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The Analysis of Finished Rubber Products Industry

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Abstract
IDEFo model is one of the models that can be used to determine the set of processes thouroughly, completely and comprehensevely by providing the information on input, control, output and mechanism (ICOM). The IDEFo model generates models as network diagrams which are useful to guide and to evaluate the process for obtaining a good performance. Industrial processes in the finished rubber product industry obtained from the IDEFo modeling consist of an industrial process besed on solid rubber and latex. Solid rubber-based processes include the preparation of activity materials (natural rubber, synthetic rubber and auxiliary materials), compound manufacture, molding and vulcanization. Latex-based processes include the manufacture of concentrated latex, making dispersion auxiliary materials, the manufacture of latex compound, molding and vulcanization.
Keywords: IDEF0, model, process, finished rubber product industry, solid rubber, latex

1. Introduction

Model is something that describes for a particular purpose. Model is used to facilitate people to understand, communicate, support improvement and management processes, which indirectly guides the process implementation (Curties et al., 1992). Several models have been developed to describe what to do in the management systems and processes such as DFD (*Data Flow Diagram*), SADT (*System Analysis and Design technique*) and IDEFo (*Integration Definition*).

IDEFo model is based on the structure and SADT planning techniques that was upgraded by the ICAM (*Integrated Computer Aided Manufacturing*) in 1993. IDEFo is a very useful model to explain the processes related to the work environment (Fieldman, 1998). This model is able to thoroughly explain the complex technical details to both the technical and non - technical employee. Therefore, the work focus is easier to be understood (Ang, 2000)

IDEFo model is developed through graphs with boxes and arrows (Millet et al., 1992). The arrow from the top to the bottom shows a control (*control*), the incoming arrow from the left and the arrow in the right of the box show the input - output relationship, and the arrow from the bottom is a mechanism which depicts a support to the activities (Presley and Liles, 1992).

IDEFo model has three main elements; concepts, language and pragmatics (Rita, 2003). The steps that must be considered in the use of the IDEFo model include: 1) the development of a graph model from the system, so that the elements of the system and their interactions can be defined, documented, discussed and analyzed effectively, 2) the development of models in a top-down structure, modular, and hierarchy by defining elements of the system which are integrated, to construct a hierarchical system, 3) the separation of the design functions which allows the basic functions to be altered, so it can create a new function, 4) reflecting objects or actions and cases, 5) creating a graph (listed in the chart) which is not a mathematical or text, so it can deliver a communication value concisely and precisely that reflects the real functions of the process, 6) the model is the result of working groups which are discipline and coordinated to obtain the group approval and 7) the model shows the overall information in the text (Sri. AR, 2010).

2. Methods

The framework of model development using the IDEFo technique in the finished rubber product industry compose of the combination of all existing processes linking to the various correlations that occur based on the inputs, controls, mechanisms and outputs. For the implementation, the available data and information from the modeling process are decomposed into the planning schedules in order to get the activities completion time or cost required. The framework of model development in the finished rubber product industry is illustrated in Figure 1.

The step-by-step of model development by using the IDEFo method (Draft 183, 1993) in the finished rubber product industry consist of:

1. Collecting data and information relating to the process in the rubber product industry thoroughly, completely and detail from the problem found in this study.
2. Dividing all stages of the process into working units or activities (distribution of the development process).

- Defining the scope of the entire processes.
- Determining the activity details in each element of the processes.
- Distributing more activities if it is required (breakdown activities).

3. Identifying the dependence of information between activities.
   - Identifying input, output, control and mechanism (ICOM) in each activity.
   - Determining the relationships between each activity based on the ICOM.
   - Developing the IDEFO diagrams.
   - Completing specifications and elaborating activities when required for further explanation
   - Examining and determining whether it is still required additional activities (*breakdown*), if necessary, return to step 2

Data in this study were obtained from various references and depth interviews with the rubber technology experts from *Bogor Rubber Technology Research Center*, *Industrial Research and Standardization, Palembang* and *Daya Cipta Mandiri Insani Company, Bandung* (producer of finished rubber product exports).
Data obtained were analyzed and the model was developed by using IDEFo technique. Results of the model were validated to ensure that the concept is appropriate and can be implemented and does not violate the rules of the processes in the finished rubber product industry (Sargent, 1999). The concept of IDEFo model finished rubber industry is illustrated in Figure 2.

