

MANAGEMENT INFORMATION SYSTEM FOR ORDER FULFILLMENT: A CASE STUDY

Johanes Fernandes Andry¹, Halim Agung², Yana Erlyana³.

Faculty Technology and Design, Bunda Mulia University, Jakarta, Indonesia
jandry@bundamulia.ac.id, hagung@bundamulia.ac.id, yerlyana@bundamulia.ac.id

ABSTRACT

Nowdays companies must increasingly rely on the services of intermediate suppliers. Manufacturing sector strongly needs to create, share and disseminate up-to-date and appropriate knowledge and information. Many companies have now focused more on their supply chains. Order fulfillment management is a critical factor for one reason: the product must come in time to benefit from the existing sales opportunities.

The following research was conducted in the company that specialized in oil industry. The authors particularly analyzed the process of order fulfillment. The analysis was viewed the aspect of the business goals and objectives of information system, global requests, demands and needs of stakeholders, macro and micro organizational structure, management and decision-making processes, processes that exist in the organization, procedures, and guidelines which defines technologies and ways of processes execution and activities, competencies and responsibilities, time, constraints, deadlines, business and technical documentation, standards applied, generated reports for different levels of management and decision making processes, internal and external communications, and other resources.

Key words: supply chain, order fulfillment, information system management

1. INTRODUCTION

To remain competitive on a global scale, companies must increasingly rely on the services of intermediate suppliers (Perlman, Raz, Moshka, 2009). In responding to the advancement of global economy, manufacturing sector strongly needs to create, share and disseminate up-to-date and appropriate knowledge and information. For competitive advantages, many companies have now focused more on their supply chains and hence have thought of ways to improve their supply chain management. A supply chain is stays connected by flows of information, finance and material by the suppliers, producers, retailers, distributors and customers. The true value of sharing information within a supply chain can be defined by the fact that benefits achieved outweigh the costs involved. These costs may include information systems investment and charges by customers or suppliers for providing the information. The coordination costs may include communication and administration costs. The impact of information sharing on supply chains has become more significant with recent advances in Information Technology (IT). Furthermore, some

investigations have been conducted in order to focus on the impact of information sharing on product quality. Moreover, there is still room for further studies to clarify exactly how and what information should be shared and the beneficial effects on quality improvement (Lotfi, Mukhtar, Sahran, Zadeh, 2013).

Order fulfillment management is a critical factor for one reason: the product must come in time to benefit from the existing sales opportunities. Therefore, hopefully the company will be able to fulfill the orders as the slogan says, "delivery it to the right place, at the right time for the right price" (Rahmanto and Hartono, 2011).

The following research was conducted in the company that specialized in oil industry, which is as the third link of the supply chain for order fulfillment. The authors particularly analyzed the process of order fulfillment. The analysis was viewed the aspect of the business goals and objectives of information system, global requests, demands and needs of stakeholders, macro and micro organizational structure, management and decision-making processes, processes that exist in the organization, procedures, and guidelines which defines technologies and ways of processes execution and activities, competencies and responsibilities, time,

constraints, deadlines, business and technical documentation, standards applied, generated reports for different levels of management and decision making processes, internal and external communications, and other resources (Rejman, Petrović, Milanović, 2012).

2. THEORETICAL BACKGROUND

2.1. Management Information System

Management Information System (MIS) is basically concerned with data processing into some information. MIS works in every system, which provides information for the managerial activities in an organization. The term “management information system” (MIS) is synonymous with computer-based systems. A system to convert data from internal and external sources into information and communicate that information in an appropriate form, to managers at all levels in all functions to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible. Others, however, give it more limited scope. They see it as a system collecting and analyzing data and producing reports. Its purpose is to help managers to solve structured problems (Reddy, Srinivasu, Rikkula, Rao, 2009).

2.2. Supply Chain Management

Supply chain management can be defined as the management of upstream and downstream relationships with buyers and sellers in order to create value in the final market at less cost to the supply chain as a whole. This indicates on how the export supply chain plays a key role in flow managing of produce and information between buyers and sellers who are concerned with information sharing. More importantly, information sharing is a key strategy helping its members to make better decisions about strategic issues for better performance (Jraisat, 2011). A supply chain is “a network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of

products and services in the hands of the ultimate customer” (Habib, 2010).

