Available online www.jsaer.com

***Journal of Scientific and Engineering Research*, 2017, 4(8):107-116**

Research Article

ISSN: 2394-2630
CODEN(USA): JSERBR

Implementation of System Application Product in Data Processing in Minimizing the Lack of Material on Electrical Distribution Panel Production Process – A Case Study in Pt. Scheneider Electric Indonesia

Rizal Ferdiansyah, Indra Sagita, Euis Nina S.Y.

Industrial Engineering Postgraduate Program, Mercu Buana University, Jakarta, Indonesia

Abstract Problems of shortage material has always been a major problem in the production. Customer demands more and more it is necessary to his system data integration between departments so that the process flow in the manufacture of the panels can be run well. SAP (System Application in Data Processing) is the ERP tools currently used by the company - the company developed Europe and America. Seeing the current business competition is very fast so in a sense the need for a system that can bridge the data itegrasi companies in increasing the efficiency and productivity of employees. In PT. Scheneider Electric Indonesia perform a migration from old tools into SAP. As for the results to be obtained this company is an efficient, real-time data management and pressing waste in the production process.

On the application of SAP can analyze routing and minimize the shortage that occurred at the company ini.Pada previously lacked routing process and at the time of application of the SAP routing can be seen between the plan time and actual time, the total time plan production processes and the actual 133 hours and plan 144.8 hour, only 11.8 Hour diffrence can be affected from several factors of production such as material supply, drawing revisions and others.

Shortage of materials is high on every project strongly inhibit the production process. The implementation of SAP has shown no improvement in identifying his material required in an application project, this decrease on each month. Material shortage before the implementation of the project there are 30 shortage and after penerpan 15 project Shortage shows and there was a decrease of 50% from the month previous.

Keywords ERP, SAP, Routing, Process production

1. Introduction

This introductory section contains the background, problem identification, problem formulation, research objectives and problem limitation. The rapid and competitive development industry requires every company to have a good business as well as integrated processes between divisions or departments that exist within a company. Moreover, error information is also very large so it affects the company in carrying out its business. One way to achieve that success can be done by integrating information systems, improving the efficiency of information systems to produce a more efficient management of the business process. A few companies have not integrated information system, which in the process is supported by the activity of the individual at each work location.

This condition leads to misunderstandings in communication of data between one another workplace, thus it requires much time for coordination in the provision of data compared to companies that have integrated the functions. This integrated data can assist efficient business processes and facilitate decision-making by the management company. One quite well known system concept that integrates the process of each line in the high enough company's management transparency and accountability is the concept of Enterprise Resource Planning

(ERP). To enter the international market, ERP is a pre-requisite that became the basis for any company. Indonesia is a developing country, where the economic base rests in the field of business.

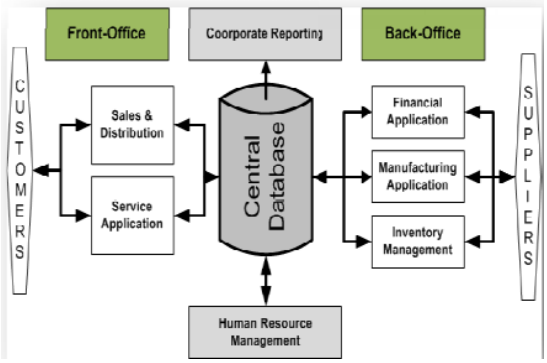
The efficiency is one factor that is important in every company. With the help of ERP, companies in Indonesia can be integrated in every process in the company into a computerized system. Frequent problems in the production line very often hamper its target for the delivery of the product. Shortage of materials, material defects and waste time are the major obstacles when production runs. MFG Pro is a ERP Software which has long been used but still have not been able to integrate existing process. With the integrated system, then data can be managed so as to minimize the existing problems in production.

2. Methods

ERP (Enterprise Resource Planning) is a framework of enterprise transactions that links the process of ordering goods, inventory management and control, distribution planning and production, and finance. ERP works as a power cross-functional enterprise that integrates and automates the various internal business processes and information systems, including manufacturing, logistics, distribution, accounting, finance, and human resources of a company.

According to Wallace and Kremzar (2001: 12), Enterprise Resource Planning is a direct result of the development and expansion of resources and planning of manufacture. Thus, ERP includes all capabilities of MRP II. ERP is stronger in the availability of a set of tools in the enterprise resource planning, providing real-time integration of sales, operations, and financial data, and linking resource planning to extended supply chain from customers and suppliers. ERP is an enterprise information system designed to coordinate all the resources, information, and activities needed to complete business processes.

