THE BREAKDOWN OF MATERIAL REQUIREMENT PLANNING INPUTS FOR E-KTP READER IN A STATE OWNED ENTERPRISE

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Abstract

The purpose of this paper is to examine a business process, detect the problem faced in each division, and find the solution to be implemented in an Indonesian State Owned Enterprise. E-KTP Reader is chosen among various genuine products, because of its importance in helping the work efficiency in public services. As of 2011, Indonesian citizens have been using e-KTP as ID card, but the benefits of the card itself still hasn't maximized. Interviews are done with the stakeholders of the company. The result of the interviews will be referred as primary data and used to detect major problem in the company. After the root cause of the problem has been detected using CRT, company's historical data will be referred as secondary data, and will be used to generate a solution that could be implemented in the company. The unavailability of material planning is the root cause of the problems. Therefore, a proper material requirement planning inputs is needed for the company to make MRP for their production plan to meet target for this year. This research is only limited to e-KTP reader as one of the product in the company. The financial aspects will not be calculated in this paper, because the price of material and cost of production is confidential to the company. The material and suppliers name will also written in codes.

Keywords: Indonesia, inventory, management, material, MRP

INTRODUCTION

Kartu Tanda Penduduk (KTP) is an official identity card for Indonesian citizens, and issued at the age of 17 or by marriage. KTP have to be renewed every 5 years (UU no. 23/2006). Since 2010, Indonesian government planned to issues e-KTP as new identity card, and the progress itself started in 2011. E-KTP is a biometrics-based national identity card, by capturing fingerprint, iris, and face (Messmer. 2012). This plan was initially scheduled to be finished before President election in 2014 (Messmer. 2012), but postponed by the new Minister of Home Affairs to 2018 (Media Indonesia). For this project, Indonesia spent $600 million for providing 172 million Indonesian citizens the new identity card, which will be used for many purposes, e.g. passport issuance, e-Voting, etc (Messmer. 2012).

The progress of issuing e-KTP reader varies across all cities in Indonesia. For example, as for January 2016, 1.7 million Surabaya citizens already owned e-KTP, while 20.000 has recorded and in progress, and 400.000 citizens still haven't recorded their data (Surabaya Tribun). Another example, in Jakarta as the capital city of Indonesia, 6.714.374 people from 7.142.952 citizens (approximately 94%) has e-KTP as their identity card (Berita Jakarta).

Based on official e-KTP website (e-ktp.com), the functions and purpose of e-KTP are: as a personal identity, valid nationally, prevent double KTP and KTP falsification, to

improve citizens data as a way to support national development, and it can be used as a voting card in e-Voting.

However, e-KTP reader also has weaknesses. In banking service, autograph is really important to verify the identity before transaction. If the autograph shown in e-KTP and in the check is different, the transaction cannot be proceeded. Some purposes of e-KTP need a card reader to decipher and read the chip. If the card reader is available at banking service, the customers only have to verify the ownership of the card by fingerprint.

Based on Surat Edaran from Minister of Home Affairs no. 471.13/1826/SJ (11 April 2013), all government offices and public services have to provide a card reader for e-KTP as soon as possible. BPPT (Badan Pengkajian dan Penerapan Teknologi) has designed the reader since 2011 and still improving it (e-ktp.com). The production of the card reader was scheduled to start in 2013, and all public services have to own the reader by the end of 2013 because the non-electronic KTP will be expired by January 1st, 2014 (e-ktp.com).

An Indonesian State Owned Enterprise (BUMN) was appointed as one of the maker of the reader. The launching time was in 2015, and by the end of 2015, the units sold of e-KTP was 7 units. Unfortunately, this fact is far from the expectation of Minister of Home Affairs that by the end of 2013, all public services have to own the reader.

This research will analyze the root problems in the company, and propose a proper solution to improve and achieve their target.

LITERATURE REVIEW

E-KTP

From its official website (e-ktp.com), e-KTP is a citizenship document containing security system from both administrative view and information technology based on national population database. E-KTP issued by Indonesian citizen aged minimum 17 years old, or by marriage. Each citizen only allowed owning one e-KTP with Citizenship Registration Number printed on it. According to Law no. 23 (2006) section 13, Citizenship Registration Number is a single identity for each citizen and valid for a lifetime. This number serves as a basis for issuing passport, driving license, and other identity-related document. E-KTP is using biometric system through fingerprint for verification and validation. The data saved in e-KTP has been encrypted with cryptographic algorithms. The process of issuing e-KTP was done in domicile of the issuer. To make the process easier, the process can be done outside the domicile of the issuer without changing the elements since April 2016.