3. Results and Discussion

The IDEFo modeling is one of the method for understanding the process thoroughly, completely and comprehensively by providing the information of input, output, control and mechanism (ICOM). This method generates the models as network diagrams or networks that are useful for guiding and evaluating the process in order to produce good performance (*effective and efficient*). Modelling with IDEFo technique can also be used in the development of the models for the purpose of obtaining a new process model which is better than existing ones (to be models).
The production process in the finished rubber product industry consist of two main processes, namely the industrial process of the finished rubber products based on solid rubber and the industrial process of the finished rubber products based on latex (BPTK , 2011). Industrial process of the finished rubber products based on solid rubber includes several activities such as preparation of raw materials, compound manufacture, molding and vulcanization. The production of the finished products based on latex comprises of the production of concentrated latex, the production of supplemetary materials, latex compound manufacture, molding and vulcanization. The IDEFo model in the finished rubber product industry is shown in Figure 3.

3.1 . *The IDEFo model in finished rubber product industry based on solid rubber*

The finished rubber product industry based on the solid rubber produce a variety of products such as tires, footwear, rubber hoses, automotive components, electronic components, industrial rubber products, rubber pipes and others.
The process of the rubber industry based on the solid rubber includes the inputs of raw materials of processed rubber such as *sheet, crepee or crumb rubber*, synthetic rubber and supplementary chemicals. Rubber raw materials, supplementray chemicals and synthetic rubber are mixed and masticated into *masterbath* or *compound* form. The compound is molded (molding) into a variety of products and is vulcanised to obtained prefered appereances. The IDEFo model in the finished rubber product industry based on solid rubber is demonstrated in Figure 4 .

3.2 . *IDEFo model in the finished rubber product industry based on latex*

The latex based rubber industry produce a variety of products such as latex foam, rubber gloves, rubber for medical equipment, rubber foam, condoms, rubber thread, balloons, rubber milk nipples and others.
The inputs required in these industry are concentrated latex and supplementary chemicals (*dispersion or conversion*). The concentrated latex and chemicals are mixed with centrifugation methods to produce a latex compound. Latex compound is molded and vulcanized to produce preference products. Printing is conducted by immersion, pouring and foaming. IDEFo model in the finished rubber product industry based on latex is shown in Figure 5 .

3.3 . *Model of information activities*

The model of information activities by using IDEFo method consists of input, control, output and mechanism (ICOM). The process of this model includes the production processes found in the finished rubber product industry based on solid rubber and latex.
Basic structures of the finished rubber product industry include (A - 0) main modeling, (A - 1) the processes in the finished rubber product industry based on solid rubber, (A - 2) the processes in the finished rubber product industry based on latex. Preparation of the basic structures of the model development in the finished rubber product industry is shown in Figure 6 .

4. Conclusion

The IDEFo model generates a modeling that clearly describes the process in the finished rubber product industry, so it is easy to be understood. The process in the finished rubber product industry consists of two main processes, namely the industrial process based on solid rubber and the industrial process based on the latex. The process in the finished rubber good industry based on solid rubber consists of preparation of raw materials, compound manufacture, molding and vulcanization. The production of finished rubber products based latex consists of manufacturing concentrated latex, making supplementary materials, manufacturing latex compund, molding and vulcanization.

References

Ang.C.L. 2000. IDEF A Comprehensive Modeling Methodology for the Development of Manufacturing Enterprise System. SIMTech Technical Report. Singapore Institute of Manufacturing Technology.

Badan Penelitian Teknologi Karet (BPTK). 2011. Materi Kursus Teknologi Barang Jadi Karet. Bogor.

Curtis, B., Kellner, M.I., & Over, J., 1992. Process Modeling. Communication of the ACM 35, 75-90.

Draft Federal Information Processing Standards Publication 183. 1993. Announcing the Standard for Integration Definition for Function Modeling (IDEFo).

Fieldmann. C.G, 1998. The Practical Guide to Business Process Reengineering Using IDEFo. New York. Dorset House Publishing.

Millet, I., & Mawhinney, C.H., 1992. Executive Information System : A Critical Perspective. *Information & Management* 23, 83-92.

Presley.A & Lilies. D. 1993. The Use of IDEFo for the Design and Spesification of Methodologies. Los Angeles. CA.