2.3. Order Fulfillment

Order fulfillment is in the most general sense the complete process from point of sales inquiry to delivery of a product to the customer. Sometimes Order fulfillment is used to describe the narrower act of distribution or the logistics function, however in the broader sense, it refers to how firms respond to customer orders. However, in order to successfully exploit these opportunities companies must master novel challenges. In particular, the design of a multi-channel distribution system requires a constant trade-off between process integration and separation across multiple channels. In addition, sales and operation decisions are ever more tightly intertwined, as delivery and after-sales services are becoming key components of the product offering (Isac, 2014).

3. RESEARCH METHOD AND FRAMEWORK OF THINKING

The most commonly utilized methods in this category are observation, interview and participation (Storey, Emberson, Godsell, Harrison, 2006). In this case framework of thinking used SDLC, Software Development Life Cycle is a process used by software industry to design, develop and test high quality software. The SDLC aims to produce a high quality software that meets or exceeds customer expectations, reaches completion within times and cost estimates. The software development life cycle (SDLC) is a framework defining tasks performed at each step in the software development process. SDLC is a process followed for a software project, within a software organization. It consists of a detailed plan describing how to develop, maintain, replace and alter or enhance specific software. The life cycle defines a methodology for improving the quality of software and the overall development process. shown in Figure 1. Framework of Thinking.

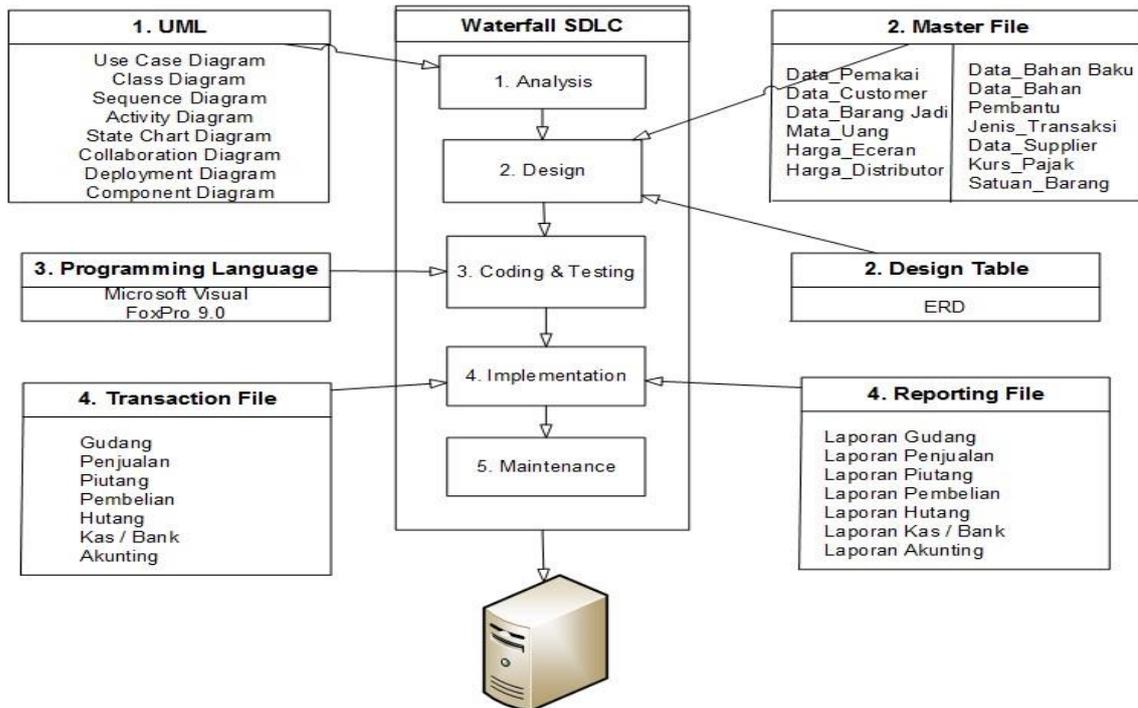


Figure 1. Framework of Thinking

4. RESULT AND DISCUSSION

The development of a new information system requires several phases, which have a relation on the activities. The activities include analysis, design, coding & testing, implementation and maintenance that sometimes referred to as phases. On the phase have elements that provide the framework for manage the project. Waterfall approach was SDLC first model to be used widely in Software Engineering to ensure success of the project. In "The Waterfall" approach, the whole process of software development is divided into separate phases. Waterfall SDLC model is a sequential software development process in which progress is regarded as flowing increasingly downwards (similar to a waterfall) through a list of phases that must be executed in order to successfully build a computer software. Originally, the Waterfall model was proposed by Winston W. Royce in 1970 to describe a possible software engineering practice (Bassil, 2012).