ERP system is based on a database in general and modular software design. ERP is software that integrates all departments and functions of a company into a single computer system that can serve all the needs of companies, both from the sales department, HR, production or finance. The purpose of ERP system is to coordinate the organization's overall business. ERP is a system that exists in the organization/company that aims to automation and integration of many business processes, shares a common database and business practices through the enterprise, generates real-time information, and allows a fusion of transaction processing and planning activities. ERP development is inseparable from the development of manufacturing engineering itself. The need for information on the manufacturing process is also more and more that will be useful for any actor of good manufacturing execution and decision makers. The development of ERP is through the very long stages to develop a system that has been born earlier.



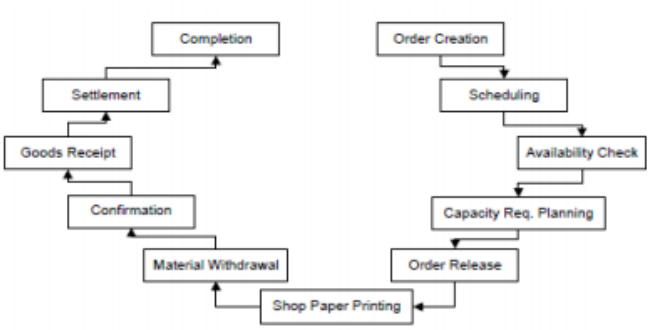
Picture 2.1: ERP Concept (Rashid et al. 2002)

2.1. Production Planning

Module PP (Production Planning) is based on the classical approach of Materials Requirement Planning (MRP II), and thus it performs the function similar to MRP II in planning and controlling the course material until the product delivery process.

Picture 2.2: Production Planning Cycle

2.2. Production Order Creation



Picture 2.3: Production Order Cycle

When the order is made, production order is made; the operation and the need for material will then be determined based on the master data (BOM and routing). The one that is closely related to the making of the order is scheduling (scheduling), which determines the detailed date of the activity that is mostly needed by capacity planning and material requirements reservation. A availability check can be executed when the order was made, both for the component material and capacity.

A. Capacity Requirements Planning

To create a feasible production plan, it is necessary to run the operation of the production order in the sequence of steps called the adjusted capacity. Often, a capacity requirement planning is executed based on the production order, to adjust production date with the availability of capacity. However, this step is optional. In certain cases, capacity requirements planning can be executed sooner or later.

B. Production Order Execution

Production Execution begins when the order is released. This causes a change in the production order status and functions as a system of technical requirements for the next step. This includes paper printing shop, withdrawal of material for the components, confirmation for good receipts, and making invoices through the process of completion. Another availability check can be done during the release. Here is a picture of the general process of production order creation.

2.3. Bill of Material

BOM (Bill of Materials) is a structured list of the components that make up a product. This list contains the numeric objects in each component, along with a number and a unit of forming component, BOM is used in different forms in the various situations in which a finished product is made up of component parts or materials. Based on the industrial sector, they can also be called a recipe or list of ingredients forming and others.

2.4. Work Center

Operations are performed on work centers. Inside the R / 3 System work centers are business objects that represent real working unit, for example, machines, production lines, assembly work centers, and employee. Together with the bill of materials and routings, work centers become the most important data in the R / 3 production planning and control system. Work centers are used in task list operations and work orders.

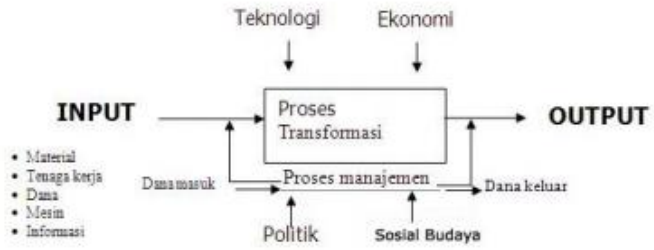
Examples of task lists are routings, maintenance task lists, inspection plans and standard networks. Work orders are made for the production, quality assurance, plant maintenance, and to project the system as networks.

2.5. Routing

Routing is a description of the operation (process steps) that must be done in the manufacture of a material (product). As the information on the operation and the order in which the operations are carried out, a routing also contains details about the work centers which are all operated on the needs of production resources tools. A standard value to execute a single operation is also stored in the routing. A routing is drawn up by a header with one or more sequences. The header contains data valid for the whole routing. Sequence is steps of operations. Operation explains the steps performed during the production process. A routing is identified by the group and group counter of the routing.