Rita. E., 2003. Pembangunan Budaya Kualitas dalam Firma Binaan di Indonesia. *Ph.D Thesis Universitas Teknologi Malaysia*. Johor Baru.

Sargent, R.G. 2007. Verification and Validation of Simulation Models. In: Simulation Conference, 2007 Winter. 9-12 December 2007, 124-137.

Sargent, RG. 1999. Validation and Verification of Simulation Model. Proceeding of the 1999 Winter Simulation Conference.

Sri. AR. 2010. Analisis Proses Bisnis pada Distributor XYZ Menggunakan Tools Pemodelan IDEFo. Makalah Seminar Nasional Aplikasi Teknologi Informasi (SNATI). Yogyakarta.

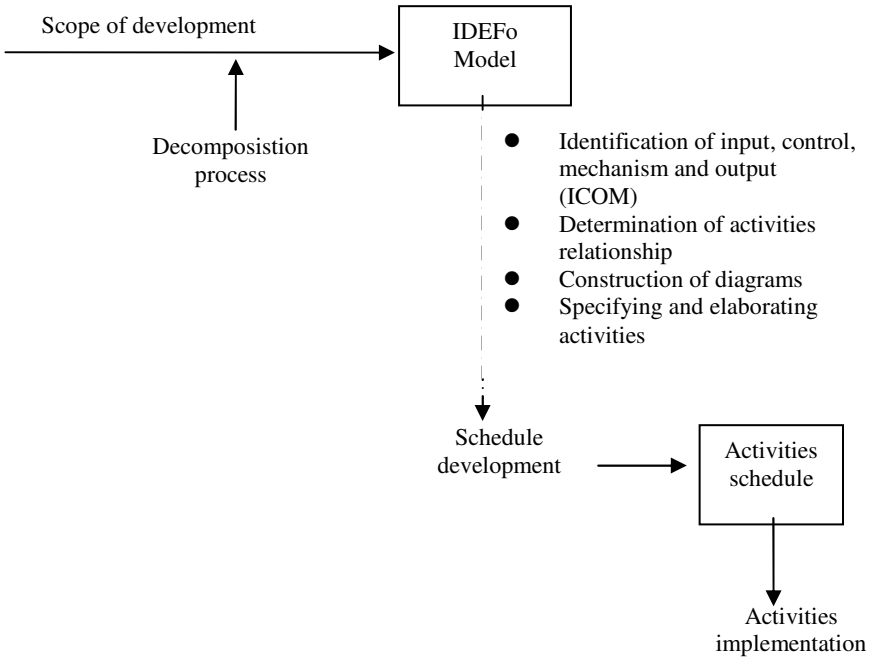

Figure 1. The framework of IDEFo model in the finished rubber product industry.