Analysis phases are phase to understand and to keep in all the detail of business needs and the processing requirements of the new system. Tools and technique for analysis is UML. The Unified Modeling Language (UML) is generally accepted as the de facto standard modeling notation for the analysis and design of the object that

oriented on software systems (Jakimi and Koutbi, 2009). UML is a standardized general purpose modeling language in the field of computer science and software engineering. The standard is managed and was created by the object management group (Siddique, 2010). UML defines thirteen types of diagrams into three categories: Six diagram types represent static application structure; three represent general types of behavior; and four represent different aspects of interactions: Structure Diagrams include the Class Diagram, Object Diagram, Component Diagram, Composite Structure Diagram, Package Diagram, and Deployment Diagram. Behavior Diagrams include the Use Case Diagram, Activity Diagram, and State Machine Diagram (OMG, 2015). In this case we only show use case diagram. Table 1. Syntax for Use Case Diagram, represent use cases are connected to actors through association relationships, which show with which use cases the actors interact (Dennis, Wixom, Tegarden, 2005).

Table 1. Syntax for Use Case Diagram

Syntax	Mean	Description
	Use case	Represents a major piece of system functionality.
	Actor	Is a person or system that derives benefit from and is external to the subject.

Use cases help us to understand and clarify the users requirement for interactions with the system and reveal it most or all the functional requirements of the new system. (Dennis, Wixom, Roth, 2012). Use cases in information systems for order fulfillment are shown in Figure 2. Use Cases Order Fulfillment. From the diagram we can conclude the information system management made up of 6 actors, there are Warehouse (Gudang), Sales (Penjualan), Debt (Piutang), Purchasing (Pembelian), Payable (Hutang) and Accounting (Akunting) Warehouse division can input all the products of good sell, raw material and additional material. They also can give out report of the products, raw material and additional material. Sales division works on sales order. Debt division works on debt post. Purchase division works on purchase order. Payable division works on payable report. Last, Accounting division works on the ledger, cost of good sells, finance report, stock report and transaction report

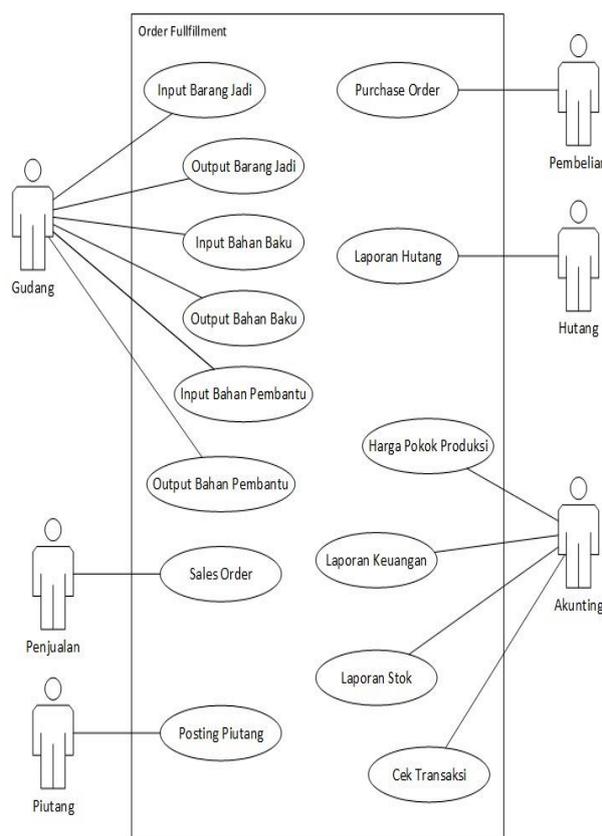


Figure 2. Use Case Order Fulfillment

Design phases are creating the system solution based on the defined requirements and decisions that made up during analysis. In this phase we create master file and