The differences between old KTP, national KTP, and e-KTP will be listed in the table1.

Table 1. The Differences between old KTP, national KTP, and e-KTP

Card	Characteristics	Technology	Verification	Picture
Old KTP (before 2004)	- Blank paper and plastic-laminated - The photo is glued manually - Signature - Data saved in computer - Valid only in issuing city/region.	- Original stamp - Special serial number - Guilloche pattern in the blank - Only used for personal identity	Control and validation by RT/RW	
National KTP (since 2004)	- The photo is printed on the card - Signature - Data saved in computer - More durable	- Made from plastic - Special serial number - Guilloche pattern in the card - Only used for personal identity - Scanned photo and signature	Control and validation by RT/RW	
E-KTP (since 2011)	- The photo is printed on the card - Data saved in computer - Valid nationally - Able to save data - Able to be scanned by the reader	- Made from PVC/PC - Special serial number - Guilloche pattern in the card - Scanned photo and signature - Microchips as data storage	- Control and validation by - RT/RW - Multi Application - Cannot be duplicated - High reliability for the card validity	

Card	Characteristics	Technology	Verification	Picture
		- Saving biometric fingerprint as unique personal identification - Able to save all personal data needed for multi-application		

E-KTP Reader

The idea started in 2014, when Minister of Home Affairs issued a Surat Edaran about e-KTP reader. This device is a result of "pull-market" system, because currently there are no differences in usage between e-KTP and old KTP. It means that public services need a device to use the advantages of e-KTP over old KTP. E-KTP reader is a device to scan and read the data of Indonesian citizen via e-KTP. Currently, there are only two companies producing the reader. Generally, the functions of e-KTP reader are: reading e-KTP data (including name, place and date of birth, address, etc.) and verifying the e-KTP owner by scanning fingerprint to the scanner in the reader.

Material Requirement Planning

Material Requirement Planning is a computer-based production planning and inventory control system (Gallego. 2009) and used to assure that required materials are available when needed. It is suitable for a multiple items situations with complex bill of materials. The major objectives of MRP (Gallego. 2009) are: ensuring available material and component, keep the inventory as low as possible, and plan manufacturing activities, delivery schedules, and purchasing activities. MRP is performed to anticipate a customer order (future demand), therefore, it is using a push-view process.

To make effective MRP, operation manager needs to know: master production schedule, product structure records (bill of materials), and current inventory status (Gallego. 2009). Master production schedule is a schedule that specifies what is to be made and when it needed over a time period (Heizer and Render. 2014). Bill of materials is a list of components and their description such as lead-time and quantity per-assembly. Lastly, current inventory status contains all inventory status, including scheduling receipt and on-hand inventory (Gallego. 2009).

METHODOLOGY

Research Design

The type of this research is the standard research/application. The purpose of this research is to define a problem in a company, and then analyze the root cause of the problem. Then, a solution should be defined and recommend it to the company to decrease the gap between current situation and ideal situation. It analyzes a phenomenon in a real life context (Soy. 1997), which in this case is about material requirement planning for e-KTP Reader in a State Owned Enterprise.

Problem Identification

Problem identification was the early step of this research and done through field observation and interviewing relevant people to gather useful information and data regarding potential problem, that could be used as the topic of this research in the company. The preliminary interview was done with an Account Manager, who was a preceptor, and discussed about the products in the company with the problems each product faced in market. The problem that frequently arises in each product was about material planning, especially when the demand was not stable and the product was using import material. This research limited to discuss e-KTP reader.

Literature Review

After formulating the problem, the researcher made theoretical foundation in the research to provide broader overview of the topic. The theoretical foundation of this research was gathered from journals, books, and websites. The theoretical foundation was used as the base and reference of the research and as a tool to analyze and process the data gathered to propose a solution for the occurring problem.

Data Collection

The data gathered was gathered in approximately twelve weeks from March until May 2016. The methods used in this research are both qualitative and quantitative data. Therefore, the data for this research will be divided into two kinds of data, i.e. primary and secondary data. Primary data was gathered from field observation to the company and interview the people related to the product. Secondary data was gathered from company historical data as a supporting data to do the research.

Primary Data

To gather qualitative data, the methods used in this research were interview with stakeholders of E-KTP Reader and field observations to the company. The interview was done in unstructured interview and was done in working hour during a company. The data gathered from interview and field observation was primary data.