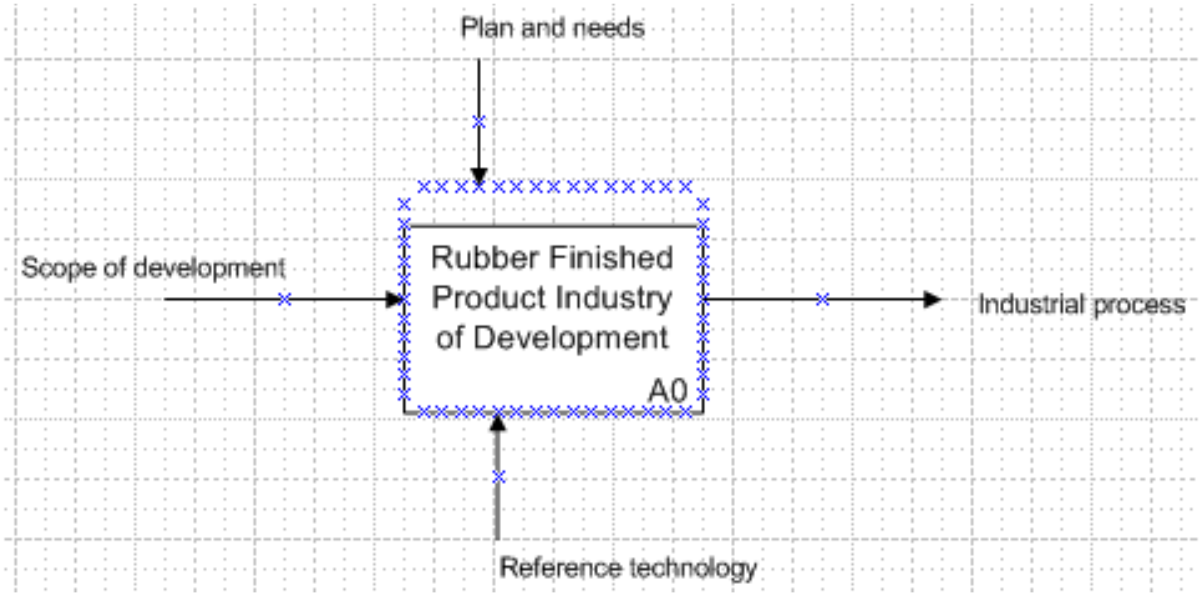

Figure 2. The concept of IDEFo model in the finished rubber product industry.

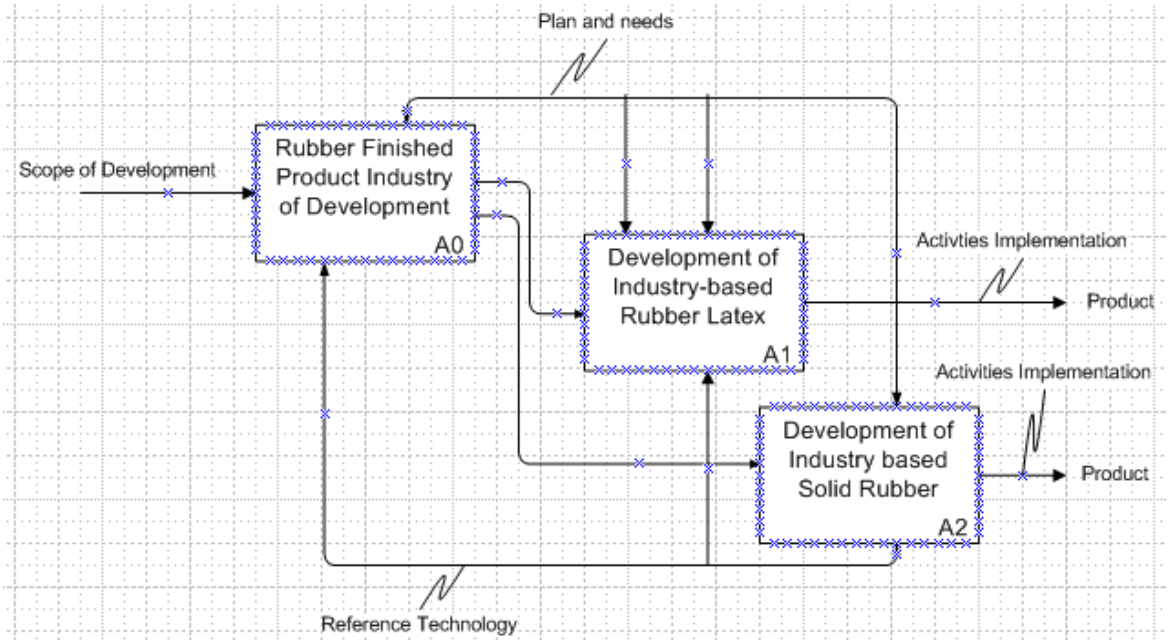

Figure 3. IDEFo model in the finished rubber product industry.