design ERD. The Entity-Relationship Diagram (ERD) has been widely used in structured analysis and conceptual modeling. The ER approach is easy to understand, powerful to model real-world problems and readily translated into a database schema. The ERD views that the real world consists of a collection of business entities, the relationships between them and the attributes used to describe them. Other ER modeling semantics used by most methodologies include cardinality, participation and generalization. The typical semantic constructs of the ER model and its variations we consider in this article include the following features: (1) An entity type represents a distinguishable object type, (2) A relationship type represents an association between or among several entities, An attribute is a property that is used to describe an entity or a relationship, (3) A cardinality constraint specifies the number of relationship instances in which an entity can participate, (4) A participation constraint specifies whether an entity instance can exist without participating in a relationship with another entity and (5) Generalization/specialization specifies superclass and subclass relationship between entity types (Song, Evans, Park, 1995). ERD includes too many entity, in this case we only shows 12 entity are purchase return (retur pembelian), finish good (barang jadi), stock card (kartu stok), finish good-in (barang jadi masuk), balance of the year (saldo awal tahun), return finish good (retur barang jadi), data list (list data), sales invoice (faktur penjualan), goods detail (detil barang), sales order, closing PO and purchase order. See Figure 2. Entity Relationship Diagram.

Coding phases are receiving the design of the system documents, the work done is divided in to modules/units and actual coding is started. Since, in this phase the code is produced so it is the main focus for the developer. This is the longest phase of the software development life cycle. In this case programming language with Microsoft Visual Fox Pro. Visual Fox Pro originated as a member of the class of languages commonly referred to as "xBASE" languages, which have syntax based on the dBase programming language. Phases Testing: After the code is developed it is tested against the requirements to make sure that the product is actually solved the needs

addressed and gathered it during the requirements phase. During this phase all types of functional testing like unit testing,

integration testing, system testing, acceptance testing are done as well as nonfunctional testing are also done.