2.6. Production System

The production system is a collection of sub-systems interacting with the aim of transforming inputs into outputs production. These inputs can be raw materials, machinery, labor, capital, and information, while production output is a product produced along with its byproducts such as sewage, information and so on. Sub-systems of the production systems include production planning and control, quality control, determination of operating standards, the determination of the production facilities, maintenance of production facilities, and determining the cost of production. Sub-systems of the production system will establish a production system configuration. The reliability of the system configuration of this production will depend on the products that are made and how to make it (the production process). How to make these products can be "types" of production process according to the way of producing output, "the operation of the manufacturing products" and variations of the resulting production. (Nasution, 2003, p2).

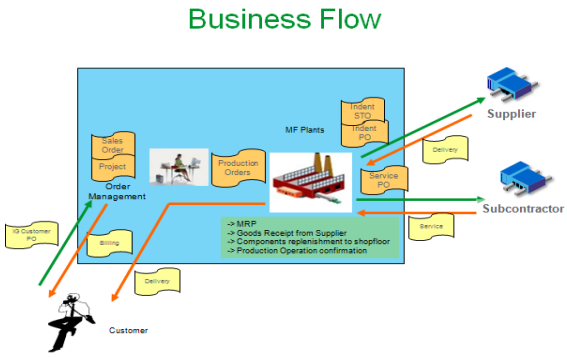


Picture 2.4: Input - Output Production System

3. Collecting and Processing Data

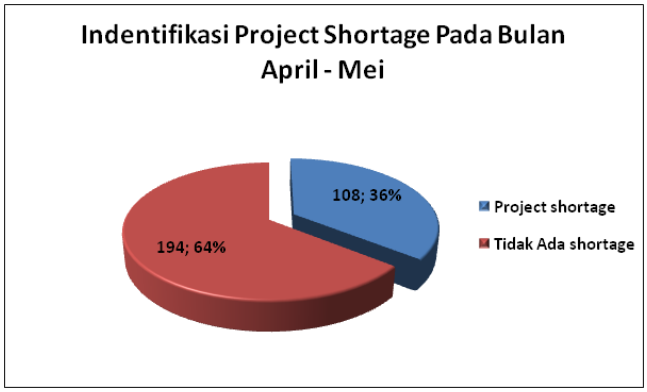
3.1. Business Process Flowchart

Business process flow on the company is important because we will know the process that is achieved in running the company's business. The business flow in this company is seen on Picture 5 below.



Picture 3.1: Business Flow Chart

3.2. *Shortage* (Deficiency) Material

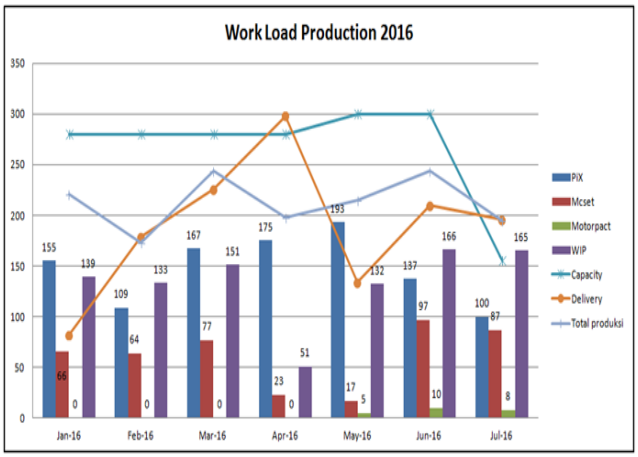


Picture 3.2: Percentage of Shortage Material Project

From the data above, shortage material in the company is very high in the last 2 months from April to May in which there were 194 panels were identified shortage and 108 panels had no shortage of material. It needs a system that controls the shortage material for the production process can run smoothly without any control. Material identification before the process runs can be integrated with SAP application systems.

3.3. Production Capacity

Design capacity is the maximum output level that is achieved based on ideal conditions. Effective capacity is usually smaller than the design capacity for the reality of change in product mix. Capacity often determines the stock requirements that affect a large proportion of fixed costs. Capacity also determines whether the request can be met, or whether the existing facilities will be excessive. The importance of determination of capacity will affect the production schedule in the company. The production capacity at PT. XYZ depends on each produced type. The production capacity data for all panel and total delivery of products until the end of July in the following picture :



Picture 3.3: Work Load Production

3.4. SWOT Analysis

SAP is the best integration software at this time because it is able to integrate every job in the company. Lots of modules can be used in this software and of course the price of the software is very expensive. Before implementing SAP software, it needs an analysis to be done on the previous software (MFG Pro). The Matrix SWOT Analysis can be seen on the following table.