The interviews were done for approximately 30 – 45 minutes and took place in the company's headquarter. The first person was a staff from Account group. The topic of interview was about general information of the company, their products, and problem faced in the company. The result in the interview affected the object study of this research, which is e-KTP reader. The second person was Account Manager for e-KTP reader. The topic of this interview was about general information and the business process of e-KTP reader. In this interview, the detailed information about e-KTP reader was gained. The third person was a head of Production Division of e-KTP reader. This interview was done via e-mail, and the information gathered was general process in production division, including quality management. The fourth person was a staff from Material Management Division. The interviewee was explaining about the material procurement process for e-KTP reader, and the problems they faced because some of the materials were gained from another country (import). The fifth person was a head of module assembling (a sub-division of Production division). The information gained in this interview was about the number of products finished, and the time needed to assembly the modules. The sixth person was a head of Cost Control Division. The information gained was a detailed business process, the bill of materials for e-KTP reader, and the lead times of the materials before received by the company. From the last interview, the researcher concluded that the problem occurred because there was no material requirement plan for the production of e-KTP reader. To make sure that the data was valid, the researcher gave the interview transcript to be read again by the interviewer.

Secondary Data

The secondary data was a company historical data and gained while interviewing people. The data gained was an organizational chart, target market for e-KTP reader, bill of materials, and lists of lead times for materials.

Analysis and Data Processing

After gathered sufficient amount of data, the data was analyzed and processed. The detailed business process of e-KTP reader was drawn into chart. Current Reality Tree was used to analyze the root problems in the company based in several interviews from various divisions. After the root cause of the problem found, then the data could be analyzed to make a solution. The root cause of the problem was the unavailability of the material requirement plan for the production. Therefore a proper material requirement planning should be proposed as a solution for the company.

There are several methods for lot sizing material requirement planning for dependent material, i.e. Lot for Lot (LFL), Fixed Order Quantity (FOQ), Economic Order Quantity (EOQ), and Period Order Quantity (POQ). The order quantity for e-KTP reader materials were not fixed, therefore FOQ was not a suitable method for this company. The financial costs of the company, including holding costs, set-up cost, etc. was not revealed by the

company, because it was confidential data. So, EOQ and POQ cannot be used. Therefore, a suitable solution for the company was Lot for Lot techniques.

Main inputs to make MRP was gained from the interview, i.e. bill of materials, master production schedule, lead-time, and current inventory status. The MRP was made in Microsoft Excel, for 4 months period. The MRP schedule will be started from September 2016 until December 2016. The first step in making MRP was to choose the time-period for the planning. Since the objective of this research was to help the company achieve their 2016 target, the time-period chosen was 4 months. The second step was to write all the materials based on their levels in bill of materials. The materials in this research were divided into three levels. E-KTP reader itself as a finished product is level 0, level 1 were the modules as main parts of the device, and level 2 were the materials components for each module. The third step was to write down all the lead-time for each material and the suppliers. The last step was to actually make the MRP based on the lead-time and material quantity needed for each module.

Conclusions

After a proper solution is gained from data analysis, the last step was to conclude and give recommendation for the company. The conclusion was drawn to answer the research questions. Lastly, a recommendation for solution was proposed to the company to improves and helps them achieve their 2016 target.

FINDINGS

Business Process

The business process divided into two figures, in which Figure 2 is depicting the process from the start until material procurement, and Figure 3 depicting the process after the material has been procured and proceed to production process.

Figure 1. Material Procurement Process

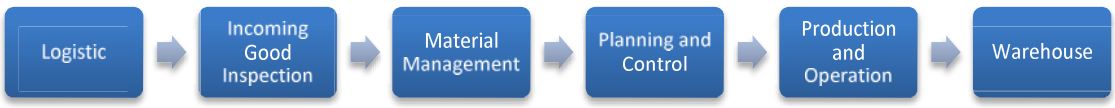

Figure 2. Production Process

The process starts from account manager, who makes a business research before starting the production. The account manager also handle the customers directly which