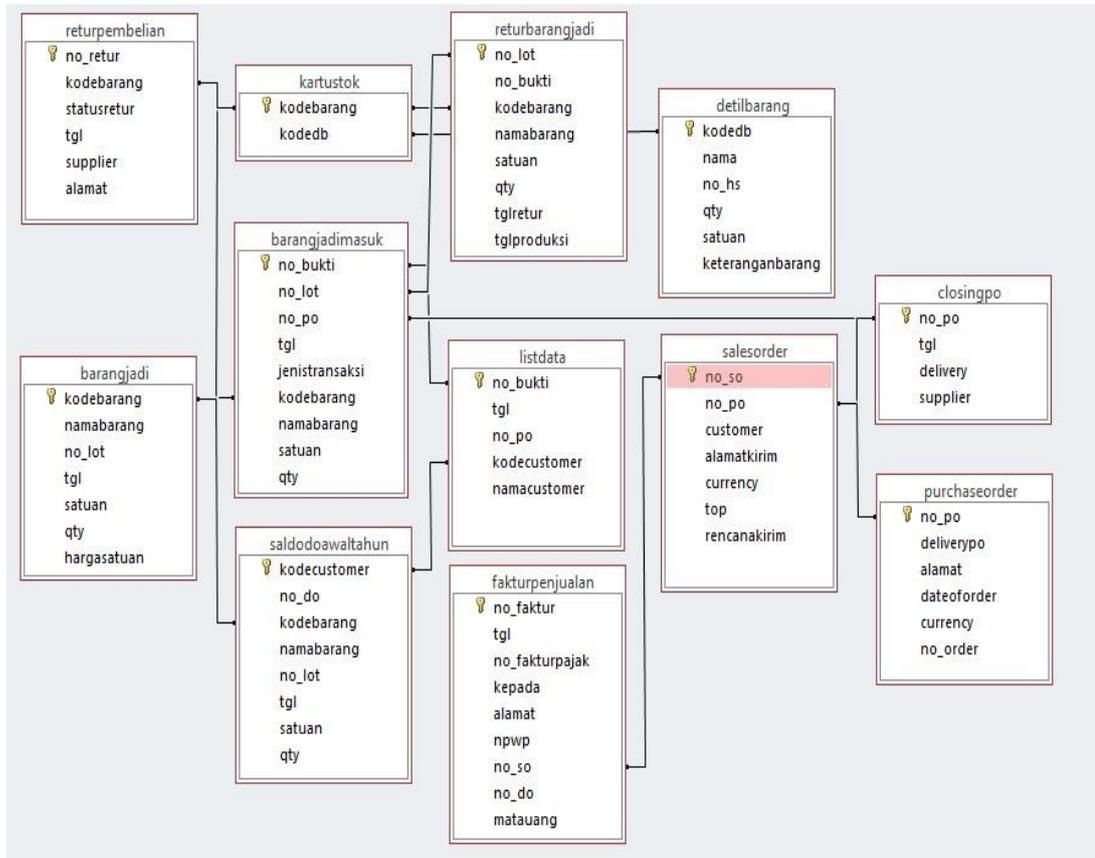


Figure 3. Entity Relationship Diagram

Implementation phases are the phase that provides users with the documentation and training requirement to use the system effectively. Data Conversion will only occur once, but user documentation will be required. Deployment of the product will be carried out, on the hardware that is going to be used in production (on live systems). Deployment itself requires careful planning. Once the product is deployed, initial data will be populated, user training will happen. Phases implementation include are reporting and transaction file. Reporting files are warehouse report (Laporan Gudang), sales report (Laporan Penjualan), debt report (Laporan Piutang), purchase report (Laporan Pembelian), credit report (Laporan Hutang), cash report (Laporan Kas/Bank) and accounting report (Laporan Akunting). Transaction file include all the data of warehouse (Gudang), sales (Penjualan),

debt (Piutang), purchase (Pembelian), credit (Hutang), bank (Kas/Bank) and accounting (Akunting).

Phases maintenance the system information when the customers starts using the developed system then the actual problems comes up and needs to be solved from time to time. This process taken for the developed product is known as maintenance. All this phase in waterfall SDLC model see Figure 1. Framework of Thinking.

The needs assessment for the order fulfillment system is implemented in an application that can be seen in Figure 4 for the login interface and Figure 5 to display the main menu interface as well as for the whole of the order fulfillment information systems can be seen in Figure 6.



Figure 4. Login Interface

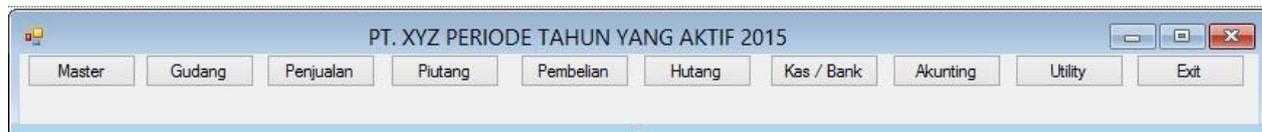


Figure 5. Main Menu Interface

5. CONCLUSION

The implementation of management information system developed for order fulfillment in the observed company was achieved in the following: (1) Monitoring of material and financial flows in real time. (2) Reduction of the data acquisition processing time and order processes automation. (3) Increasing the number of processed data include data about the required materials/parts for purchasing, current stock of finished products and input materials, materials/parts in transport, etc. (4) Increasing the quality of information. (5) Reducing the number of employees who work on data processing, not only in order fulfillment processes, but also in other processes while increasing the time available.