Table 3.1: SWOT Analysis

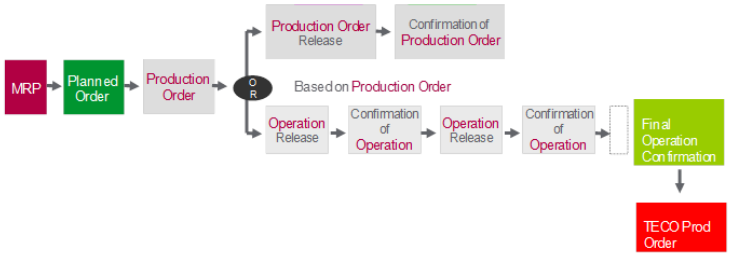
Internal Factor / Ekstemal Factor	STRENGTHS (S)	WEAKNESSES (W)
	- Sistem integrasi untuk multi company - Material terindentifikasi secara jelas - Mudah untuk kontrol scheduling - Mudah shortage terindetifkasi sebelum produksi	- Akurasi data yang tidak akurat - Masih membutuhkan add on software - Kurangnya pemahaman akan aplikasi - Tampilan masih DOS - Kurang nya integrasi data antar divisi - Kurangnya pemahaman aplikasi dan data
OPPORTUNITIES (O)	STRATEGI (S - O)	STRATEGI (W- O)
- Memperpendek proses leadtime - Mengintegrasikan data - Peningkatan proses produksi - Pencapaian target dilevery - Cost Reduction	- Pemberdayaan sumberdaya yang ada - Berkerjasama dengan Plant lain - Membuat prioritas dalam manage data - Implementasi ERP baru dengan software terbarukan	- Peningkatan proses bisnis dengan perbaikan data - Merekrut sdm yang baik untuk pemahaman data - Pembelian aplikasi baru yang lebih cangggih
THREATS (T)	STRATEGI (S - T)	STRATEGI (W - T)
- Persaingan bisnis yang ketat - Kerahasian data perusahaan - Persaingan harga produk	- Peningkatan market share - Meminimalis cost produksi - Penyedian proteksi atau pembatasan akses	- Efisiensi biaya-biaya

3.5. Strategy and Preparation Data Migration

Determination of project planning is the most important thing in a project, in which we will determine the project goes according to the schedule and be controlled. The following picture shows project planning in SAP migration process. Based on the image, the project planning in data migration to SAP took more less than 1 year. There are some six phases in this project: Anticipation, preparation, foundation, completion, cut over and hipercare.

3.6. Implementation of SAP

Production execution is a stage where the project is ready to be executed or processed in production. At this stage, of course, it highly depends on data or SO BOM that has been uploaded. Here stages of the production process in the image below.



Picture 3.4: Production Process in SAP

3.7. Production Order Release and Availability of Material

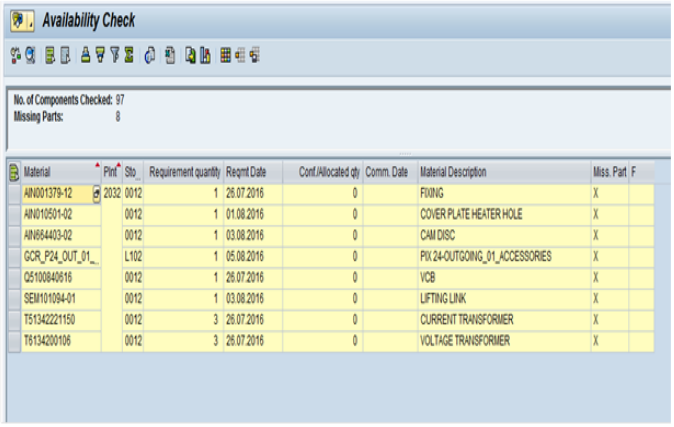
Release orders indicating a panel manufacturing process will be done. The existing production order will be released according to schedule listed in the SAP system. Before the release, the SAP system will identify material availability (availability check) according to requirement material for the panel itself according to the BOM that has been uploaded .At the time of production order release, the system will create a TR (transfer requirement) to the warehouse and the warehouse will confirm TO (transfer order) into production. The production process can be run if the material is not a critical part. This identification of production eases the production to inform PPIC to check the arrival of the materials.

