



13th International Conference on Industrial
Engineering and Industrial Management

XXIII Congreso de Ingeniería de Organización

The sculpture is a large, dark, monolithic structure made of what appears to be weathered metal or stone. It has a curved top and two vertical pillars on either side, forming a central opening. The background is a clear blue sky with a green field in the foreground.

**Organizational
Engineering
in Industry 4.0**

BOOK OF ABSTRACTS

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**“13th International Conference on
Industrial Engineering and
Industrial Management” and
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Organización (CIO2019)”**

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How to identify and exploit the bottleneck in Make-to-order industries. A cross case study.

Lizarralde A¹⁰⁰, Apaolaza U, Mediavilla M

Keywords: Drum–Buffer–Rope; Theory of Constraints; strategic decision.

1 Introduction

Make-to-order (MTO) companies are increasingly sensitized with concepts from other types of industry, such as flexibility, quality and the ability to adapt to consumer demand, due to the fact that customers demand more variety and more reliable products, as well as shorter delivery times. Two types of manufacturing scenarios exist in MTO environments: repeat business customizers (RBC) and versatile manufacturing companies (VMC), although complexity within each category is not uniform. An RBC provides customized products on a continuous basis over the length of a contract. Goods are customized but may be made more than once permitting a small degree of predictability.

Production planning and control systems (PPCS) are crucial tools for meeting increasingly high customer demands and expectations in MTO scenarios. Choosing the right PPCS is a crucial, strategic decision. Anyhow, the literature on suitability of PPCS for MTO environment is scarce and there have been only empirical studies based on simulation. TOC-DBR seems to be a suitable PPCS but there are scarce empirical evidences on its application in MTO environment.

2 Objectives

The objective of this research has been to assess the impact that the systematic process of four steps that the researchers developed (Lizarralde, Apaolaza, & Mediavilla, 2019) and tested empirically in different MTO scenarios.

This process was derived from the seminal work from Goldratt, and included some key aspects from the resource-based view (RBV) and practice-based view (PBV) strategy theories.

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3 Methods

This work includes four different cases studies in MTO environment in which the researchers have been an active part of the study. Therefore, the practical nature of the case studies made Action Research (AR) to be an appropriate methodological approach, since it aims to contribute to academic research while helping solve practical problems that occur in reality.

4 Cross case study results

The cross-case study has been carried out in four MTO oriented companies located in the Basque Country (Spain), where the researchers applied their systematic process. Given the repetitive nature of the work in the RBC companies, the workload was much more stable than in the VMC companies. The wide diversity of products in VMC companies made difficult to determine the workload and capacity, since process times were difficult to estimate accurately. Also, in RBC companies there was no clear difference among added-value operation between various route operations, while in both VMC cases the added-value of one section was much larger and the investment required to elevate the capacity was very high in comparison with other activities.

5 Conclusion

The literature recognises that MTO environments are complex and difficult to manage in practice but the existing literature regarding the usage of PPCS in these contexts is scarce and focused on make-to-stock environments.

Our empirical work in the industry is valuable to provide insights from the practice and embrace the complexity of PPCS implementation. For that purpose the researchers have presented a multi-case analysis of the implementation of a four-step-process for the bottleneck selection and exploitation. Specifically, the implementation of the four-step-process in the case companies led to similar results (especially in step1), but the rest of these steps have shown significant differences in RBC and VMC scenarios. Specifically in RBC scenario, the selection of the bottleneck is a relatively simple decision, it is necessary to choose between various similar resources and the main repercussion is to properly exploit the system. On the other hand, in VMC scenarios, the selection of the bottleneck has more strategic implications, and it is an important company decision. Based on the results, seems that the RBV theory could fit better in the RBC scenarios, while PBV theory may explain more adequately the competitive advantages in VMC scenarios. Anyhow this insight should be further tested by more cases.

References

- Lizarralde, A., Apaolaza, U., & Mediavilla, M. (2019). Enfoque estratégico para la identificación de cuellos de botella en entornos de fabricación contra pedido y plantas tipo V : estudio de caso de DBR. *Dirección y Organización*, 67, 46–51.