involved in the new system. In addition, data conversion and integration from the existing system to the new system could be an issue as some data could be lost or not compatible with Manu2005.

The Decision

In order to be competitive in the marketplace, developing unique products, reducing cost, and managing materials procurement and operations played a crucial role for grinding wheel manufacturers like Kinik-Thai. Pairoj had to decide if he should continue hiring Somchai, the company programmer who had developed the internal system, and further develop that system to meet his company's demands or acquire Manu2005.

He had to meet his Taiwanese partner to discuss the matter further in May 2013. He realized that he had to act fast to maintain his position in the market as the leader of Thailand's grinding wheel manufacturers. The decision was tough but he had to choose something (and it had to be the right choice).

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Biographies

Narumon Sriratanaviriyakul (BA, MS, AdvDip, Grad Cert TTL), Narumon is a Senior Lecturer in the Centre of Commerce and Management at RMIT University Vietnam and has 6 years of teaching experience in higher education in international universities.

Narumon can be reached at narumon@rmit.edu.vn

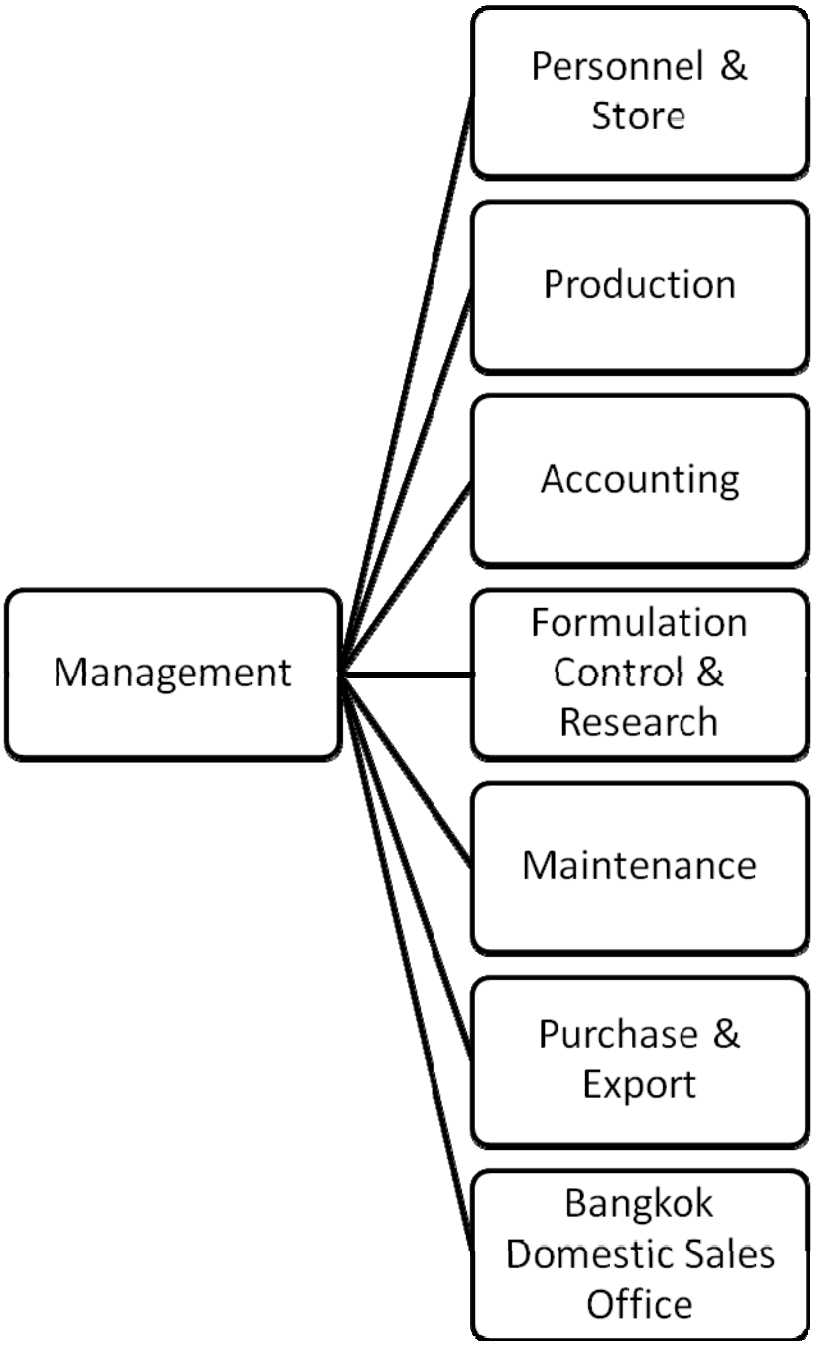
Dr. Mathews Z. Nkhoma holds a PhD in Information Security from University of East London, England. His major research topics are information systems security, information security investment model, ethical hacking, network defence, network security management and forensic computing. Mathews has international experience in teaching–leading Information systems and computer forensics courses in Africa, Europe, Middle East and Asia at both undergraduate and postgraduate levels.