From data above, there are 8 item missing part, called material shortage from the total 97 item part needed, the items are:

1. Material AIN001379-12 pada location warehouse (0012) dengan permintaan kebutuhan 1 Pc
2. Material AIN010501-02 pada location warehouse (0012) dengan permintaan kebutuhan 1 Pc
3. Material AIN664403-02 pada location warehouse (0012) dengan permintaan kebutuhan 1 Pc

4. Material GCR_P24_OUT_01 pada location shop floor (L102) dengan permintaan kebutuhan 1 Pc.
5. Material Q5100840616 pada location warehouse (0012) dengan permintaan kebutuhan 1 Pc.
6. Material SEM101094-01 pada location warehouse (0012) dengan permintaan kebutuhan 1 Pc.
7. Material T51342221150 pada location warehouse (0012) dengan permintaan kebutuhan 3 Pc.
8. Material T6134200106 pada location warehouse (0012) dengan permintaan kebutuhan 3 Pc.

Production process can running if the material not being critical part. This identification can solve production process to inform to Planning Department to check arrival material.



Picture 3.5: Missing Part

3.8. Confirmation Production Order

Confirmation is a step when the production has been completed the previous production software. In MFG Pro, there is no confirmation as well as accurate routing so that we cannot see the cost that is used in the production process. In this study, the latest systems can display overall cost before and after the panel is created that refers to the routing production order that is created.

4. Results and Discussion

In this chapter, it will be explained the advantages of using the SAP software that can identify and minimize the shortage of material that occurs during production. The process of ERP development method is expected to reduce the production problems.

Table 4.1: Component List for Purchase

Project Name : J-PROC DKI & JABAR
Company : P.T. Schneider Indonesia
Department : Engineering
Related W/O N : M50...-EN1
Date : 16-Feb-12
Issued : WW
Checked : UP
Appproved : AHK
Rev. : 00
Dwg No. : PO...-020

COMPONENT LIST FOR PURCHASE

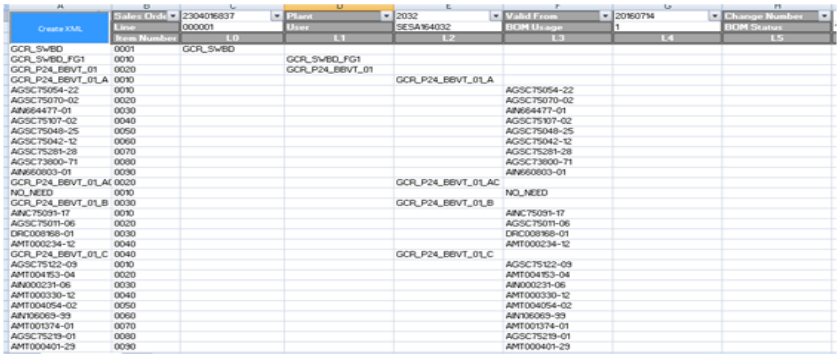
MV SWITCHGEAR PIX 24

No	Part Number	Manufacturer Part Number	Item Designation	Description	Technical Data	Manufacturer	DKI & JABAR OUTGOING	DKI & JABAR Bus Coupler (Cable conn	DKI & JABAR TOTAL	REMARKS
							186	31	217	
Cubicle panel (Basic Kit)										
1		PV241620FH2		PIX-24, FEEDER 24KV	2000A, 25kA, W:1000 x D:1605 x H1800	SCHNEIDER		31	31	
2		PV248612FH2		PIX-24, FEEDER 24KV	1250A, 25kA, W:800 x D:1605 x H1800	SCHNEIDER	186		186	
B										
1	B2129500001		-B21	Thermostat	Type : RSB30	RUN	186	31	217	
					Thermal Setting Range : 0-90 degree Celsius					
F										
1	F5000800160	P122B00Z112CE0	-F51	Feeder Management Protection Relay	Type : MiCOM P122B00Z112CE0	SCHNEIDER		31	31	
					Rated Current Input : 1 or 5A					
					Auxiliary Voltage Rating : 24-250V DC/24-240V AC					
					3 Logics Input + 6 Relay Outputs					
					Software Version V12.E					
					Earth Current Setting : 0.01 to 8 Ion					
					Port Communication : Modbus (RS485)					
					Flush Panel Mounting					
2	F5000800163	P123B00Z112CE0	-F51	Feeder Management Protection Relay	Type : MiCOM P123B00Z112CE0	SCHNEIDER	186		186	
					Rated Current Input : 1 or 5A					
					Auxiliary Voltage Rating : 24-250V DC/24-240V AC					
					5 Logics Input + 8 Relay Outputs					
					Software Version V12.E					

