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Addressing the performance of order acceptance

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Abstract

While there are many mathematical approaches to order acceptance (OA), the performance of OA in practice is overlooked. This paper assesses current OA methods and performance measures that could measure OA. The outcome is a conceptual performance measurement system for OA that measures performance through utilization of resources, output and flexibility in a diagnostic and predictive manner. This paper found a close relationship between OA and S&OP, as they both match supply and demand. The contribution of this paper is that it detaches OA from mathematical models and proposes a method to assess the value creation of OA in practice.

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Keywords: Performance Measurement; Order Acceptance; S&OP, Supply Chain Management, Scheduling; Due dates; Pricing; Value Creation

1. Introduction

Orders acceptance (OA) is the function of either accepting or rejecting sales orders, often in combination with setting the correct price and due-date for the order [1]. For companies order acceptance is a vital decision in their production process, independent of whether it is an explicit decision, because order acceptance is "the joint decision which orders to accept for processing and how to schedule them" [2].

Mathematically there are many approaches to order acceptance, see for example Slotnick [2]. These methods are either to increase revenue, profit, decrease cost or improve due date reliability.[2] Literature discusses the implementation of these methods often from a mathematical and thus operations research perspective. Ebben, Hans [3] add to this that "it is hard to compare the tested OA methods with the OA performance of a planner in practice, since a planner probably makes his decisions based on experience"[3].

Performance measurement could evaluate order acceptance, because "performance measurement is the process of quantifying the efficiency and effectiveness of action"[4] or "the process of measuring actual outcomes or the end goal of performance, as well as the means of achieving that outcome as represented by in-process measures" [5].

Currently, the performance of order acceptance in practice is overlooked. The impact of order acceptance decisions on a supply chain, i.e. "an integrated process wherein raw materials are manufactured into final products, then delivered to customers" [6], is not reported in a structured way. Current literature on order acceptance now focuses on expected benefits or mathematical issues when constructing order acceptance methods; it does not address its performance in retrospect or relation to other company functions. Also, an approach in which a performance measurement system (PMS) includes order acceptance measures does not exist.

In this paper, we therefore address the following problem statement: The impact of order acceptance within companies is not measured and linked to company performance.

To tackle this problem statement, this paper addresses the following research questions:

- What are the goals of order acceptance methods?

The rationale for this question is to get an understanding of which goals OA has and how these are approached in both mathematical methods and industry practices.

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- How can the performance of order acceptance be measured?

In this question the relation between order acceptance and performance measurement is made. As it is a supply chain management process, it will be linked to both general and supply chain specific performance measurement literature.

- How can the performance of order acceptance be measured in a PMS?

To answer this question, we design a conceptual model for measuring the performance of OA. This is based on the knowledge gained from answering the first two research questions in combination with a conceptual design approach.

Section 2 discusses methodology to continue with a literature study in section 3. Section 4 discusses a conceptual performance measurement model before the paper is concluded in section 5.

2. Methodology

This paper explores the possibilities of performance measurement of OA, and by doing so builds a first concept to measure the performance of OA. Research question 1 and 2 are answered through a literature study, and a conceptual model of a PMS is designed to answer research question number 3.

Analytical concepts are based on logic, using introspection to derive concepts from the authors experience. A conceptual model, in this sense, is a "mental model of deduced relationships […], which may then be evaluated using a framework that captures the essence of the systems under investigation". [7]

This conceptual model is built on the found literature and the author's experience. To construct a conceptual model, we include a few criteria to construct our model:

- Thorough understanding of the background on which the model is built
- Clear description of the process for which the model is built.
- Construction of the PMS based on the process description, literature and the authors understanding of OA.

The reason for this approach is to explore the possibilities of performance measurement in relation to OA. We argue that continuing to expand mathematical OA models leads to a further disconnect between practice and theory building. This approach deviates from the mathematical approach, which in turn could lead to cases and action research that reviews actual OA performance in practice.

3. Literature study

3.1. Goals of order acceptance methods

The first and foremost goal of order acceptance is maximizing monetary value generated, either through maximizing net present value (NPV), revenue, profit or minimizing cost by accepting the optimal orders from an order set. Secondary objectives are to maximize service levels and utilization, minimize tardiness and lateness. [2] For example, [8] accepts orders based on order priority, while [1] looks at pricing and the delivery date after the order has been accepted. These goals are similar to other mathematically defined scheduling problems, incorporating the possibility to reject an order. Most mathematical OA methods, only address one optimization criteria. [2] Ebben, Hans [3] describe that sales departments often try to maximize turnover by accepting all orders, while production departments try to maximize utilization and minimize tardiness [3].

OA can be seen as a hierarchical process step, or as process that is integrated both with scheduling and sales. The main difference is that as a hierarchical process step, OA accepts or rejects orders based on static information, while as an integrated process OA is part of production planning and scheduling. [9]. With a strong relation to scheduling, OA accepts the orders that hold the maximum value. Therefore, we address the goal of OA in this paper as follows:

- Accepting orders from a sales order set that hold the maximum potential value.

In the operations research domain the further relation to day-to-day business is not described, while there are several relations to the day-to-day operations of a manufacturing operation. First, for more complex manufacturing environments order acceptance is often not a routine operation, involving product design and specification [10]. Second, companies do not consider advanced order acceptance methods [3]. Also, it can be argued that sales orders are often preceded by information requests, requests for quotations or requests for proposals from the vendor. Once vendors send out a quotation or proposal, they often commit to accept the following sales orders. Lastly, OA is often not only a mathematical decision, but also involves stakeholders needs and interests, is influenced by a sales representative intuition, and is a manual process.

Therefore, while the goal of order acceptance is clear, the solution from a mathematical perspective is limited, making only an acceptance and scheduling decision for an arriving order. If we reflect on this, OA should not only look at order intake itself, but has to look at the causes of order generation as well. In some cases, orders are one-offs that do not have a preceding action, but often at least a quotation process has taken place. The quotation process sets a price and often a delivery date for the goods requested.

Therefore, it is questionable that order acceptance methods are only valid for order intake; they should be used during quotation and contracting phases as well. Otherwise, the rejection function of order acceptance methods has limited value. Rejecting orders, however, does not only turn away one order, but also potential future orders from the same customer.

Current order acceptance methods relate to scheduling problems. Orders are accepted if it fits the schedule or minimum lateness for the existing order set is incurred. In this context, the relation between sales and operations is addressed [9]. Also in sales and operations planning (S&OP), the main goals are to align demand and supply, and to improve operations. [11] In S&OP literature, however, there is no relation to order acceptance. The outcome of S&OP is an alignment of plans by marketing, sales, production, logistics, sourcing, and finance. It is a cross-functional and integrated