



Process Planning and Information System in SME

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Abstract:

With the ongoing globalization and the development of economic rationalization, the importance of SME (Small and medium Enterprises) are gaining the center place of the development of mechanical industries and have a significant impact on GDP (Gross Domestic Product). The process planning is an important element in the manufacturing area of research. The areas selected here are the enterprises with different challenges. The recommendations are involving the concepts and best practices and the effective utilization. During this, information plays an important tool to maintain enterprises to continue and survive. It is the companies to collect, process, store and transmit such information to develop the knowledge based system.

Keywords: SME, IT, Process Planning, Industries.

I. INTRODUCTION

PANTA rhei – everything flows. This statement of the Greek philosopher Heraclitus (535-475 BC) emphasizes that everything on this planet is subject to change. Industries are asked to develop new markets, increase their productivity and strengthen the manufacturing collaboration with their suppliers and customers. Sustainable growth and economic success demands constant adaption to change for enterprises. The target of this work is to analyze how PP (Process Planning) is implemented in SME with geographical focus with suggesting more clear and structured recommendations for efficient and effective usage of PP methodologies for SMEs are proposed. The focus lies on realistic and pragmatic, as well as entrepreneurial worthwhile the use of modern technologies and systems for contemporary management has become a necessity. Information Systems (IS) were introduced to assist in the growth and survival of SMEs with the aim of improving the planning processes within enterprises.

II. PROBLEM DESCRIPTION

The problem defined here is to verify, that is evaluated within this work of process planning duly used in and around the industry sector of small and medium-sized enterprises. The attention has been made to face the challenges that these companies have to face in regards of process planning. These challenges are not limited to the operational production process only, however they reside within the whole range of the supply chain. Process planning is not an isolated process within a company. The different areas within an enterprise can lead to negative side effects and problems if not properly managed, monitored and controlled. Hence, it is presumed that, every company has its unique requirements as well as production and planning setups. Followed is an overview of potential areas, that is listed and the main questions are explained that are examined and evaluated in this work.

A. Process Planning: How and what kind of process planning is suggested for in and within the company? Which

kind of suggested tools are used and which information is used for what? Can an optimal process plan be ensured, or what prevents it from being generated? What kind of impact of the generated process plan to manufacturing? Who is responsible for process planning and their targets are given?

B. ERP-System: Does there be an ERP-system? Which parts of the ERP system are used for process planning? The integration of the process planning and manufacturing process has been taken care or not? What kind of data represents the input for process planning? Does media discontinuity exist within the IT-landscape? To which degree is process planning actively supported by software solutions?

C. Business Processes: The business processes has been asked to manage within the company. The processes are documented and is structured in an approach for process optimization and re-engineering. The business processes of different departments connected to the network chain, in certain kind of manufacturing. The authority is to define new processes or adjustments within the company.

III. THEORETICAL BASICSOFPs AND SME

A. PPs and ERP-Systems:

Process Planning (PP) systems as parts of the manufacturing processes and is the point of research and development of high interest. It indicates the economic backbone of manufacturing sector and information processes at the development time within manufacturing industries. With the evolution of internet and software's the PP-Systems are mostly integrated into advanced Enterprise Resource Planning Systems (ERP). The development of ERP marked a milestone within the evolution of PP-systems. Within an ERP all resources that are necessary for the business activities of an enterprise are considered. Their most important functional areas that are: PPs, Materials Logistics Acquisition, Maintenance, Quality Assurance Marketing, Sales and Distribution, Route Planning, Financial Accounting, Liquidity Planning, Controlling, etc.

B. Process Methodologies: With a focus on process planning in the manufacturing activity, the supporting and stabilizing processes in the course of this work, four PPs methodologies have been suggested. They are selected on bases of economic potential and applicability:

1. Just-in-Time
2. Kanban Scheduling System
3. Lean Production
4. Constraint Oriented Production

The said methodologies along with the applications to represent PPs that are applicable at an international level within the manufacturing industries. These four methodologies added the value throughout a company's policies:

1) **Just-In-Time (JIT):** It defines the right material, at the right time, in the right quality, in the right quantities, and at the right place. It is a philosophy that is to optimize production flows in a definite way. JIT-production is the core which transforms the raw material to a finished product. The transformation process element of the JIT- is a philosophy. Reason of comparison is to the production demands a fundamental paradigm shift in companies, especially SME. This paradigm speaks the change from *Push* to *Pull*. Which means, the focus lies on the customer demand where a customer comfortably confirms the production to comply. The application of a flow shop or assembly line production with small lot sizes is a very good example of this. However the *Push makes* the downstream production in order to delivers material upstream causing overflow or shortage. Along with *Pull*, the upstream production pulls a product as soon as it is idle. The JIT-production which produces from work station to work station without any difficulties. This results in reducing lead times significantly as well as minimizing work in process.