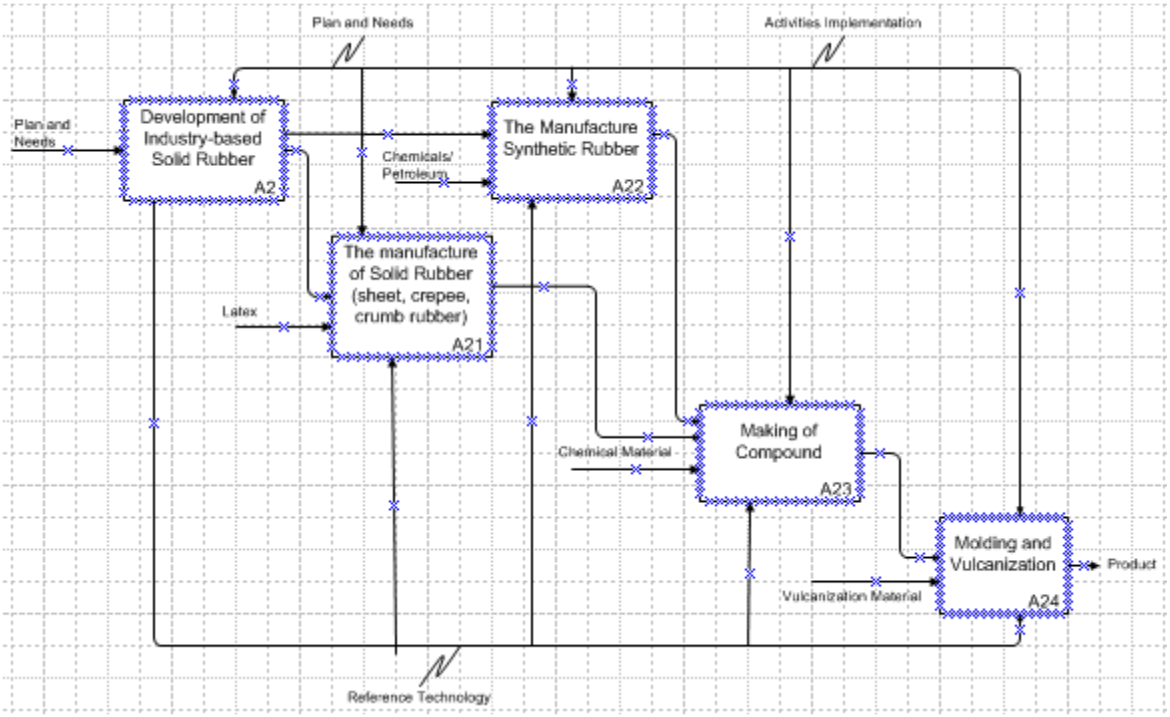

Figure 4. IDEFo model in the finished rubber product industry. -based on solid rubber.

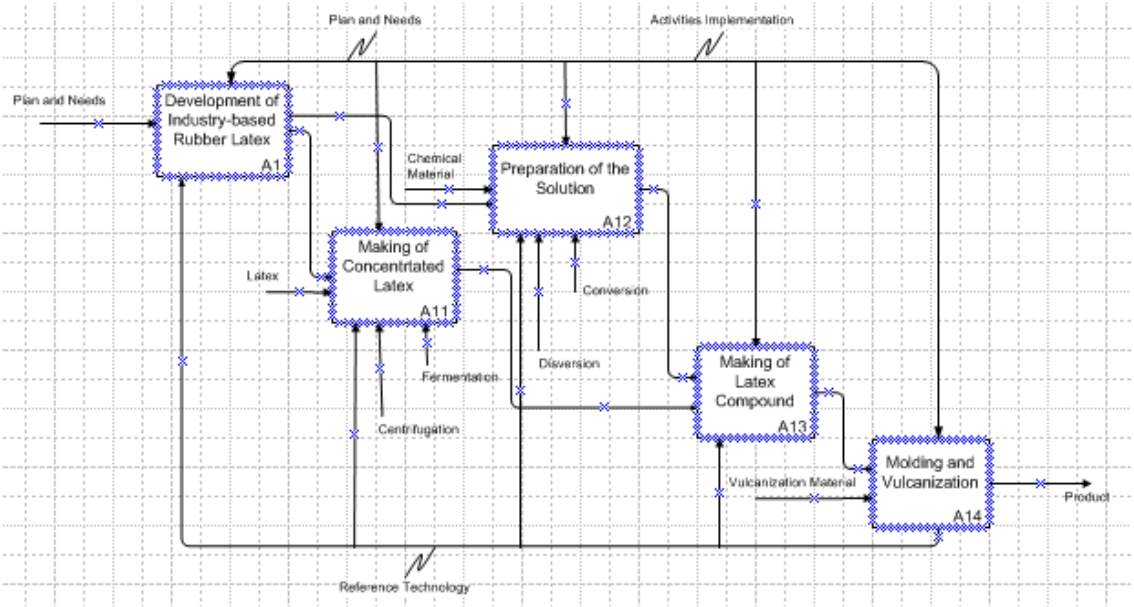

Figure 5. IDEFo model in the finished rubber product industry based on latex rubber

Figure 6. The structure of IDEFo model in the finished rubber product industry.