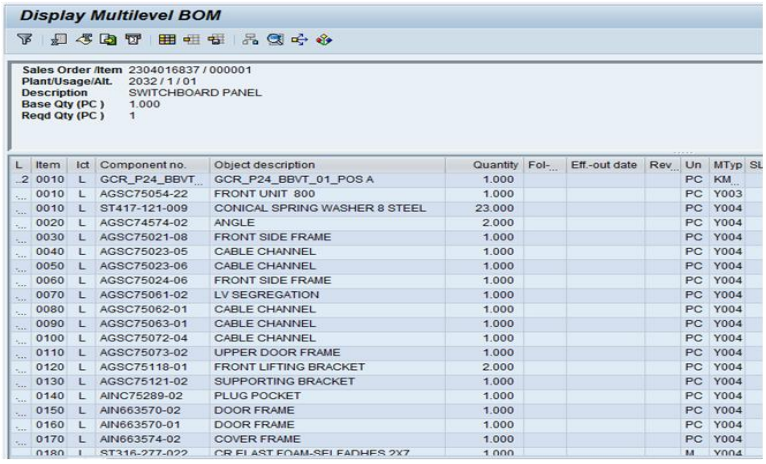
4.1. System Comparison Before and After Implementation

4.1.1. BOM and Purchase Demand Comparison

On prior implementation, the missing material was identified manually as BOM data is separated between electrical and mechanical parts and the purchase that is still manual. With the implementation of this new system, the manual process above was eliminated, component above was uploaded with the SAP system so that a demand that were managed by a system based on the lead-time purchase and arrival material. In SAP, the Bill of Materials will be uploaded via xml file that will be entered into SAP. Based on BOM upload, system will manage through MRP then it will be purchased by the schedule and requirements that have been inputted.

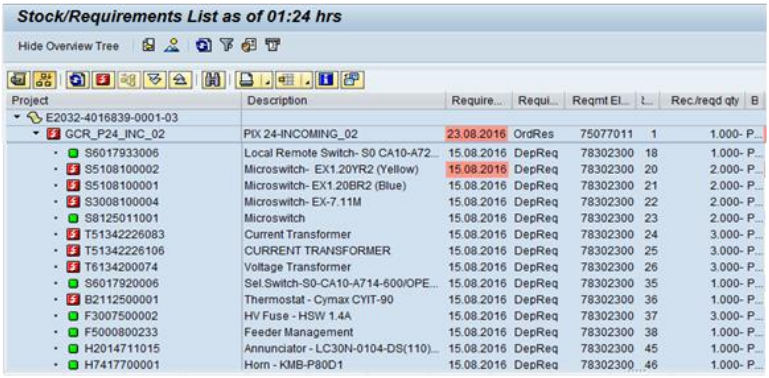


Picture 4.1: XML File Upload



L	Item	Ict	Component no.	Object description	Quantity	Fol-...	Eff.-out date	Rev...	Un	MTyp	Sl
..2	0010	L	GCR_P24_BBVT...	GCR_P24_BBVT_01_POS A	1.000				PC	KM...	
...	0010	L	AGSC75054-22	FRONT UNIT 800	1.000				PC	Y003	
...	0010	L	ST417-121-009	CONICAL SPRING WASHER 8 STEEL	23.000				PC	Y004	
...	0020	L	AGSC74574-02	ANGLE	2.000				PC	Y004	
...	0030	L	AGSC75021-08	FRONT SIDE FRAME	1.000				PC	Y004	
...	0040	L	AGSC75023-05	CABLE CHANNEL	1.000				PC	Y004	
...	0050	L	AGSC75023-06	CABLE CHANNEL	1.000				PC	Y004	
...	0060	L	AGSC75024-06	FRONT SIDE FRAME	1.000				PC	Y004	
...	0070	L	AGSC75061-02	LV SEGREGATION	1.000				PC	Y004	
...	0080	L	AGSC75062-01	CABLE CHANNEL	1.000				PC	Y004	
...	0090	L	AGSC75063-01	CABLE CHANNEL	1.000				PC	Y004	
...	0100	L	AGSC75072-04	CABLE CHANNEL	1.000				PC	Y004	
...	0110	L	AGSC75073-02	UPPER DOOR FRAME	1.000				PC	Y004	
...	0120	L	AGSC75118-01	FRONT LIFTING BRACKET	2.000				PC	Y004	
...	0130	L	AGSC75121-02	SUPPORTING BRACKET	1.000				PC	Y004	
...	0140	L	AINC75289-02	PLUG POCKET	1.000				PC	Y004	
...	0150	L	AIN663570-02	DOOR FRAME	1.000				PC	Y004	
...	0160	L	AIN663570-01	DOOR FRAME	1.000				PC	Y004	
...	0170	L	AIN663574-02	COVER FRAME	1.000				PC	Y004	
	0180	L	ST316-277-022	CR FLAST FOAM-SELFADHES 2X7	1.000				M	Y004	