2) *Kanban* is the word for "ticket" or "signal" used in Japan. The scheduling system which was developed in Japan around 1970 and got applied at that time in the production scheduling of Toyota. The developed methodology is to reduce stock in order the reduce capital commitment. The principle of *Kanban* is a system of self-regulating closed loop controls intended to adjust and balance between production steps. The scheduling system used for manufacturing is also applicable for industrial production. When a sales order is placed and goods are shipped from central storage to customer, this information triggers a re-order at the last production stage upstream. Every production stage has a dedicated buffer stock in a production system is defining minimum stock level. Each production stage has therefore access to stock with a specific amount of intermediate goods. A re-order triggers a production activity up-stream. If the re-order falls achieves the minimum stock level, an additional reorder is to be taken care for the next production stage up-stream. This chain of triggering reordering activities and process activities goes up-stream till purchasing is reached. If a product is delivered to the customer and hence leaving the system for good, the *Kanban* ticket is returned. The *Kanban* Scheduling System realizes the so-called *pull principle*. This means that work orders are taken care with production activities are pulled from a final product of manufacturing point of view through the system.

3) *Lean Production* The widely known Toyota Production System (TPS) represents the basis for manufacturing efficient, more competitive and modern flow of materials system. The successful methodology applied in industries such as automotive, mechanical engineering, building sector, medical

engineering or bio-chemistry. This becomes an interesting fact and is applied in high- as well as low-wage-countries. The methodology is a used in element of lean thinking is the understanding and elimination of *muda*, which means "waste" in Japanese. Waste or *muda* are all processes or things that add no value to the product or end customer. This covers mainly human activities that absorb resources but create no value. Based on Womack and Jones [6] supported by Rother [5].

4) SMEs(Small and Medium sized Enterprises): The classification of micro, small and medium sized enterprises is made up of enterprises which is carried with less than 250 employees and with an annual turnover of not more than 50 crores. They are with market imperfections as well as the increasing pressure of globalization. It is made to face faster process and product innovations, an increase of complexity and variety.

IV. METHODOLOGY

The methodology is based on a questionnaire survey. It is conducted via personal interviews with experts in the area of production. The following questionnaire has been formed to keeping in mind that the processes, implementation of standards, their setting up, the situations of the work going on, etc. The questions are:

1. Asking the company and their production processes.
2. The challenges within production systems.
3. How does the operational process planning looks like in the manufacturing?
4. Which tools are applied during process planning (e.g. ERP-system)?
5. The familiarity with one or more of the above PPs methodologies.

Personal interviews including the inspection of the manufacturing facilities represent the other type of interview technique applied in this work. The logistic costs in that case are significant. Travel time and expenses have to be taken into account and based on the distance this can be time consuming. However these efforts allow excellent information acquisition. Whereas the personal interviews based on the questionnaire takes comparable time as the telephone interview, it allows better and more intense discussions as a face-to-face dialogue is possible.

A. *SMEs upon the implementation of IS:*

Although SMEs seem to be rising, they must be aware of the available technologies that can be utilized for the proper business uses. Some of the challenges faced by SMEs upon the implementation of IT/IS are the limited awareness, lack of IT support, lack of IT literacy, varying skills of IT awareness and management, inexperience in using consultants, lack of suitable Infrastructure and limited resources.

1) **Limited Awareness:** It has been noticed that many SMEs do not have knowledge of the available technologies to be applied in the SMEs to increase productivity.

2) **Lack of IT Support:** It came to know that it is difficult for SMEs to attract employees of IT departments. In addition it is difficult to retain them. For big and established companies which offer them higher salaries compared to SMEs. So, IT personnel are hard to afford for SMEs.

3) **Lack of IT Literacy:** The practice is that, the employees in SMEs work for several years on a specific and consistent pattern. Without any training and development, these

employees are not IT intellectuals and they oppose changing the work patterns.

4) Varying Skills of IT Awareness and Management: The study reveals the success of most organizations depends on managers' skills. Hence, managers are trained in terms of management and leadership skills, incongruities will be found, as far as thinking and skills are concerned, which may cause collisions during the implementation of their plans.