6. REFERENCES

- (a) Bassil, Youssef. (2012) A Simulation model for the waterfall software development life cycle, *International Journal of Engineering & Technology (IJET)*, ISSN: 2049-3444, Vol. 2, No. 5, 2012.
- (b) Dennis, Alan., Wixom, Barbara Haley., and Roth, Roberta M. (2012) System analysis and design, fifth edition., ISBN 978-1-118-05762-9, John Wiley & Sons, Inc.
- (c) Dennis, Alan., Wixom, Barbara Haley., and Roth, and Tegarden, David. (2005) *Systems Analysis and Design with UML Version 2.0, An Object-Oriented Approach*, Second Edition, John Wiley & Sons, Inc.
- (d) Habib, Md. Mamun. (2010) Supply chain management: theory and its future perspectives, *International Journal of Business, Management and Social Sciences*, Vol. 1, No. 1, pp. 79-87.
- (e) Isac, Claudia. (2014) E-fulfillment – a new challenge for electronic business, *Annals of the University of Petroșani, Economics*, 14(1), 21-128.
- (f) Jakimi, A, and Koutbi, M. El. (2009) An object-oriented approach to UML scenarios engineering and code generation, *International Journal of Computer Theory and Engineering*, Vol. 1, No. 1, April 2009, 1793-8201, DOI: 10.7763/IJCTE.2009.V1.6.
- (g) Jraisat, Luai E. (2011) A perspective for supply chain management: building a conceptual framework, *Int. Journal of Business Science and Applied Management*, Volume 6, Issue 3.
- (h) Lotfi, Zahra, Mukhtar, Muriati, Sahran, Shahnorbanun, and Zadeh, Ali Taei. (2013) Information Sharing in Supply Chain Management, The 4th International Conference on Electrical Engineering and Informatics (ICEEI 2013), *Procedia Technology* 11, 298-304.
- (i) Perlman, Yael., Raz, Tzvi., and Livnat, Moshka. (2009) Key Factors in Selecting an International Freight Forwarding Company, 1874-4478/09 2009 Bentham Open, *The Open Transportation Journal*, 2009, Volume 3.
- (j) Rahmanto, Nurdin and Hartono, Budi. (2011) Analisis manajemen pemenuhan pelanggan pada industri kecil menengah pembuatan tas dan bordir menggunakan pemodelan system dynamics (Studi kasus pada CV. Kurnia Jaya – Yogyakarta), *Jurnal Manajemen dan Organisasi* Vol II, No. 3. Desember 2011.
- (k) Rejman, Dragana., Petrović., and Milanović, Igor. (2012) Management Information System of Purchase

- Function in e-SCM, *Management Information Systems*, Vol. 7, No. 1, pp. 003-012.
- (l) Reddy, G. Satyanarayana., Srinivasu, Rallabandi., Rikkula, Srikanth Reddy., and Rao, Vuda Sreenivasa. (2009) Management information system to help managers for providing decision making in an organization, *International Journal of Reviews in Computing* © 2009 IJRIC, E-ISSN: 2076-3336.
- (m) Storey, John., Emberson, Caroline., Godsell, Janet., and Harrison, Alan. (2006) Supply chain management: theory, practice and future challenges, *International Journal of Operations & Production Management*, Vol. 26 No. 7, 2006 pp. 754-774, Emerald Group Publishing Limited 0144-3577 DOI 10.1108/01443570610672220.
- (n) Siddique, Qasim. (2010) Unified modeling language to object oriented software development, *International Journal of Innovation, Management and Technology*, Vol. 1, No. 3, August 2010, ISSN: 2010-0248.
- (o) Song, Il-Yeol., Evans, Mary., and Park, E.K. (1995) A comparative analysis of entity-relationship diagrams, *Journal of Computer and Software Engineering*, Vol. 3, No.4 (1995), pp. 427-459.
- (p) http://www.omg.org/gettingstarted/what_is_uml.htm, access date: 18 August 2015 at 09.00.
- (q) <https://msdn.microsoft.com/en-us/vfoxpro/bb190225.aspx>, access date: 12 August 2015 at 08.00.
- (r) http://docs.oracle.com/cd/A97335_02/aps.102/bc4j/developing_bc_projects/bc_whatisanapplicationmodule.htm, access date: 18 August 2015 at 09.00.
- (s) <https://msdn.microsoft.com/enus/library/ms187837.aspx>, access date: 5 August 2015 at 15.00.
- (t) http://www.tutorialspoint.com/sdlc/sdlc_overview.htm, access date: 5 August 2015 at 14.00.

