

The Importance of Factors of Production in Enterprise Production Planning System

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Abstract

Production companies transform inputs into products and services with value added as a result in order to meet customer requirements. To be competitive, companies must address the ever-rising complexity in processes and increasing demands for greater flexibility due to changes in the external environment. This paper emphasizes the importance of selected factors of production in enterprise production planning system and also briefly describes the capacity planning model of production, which should be one of the major outcomes of the dissertation thesis.

Keywords

Factors of Production, Production Planning, Capacity, Productivity

1. Introduction

Production companies today have to face increasing competition resulting from globalization, which offers comparable products and services both in terms of quality and price. The products and thus the producers as well become easily interchangeable and replaceable for the customers. Persistent competition naturally drives prices down and at the same time also increases pressure to reduce costs. Parallel ongoing changes in the structure of the supply chain and the orientation of enterprises on their core competencies result in an increase in the complexity of internal processes. These fundamental changes in markets force companies to focus on key success factors [1]. To be able to manage the complexity and still remain profitable, the companies need a functional enterprise resource planning system. Regarding the planning of production itself, the essential role belongs to human factor and to capital equipment. This paper and so the whole dissertation aims to outline the importance of these factors in the production management area.

2. Factors of Production

Identification of prevailing difficult conditions mentioned in the introduction is, more than ever, important to correctly determine the critical factors for successful long-term operation and increased market share in the global markets. Whether we discuss consumer products or supplier of complex B2B items, an essential prerequisite for the success of achieving a quality product at allowable costs is to perform sustainable operational excellence.

Factors of production, also called productive inputs, are used for manufacturing of goods and services. Current economic theory defines following four main factors of production:

- Land
- Labour
- Capital
- Entrepreneurship

The operational excellence can be achieved only if limited productive inputs are optimal combined (in most cases from a financial point of view), so that production processes bring (under given conditions) the required output. How effective are the factors of production being used in the previous sense is very often strongly affected by appropriate planning. The planning of use of these factors is an integral part of each enterprise resource resp. production planning system. Considering current volatility of markets, which makes primarily the forecasting of future demand much more difficult, it is inevitable to be faster and more flexible to be able to respond to actual needs. According to the topic of the dissertation, the paper concentrates on labour and capital factors of production, whose influence especially on corporate earnings is very important.

A key integral indicator of company's performance is productivity. When measured and properly interpreted, it can successfully indicate efficiency in use of factors of production, especially workers and machines, and assist in optimization of capacity utilization from a cost point of view, in both human resource and technical terms [3, 4]. Enhancing productivity ensures a wide range of technological, organizational and human resource arrangements, some of them are mentioned in the following paragraphs.

2.1 Labour

The labour factor of production in general means the ability to work, in other words the time that spend a human being in production. The amount of this time is on the one hand related to a form of production, on the other hand to a person itself. In improving of production processes are the most important [5]:

- Organizational arrangements – processes are analysed with value stream mapping method, value added activities are identified, based on it can be for example reorganized material and information flow, which supports the elimination of non-value added activities represented by well-known seven arts of waste (main benefit of these arrangements is a significant reduction of lead time and working capital)
- Human resource arrangements – the most efficient measures leading to an increase in productivity include three basic elements of continuous improvement process concerning a person as a central part of production, in particular qualification (“know-how”), competencies (“empowerment”) and motivation (“willingness”)

2.2 Capital

The capital factor of production is all of the hardware and software equipment that is intended to use for further production. Production companies invest in progressive production technology, which makes sense both from the perspective of various interest groups and from the viewpoint of benefits in the fields of quality, cost and productivity [2]. First of all, a significant commercial potential should be emphasized. The demand for innovative products is constantly growing. Moreover, the fact itself, that the product was manufactured with use of progressive technology, is often one of the important arguments for the customers within their decision making process of prospective purchase of the product. But the acquisition of high-tech technology itself is usually not sufficient for success. It is inevitable to integrate the new technology into other business processes properly and not to underestimate the essential role of human factor at the same time.

In the case study of welding automation presented in the dissertation, the appropriate staff qualification through specialized training and their apparent motivation and commitment to the cause were the main reasons of the success. Thanks to that, the potential of these technologies can be used for gaining the competitive advantage, which is important to provide the companies any further investments also in the future.

3. Production Planning

Enterprise resource planning systems (ERP-System) serve production managers as a tool for planning and control of economical use of factors of production in order to supply products according to customers' demand and to fulfil (financial) expectations from the owners simultaneously. However, economic results are largely affected by the productivity of factors of production. The planning of manufacturing processes including capacities is therefore also important from the perspective of achievable productivity. Capacity is volume of time, which is available for expected level of output and thus for realizing of future revenues and sales. This production readiness is though always associated with considerable costs (fixed and variable), regardless of whether the capacity is personal or technical.

One of the biggest challenges for today's production companies is to properly set up and plan the capacity needs. There are two approaches commonly used for levelling of customer needs and available capacity:

- demand is adjusted to capacity (orders are forwarded or postponed)
- capacity is adjusted to demand (resources are increased or decreased)

Although in practice both approaches are usually combined, the approach with adjusting of capacity to demand is more frequent due to strong competition. The problem of capacity flexibilization is solved in the dissertation thesis as a module of capacity planning model of production besides core functions of ERP-System such as material requirements planning and scheduling.

The model has been proved on larger engineering company with one-piece to small-batch manufacturing processes with predefined product portfolio and start of production after a receipt of an order from a customer.

4. Conclusion

In the dissertation thesis is solved the importance of factors of production in enterprise resource planning system. This issue deals with identifying of the critical factors that are labour and capital, and their influence on production planning system. Intended outcomes of the dissertation, which should result in enhancing efficiency of production:

1. The importance of factors of production (incl. experimental results):
 - Proposal of organizational arrangements
 - Proposal of human resource arrangements
 - Proposal of technological arrangements
 - Proposal of evaluation of productivity
2. Capacity planning model of production:
 - Module of capacity flexibilization

Despite the unique structuring of manufacturing processes in different branches and hence by different producers, suggested rules and recommendations should be valid with certain restrictions also for example for small and medium enterprises. Most companies in the world are inspired from the Toyota way, which focuses on automotive industry mostly with serial to mass manufacturing processes. Unfortunately, the complexity of other types of production is not sufficiently solved. The dissertation would like to contribute to fill in this gap.

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