5) Inexperience in Using Consultants: It has been observed that many SMEs have little experience in identifying good consultants. To implement projects of SMEs need to have good consultants to save time, effort and cost. Hence they should try to have them at reasonable cost for SMEs.

6) Lack of suitable infrastructure and limited resources: Many of the times the unstable and weak economic status of the SMEs does not permit to use of IS/IT implementation in SMEs.

V. ANALYSIS

The majority of SME lack a holistic business process management. This prevents them from performing a continuous process planning optimization, resulting in inefficient or out-dated workflows as well as an unnecessary waste of resources. Especially companies that evolve from small to medium-size are affected here. The possibility of having coordinated, cost-effective, and high-quality processes demands the implementation of holistic business process management. This means to model processes, optimize them, and make them measurable. A successful implementation of BPM leads to significant improvements as business processes and their processes can be adjusted to meet specific market needs. Furthermore it allows improving existing processes throughout the supply chain, increasing efficiency and therefore the output of manufacturing itself to implement the information system. The most interesting aspect however is, that BPM supports the implementation of ERP-system projects. Reason is that optimized business processes are easier to be adopted into an ERP-system. An ERP-implementation project has a higher chance of success and can be performed smoother if lean and optimized processes exist. Based on Becker [2] the structured and methodic approach of a process-oriented reorganization project covers the following phases:

1. Preparation of Modeling
2. Development of Strategy and Business Process Framework
3. Execution of As-is-Modeling and As-is-Analysis
4. Execution of To-be-Modeling and Process Optimization
5. Development of Process-oriented Organizational Structure
6. Introduction of New Organizations and Implementation
7. Continuous Process planning.

The methodologies suggested an approach to the unique requirements of SMEs which demands additional success depending on the factors in order to perform successful business process management. The following additional recommendations for BPM projects for SME are listed:

1. Employ external consultants if BPM know-how is not available internally.
2. Minimize man-days of consultants and efforts of project team members.
3. Integrate project work into daily work of employees, especially for process analysis and improvements.

4. Improve motivation of employees and project team with initial workshops, including top management.

5. To-be processes shall be evaluated by the affected departments and not by management only.

6. Establish a committee that meets regularly and discusses and reviews existing processes in order to ensure continuous process management.

Considering these discussed recommendations of a structured business for process-planning oriented organization project as for the best practices for SME. It seems to bring into account, support of the transformation into a process-oriented organization is ensured. The process planning is a crucial element for the growth and sustainable business success of an enterprise.

VI. THE ADVANTAGES OF INFORMATION SYSTEM & IMPLEMENTATION IN SME

An advantage that a firm has over its competitors allowing it to generate greater sales or margins and/or retains more customers than its competition". During the study, the SMEs are considered small rather than large. The size of small and medium enterprises should not be the subject of hurdle, whereas they have positive aspects with which they can achieve excellence such as proximity to market, flexibility, reaction speed and the speed of adjustment. The factors considered are important for increasing the competitive atmosphere and is the advantage in the small and medium-sized enterprises. This supports the change occurs in the contemporary environment. There are different kinds of SMEs has three kinds: a flexible process that allows freedom, and speed and re-employment of resources, a flexible organizational change regulation that is quick and has a low cost and a flexible strategy in the selection and adjustment of goals. These features help SMEs to respond to rapid changes faster than large enterprises. IS system help to improve SMEs to raise the competitive position as relying on information systems can easily compete players in the production market. Information systems help organizations in processing unit that adopt the competitive vigilance method; which is strict and careful follow-up of the movements of competitors by collecting information about them to implement successfully. Information systems in SMEs are considered a competitive advantage over the enterprises today. It speaks the concept of competitive advantage without possessing integrated management information systems to implement in SMEs.

VII. CONCLUSIONS

The studies carried out here at SMEs for process planning and information technology reveals the clear and realistic solutions. This work provides a set of recommendations for small and medium sized enterprises to approach the challenges within the process planning. The real life examples and personal experiences of process planning within SME are essential to propose improvements. There is still scope to do research in this area. The methodologies cannot be implemented blindly without a thorough and sophisticated examination. However, the shortlisted changes of best practices within small enterprises are critical for SME to ensure the applications. Finally, increasing the number of SMEs that apply information systems will facilitate their work and enable them to complete globally.

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