AUTHOR BIOGRAPHIES

Johanes Fernandes Andry is a lecturer in Department of Information System, Faculty of Technology and Design, Bunda Mulia University, Jakarta. He received his Master of Computer Science from Budi Luhur University in 2006. His research interests are in the area of Supply Chain Management. His email address is <jandry@bundamulia.ac.id>

Halim Agung is a lecturer in Department of Information Technology, Faculty of Technology and Design, Bunda Mulia University, Jakarta. He received his Master of Computer Science from Budi Luhur University in 2014. His research interests are in the area of Information System. His email address is <hagung@bundamulia.ac.id>

Yana Erlyana is a lecturer in Department of Visual Communication Design, Faculty of Technology and Design, Bunda Mulia University, Jakarta. She received her Master of Management from Bunda Mulia University in 2011. Her research interests are in the area of Management. Her email address is <yerlyana@bundamulia.ac.id>

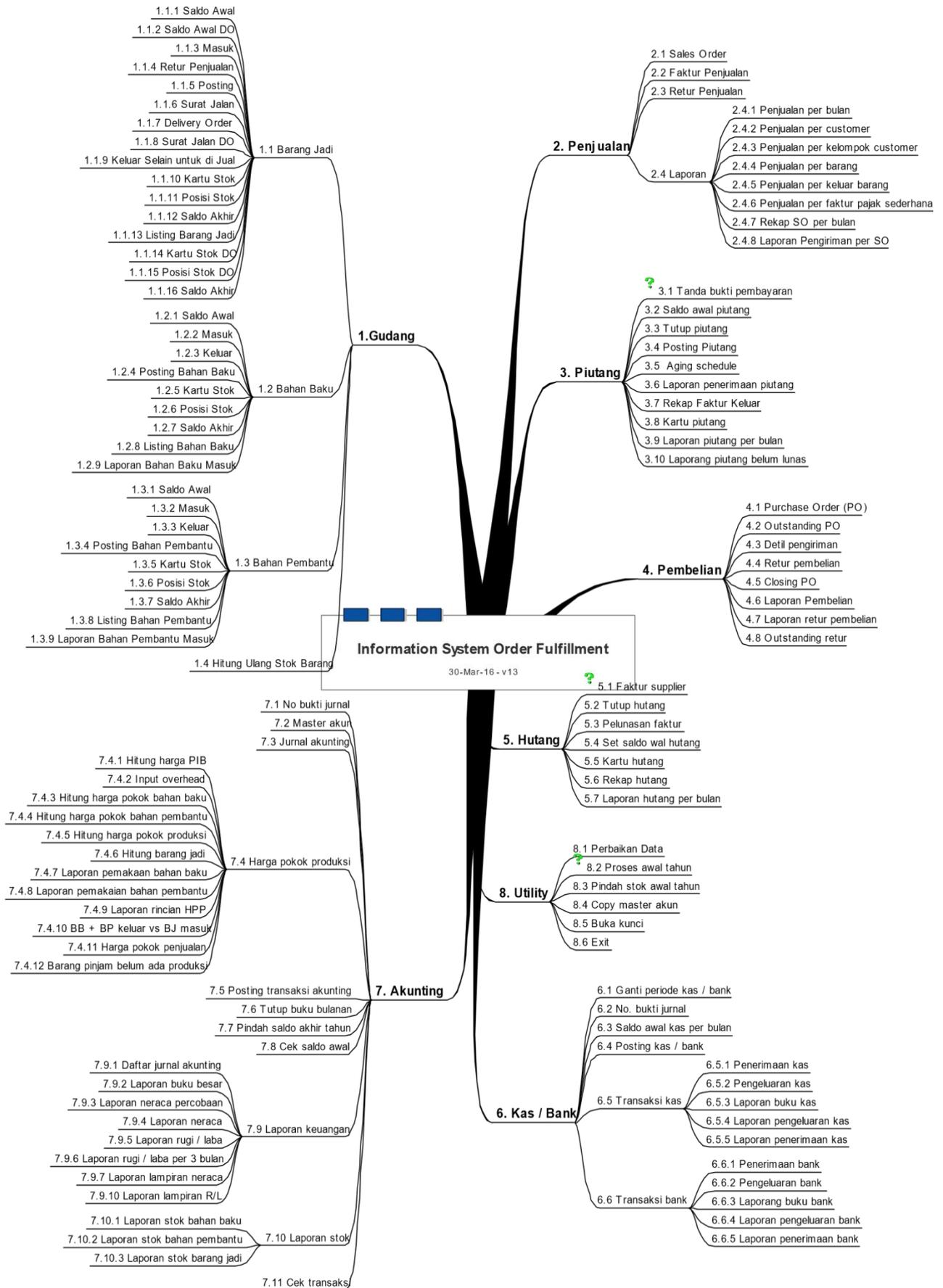


Figure 6. Information System Order Fulfillment