Mathews can be reached at mathews.nkhoma@rmit.edu.vn

Hiep Pham is a Senior Lecturer at RMIT Vietnam University. He has completed a Master degree in Advanced Information Systems at University of New South Wales and a MBA (Executive) at RMIT Vietnam University. He is actively conducting research in Information Management and Information Security Management.

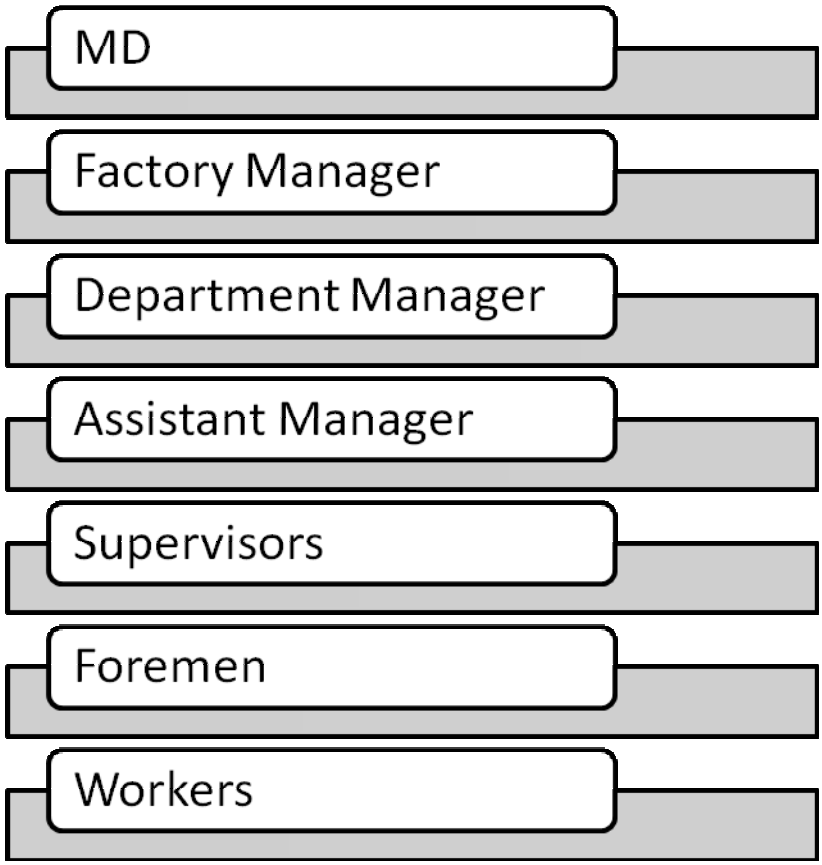
Hiep can be reached at hiep.pham@rmit.edu.vn

Exhibit 1: Kinik-Thai Operations Structure



Source: Kinik-Thai (2012)

Exhibit 2: Kinik-Thai Management Structure



Source: Kinik-Thai (2012)

Exhibit 3: Comparison between Off-the-Shelf and Proprietary Software

Proprietary Software		Off-the-Shelf Software	
Advantages	Disadvantages	Advantages	Disadvantages
You can get exactly what you need in terms of features, reports, and more.	It can take a long time and significant resources to develop required features.	The initial cost is lower because the software firm can spread the development costs over many customers.	An organization might have to pay for features that are not required and never used.
Being involved in the development offers control over the results.	In-house system development staff may become hard pressed to provide the required level of ongoing support and maintenance because of pressure to move on to other new projects.	The software is likely to meet the basic business needs – you can analyze existing features and the performance of the package before purchasing.	The software might lack important features, thus requiring future modification or customization. This can be very expensive because users must adopt future releases of the software as well.
You can modify features that you might need to counteract an initiative by competitors or to meet new supplier or customer demands. A merger with or acquisition of another firm also requires software changes to meet new business needs.	The features and performance of software that has yet to be developed presents more potential risk.	The package is likely to be of high quality because many customer firms have tested the software and helped identify its bugs.	The software might not match current work processes and data standards.

Source: Stair & Reynolds (2009)