means that they are the key of the production, because they are the one who determine the quantity of production. This quantity of production is called Pre-Order document. The Pre-Order document will be sent to Sales Marketing Support, and their job is to make a budget planning based on bill of quantity and other technical document. The other technical document includes: product design, test system, bad test, and list of material. In making technical documents, SMS is helped by Product Development. These documents are sent to Production and Operation who will releases purchase requisition in the system and job-order-letter. Material Management receives the purchase requisition and will checks the material balancing and then processing inventory receipt. The next division is logistic, which received the pre-order material based on specification and quantity and the one who will purchase materials from the suppliers. The logistic team itself divided into two, i.e. domestic purchase and international purchase (import). After the purchase has been made and the materials are delivered, the IGI (Incoming Good Inspection) will inspects the materials ordered, whether they are compatible with the specification or not. Material Management will create GR (good receipt) and Goods and Service Receipt Report (in Indonesian: LPBJ) for the materials that pass the inspection, and then record the stock in the system. Production division will then create a reservation in the system for materials based on production planning. The assembling process can be started after materials are received. The assembling process including: plotting, inserting, soldering, and testing. The finished product will be moved to quality control process. The first stage of quality control is the visual test by IGI, they will check the defect and specification of the finished product. The next stage is visual test from soldering process to know if there is any lack or excess tin. If there is any mistake, the product still can be reworked again to solve it. The last stage is function test. If the test turned out to be good, the product is passed quality control. Otherwise it will be repaired. If the product is cannot be repaired, it categorized as a defect product. The next process is packing, and they have to check whether the serial number is match with the packaging and the additional goods (manual book, warranty, etc.) are already included. After the production process is finished, they make Production Process Handover Report (Indonesian: STHP), and the product will be stocked in the warehouse.

Current Reality Tree

The undesired effects occurred in the company were launching postponement, and unable to make any progress for this year's target. The launching was postponed because there were no available products at the moment. The product was not finished on schedule because the Production division has to wait for material to be available, and this is also caused the production schedule is delayed and unable to make any progress for this year's target. The Production division has to wait for material to be available if required material has to be ready when needed, but the available material is not compatible with the required material. The available material is not compatible with the required material because the material procurement is not well scheduled. This is caused by the unavailability of MRP, because ideally, MRP schedules the best time to order materials. The unavailability of MRP is the

root cause of these undesired effects in the company. Below is the CRT derived from the undesired effects in the company.