Picture 4.2: Uploaded result of BOM SAP



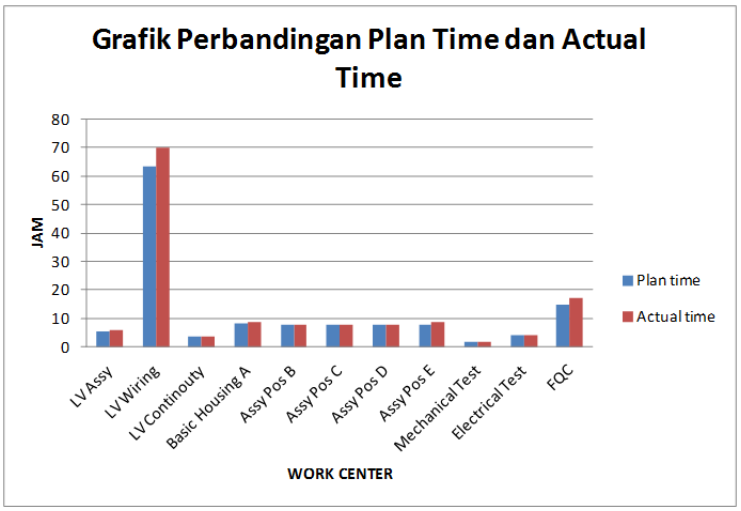
Project	Description	Require...	Requi...	Reqmt El...	I...	Rec./reqd qty	B
E2032-4016839-0001-03							
GCR_P24_INC_02	PIX 24-INCOMING_02	23.08.2016	OrdRes	75077011	1	1.000- P...	
S6017933006	Local Remote Switch- S0 CA10-A72...	15.08.2016	DepReq	78302300	18	1.000- P...	
S5108100002	Microswitch- EX1.20YR2 (Yellow)	15.08.2016	DepReq	78302300	20	2.000- P...	
S5108100001	Microswitch- EX1.20BR2 (Blue)	15.08.2016	DepReq	78302300	21	2.000- P...	
S3008100004	Microswitch- EX-7.11M	15.08.2016	DepReq	78302300	22	2.000- P...	
S8125011001	Microswitch	15.08.2016	DepReq	78302300	23	2.000- P...	
T51342226083	Current Transformer	15.08.2016	DepReq	78302300	24	3.000- P...	
T51342226106	CURRENT TRANSFORMER	15.08.2016	DepReq	78302300	25	3.000- P...	
T6134200074	Voltage Transformer	15.08.2016	DepReq	78302300	26	3.000- P...	
S6017920006	Sel.Switch-S0-CA10-A714-600/OPE...	15.08.2016	DepReq	78302300	35	1.000- P...	
B2112500001	Thermostat - Cymax CYIT-90	15.08.2016	DepReq	78302300	36	1.000- P...	
F3007500002	HV Fuse - HSW 1.4A	15.08.2016	DepReq	78302300	37	3.000- P...	
F5000800233	Feeder Management	15.08.2016	DepReq	78302300	38	1.000- P...	
H2014711015	Annunciator - LC30N-0104-DS(110)...	15.08.2016	DepReq	78302300	45	1.000- P...	
H7417700001	Horn - KMB-P80D1	15.08.2016	DepReq	78302300	46	1.000- P...	

Picture 4.3: Schedule and Requierment Material

4.1.2. Comparison Routing

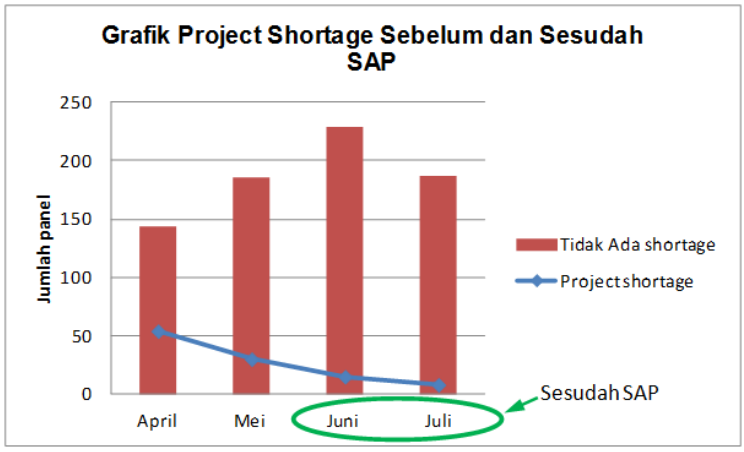
Data processing results above indicated that a routing plan can be compared with the actual construction process so that the process can be evaluated for increased productivity. This is the graph of comparison of Plan and Actual. From the data, there was the difference between Plan Time and the actual time, the difference was

highest at the work center LVBOX at the LV wiring that is the plan time of 63.3 hours and the actual process of 70 hours so that in the process there is a difference of 6.7 hours or 10% of plan time.



Picture 4.4: Comparison of Plan Time and Actual Time

4.1.3. Comparison Shortage (Deficiency) Material



Picture 4.5: Project Shortage Before and After SAP Implementation

From the data above, it showed a decrease in the amount of shortage of material on each project in June. There were only 15 projects shortages earlier in May and April as many as 54 and 30 projects. Based on this data shortage, it means there is a 50% decline from the prior SAP implementation. With the SAP application systems and ERP development process, all the existing data are able to be managed in a system that can be accessed in real time. Here's a comparison of data before SAP and after SAP, namely:

Before the implementation of SAP

- The lack of a good mapping of business processes.
- The absence of routing systematically
- The schedule production is not in accordance with the schedule of arrival materials and manuals.
- The existing data is hard to see and analyzed, causing the increase of material shortages when the production process takes place.

After the implementation of SAP

- The establishment of mapping processes that is clearly giving the process of flow work correctly.
- The creation of the routing system so that it can be compared between the time of actual work with the planned time.
- The schedule and the requirement of material are integrated in the system so it is easy to control.
- There is an identification of the material before the production process runs so that there is a decrease of shortage of material in a project when it is produced.

5. Conclusions

Based on the analysis and discussion of the problem, as well as the approach of ERP has been implemented with SAP applications, then there are a number of conclusions:

- After the implementation of SAP with the approach of ERP in the company, it is formed business processes and process flows so that the process is more efficient.
- By the routing in the system, each process can be compared between plan time and actual time. In the production process in this company, there is a difference between plan and actual. The Plan-time SAP for the production of panels is 133 hours and in the process of actual, it is 144.8 hours. There is a difference of 11.8 hours that can be caused by a couple of factors: supply of material, revision drawing, and others.
- Integrated production schedule with material requirement that facilitates the purchase of materials and control system of the material as defined by schedule in the system.
- Identification of the material availability before the production process so that the material shortage affects the decrease in the number of projects shortage of material from the previous 30 to 15 projects or the projects were dropped to 50%.

References

[1]. O'Brien, James A., and G. M. Marakas. "Developing Business/IT Solutions."Management Information Systems 488489 (2011).

[2]. Septryanti, A. (2014). Analisis dan Perancangan Sistem Informasi Integratif Pada Stikom Artha Buana Berbasis Enterprise Resource Planning. Jurnal Magister Informatika, 1-8.

[3]. O'Brien, J. A., & Marakas, G. (2005). Introduction to information systems. McGraw-Hill, Inc...

[4]. O'Brien, J. A. (2005). Pengantar Sistem Informasi: Perspektif Bisnis dan Manajerial Edisi 12. Jakarta: Penerbit Salemba Empat.

[5]. Creswell, J. W. (2013). Qualitative inquiry and research design: Choosing among five approaches. Sage.California.

[6]. Jogiyanto, H. M. (2005). Analisis & Desain Sistem Informasi: Pendekatan Terstruktur, Teori, dan Aplikasi Bisnis, Edisi Ketiga. Yogyakarta: Andi.

[7]. Pinckaers, F., Gardiner, G., & Van Vossel, E. (2011). Open ERP, a modern approach to integrated business management. Open Source management Solution.

[8]. Azis, R. (2010). Analisis Efektivitas Penerapan Sap (Sytem Application Product) R/3 Terhadap Informasi Akuntansi Pada PT Telekomunikasi Indonesia, tbk. Divisi Regional I Sumatera.

[9]. Gaspersz, Vincent., 1998, Manajemen Produksi Total, Strategi Peningkatan Produktivitas Bisnis Global, Gramedia Pustaka Utama, Jakarta . Yam, R. C. M., Tse, P. W., Li, L., & Tu, P. (2001). Intelligent predictive decision support system for condition-based maintenance. The International Journal of Advanced Manufacturing Technology, 17, 383–391.