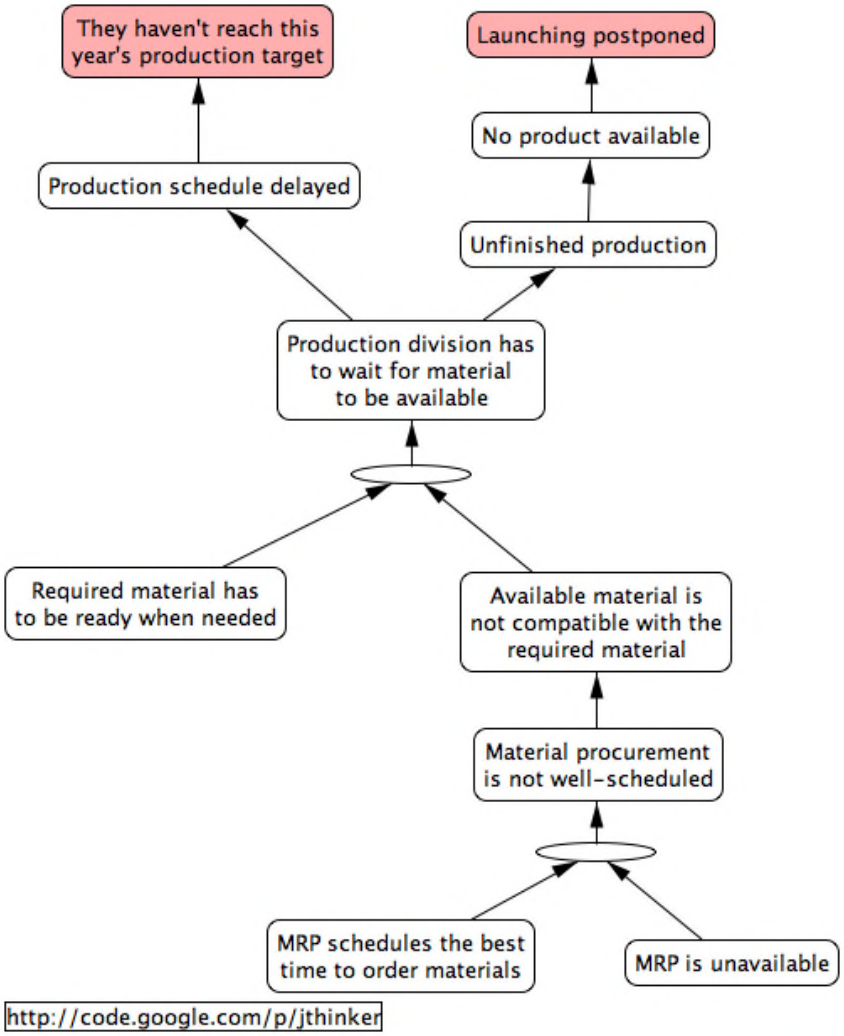

Figure 3. Current Reality Tree

Master Production Schedule

The company targeted to achieve 400 units of e-KTP reader by the end of 2016. The assembly process of the device takes 30 working days or 6 weeks, and the company has maximum capacity of producing 200 units per batch. The schedule will be started in September 2016 and ended in December 2016 for 17 weeks. By considering the time-bound of the schedule and the assembling time for the device, the production will be divided into 2 batches, in which each batches will produce 200 units of e-KTP reader. The first batch will be started in the 5th week (October 3rd, 2016) and finished by the end of the 10th week (November 11th, 2016). The second batch will be started in the 11th week (November 14th, 2016) and finished by the end of 16th week (December 23rd, 2016). The last week will be used as safety week, in case a late deliveries or delay occurred.

Table 2. Master Production Schedule

Week	1	2	3	4	5	6	7	8	9
					Start				
Week	10	11	12	13	14	15	16	17	
	Finish	Start					Finish		

Bill of Materials

The bill of materials for e-KTP reader consisted of 3 levels, i.e. level 0, level 1, and level 2. Level 0 is the finished product itself, e-KTP reader. E-KTP reader composed of five main modules and 30 materials. These main modules and materials were called level 1. The five main modules constructed from smaller components, and these components for each module were called level 2. For privacy reasons, the company wished the material name to be kept as a secret. Therefore, in this research the material names were changed into codes.

E-KTP Reader composed of five main modules, i.e. Module A, Module B, Module C, Module D, Module E, and 30 materials (named Material F until Material AI). Module A constructed from 43 smaller components (Material A1 until Material A43), Module B constructed from 10 smaller components (Material B1 until Material B10), Module C constructed from 11 smaller components (Material C1 until Material C11), Module D constructed from 12 smaller components (Material D1 until Material D12), and Module E constructed from 7 smaller components (Material E1 until Material E7).

Table 3. Bill of Materials Level

No.	Level	Materials
1.	0	E-KTP Reader
2.	1	5 main modules and 30 other materials
3.	2	Components for Modules

Lead-Time

The lead-time for the materials varying depends on the kind of material and the supplier location. The company procured the materials from 7 main suppliers, 6 suppliers abroad and 1 supplier in Indonesia. For privacy reasons, the name of the suppliers will be written in codes. *LN 1* until *LN 6* represents suppliers abroad, and *Local* represents supplier located in Indonesia. The lead-time varies from a week until 4 weeks. Out of 113 components, 11 of them were procured in a week, 87 of them were procured in 2 weeks, 7 of them were procured in 3 weeks, and 8 of them procured in 4 weeks. To prevent any delay caused by lateness of material delivery, the materials that have very short lead-time (a week) will have additional 7 days. In generating the Material Requirement Planning, all materials procured abroad will be ordered and delivered at the same to reduce price and tax administration. The

lead-time to assembly the product after all materials were completed is 30 working days (or 6 weeks).

Table 4. List of Supplier and Lead-Time

No.	Supplier	Lead-Time
1.	LN 1	2 weeks and 3 weeks
2.	LN 2	3 weeks
3.	LN 3	3 weeks
4.	LN 4	4 weeks
5.	LN 5	4 weeks
6.	LN 6	4 weeks
7.	Local	1 week, 2 week, and 4 weeks

Current Inventory Status

The current inventory status for all materials is zero, because all of the materials have been used in previous production, which are 125 units for promotional tools and trials. Therefore, the MRP presented will have no on-hand inventory and the beginning inventory will be counted as 0.

DISCUSSION AND CONCLUSIONS

The problems are caused by the unavailability of the material planning. A forecast for e-KTP reader still cannot be generated because its lack of historical data, therefore, the bases of the production plan is the production target from Account Manager. It means that e-KTP reader is using push view process. This research discusses the components requirement, therefore, it is a dependent demand and MRP is the best method to make the inventory planning. To make the material planning that based on push-view and focusing on components requirement, a proper inputs should be made. The suitable method for MRP based on the data is lot sizing, because this research doesn't include any financial aspects due to confidential information.

For further research, a financial aspect might be applied to make a better solution. By including financial aspect, the methods for MRP could be compared to one another and therefore, the method with the lowest cost will be chosen.

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