Editorial

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1 Introduction

It is known that the resources are always scarce, whereby, the improving of resources utilization is nowadays one of the major objective for the majority of manufacturing enterprises, requesting its improvement in continuity. The American Heritage dictionary (https://www.ahdictionary.com) defines resource, as the first definition, as "something that is available for use or that can be used for support or help". For short, resources can be defined as inputs used in the production of objects (goods or services) that we desire. In the same dictionary, the definition more adequate to the manufacturing enterprise resource is "The total means available to a company for increasing production or profit, including plant, labor, and raw material; assets".

Even knowing that the definition of the term 'resource' can assume some differences, even when definitions are presented within the same institution [as, e.g., in the case of the International Standard Organization (ISO), that provides different definitions in the norms, e.g., ISO 15531-32 (2005), ISO 15704 (2000) and ISO 18629-11 (2005)], the resources are always scarce and their utilisation should be improved.

For that reason, on the Second International Conference Business Sustainability 2011 (BS'11), a set of papers were presented (Putnik and Ávila, 2011), addressing the theme of this special issue, and after that, a number of them, covering different approaches and research results to manufacturing enterprise resources utilisation improvement, were selected, extended and improved, from which six papers were selected for publication.

The objective of this special issue is to communicate and present research, and corresponding research results, carried out in the area that came from the BS'11 communications. Firstly, in this editorial, we will begin with a discussion on the relevance and the actuality of the theme as well as their implications for enterprises. After that, we follow with a global view on the special issue's contents. The papers included in this special issue represent contributions in two main fields: the first related to measures to support the decision in the resources management; and the second related to algorithms applicable to the process optimisation. Finally, we give a short description of each paper included in this issue.

2   Importance of the theme and its implications for the enterprises

The relevance of this special issue theme is quite perceived by the common enterprise managers because they have to compete daily in the global market. As we sad before the enterprise resources are always scarce. Consequently, the resources price tends to go up, and then, there is almost an obligation of promotion of the resources utilisation improvement. Usually this is the cycle, characterised by a reactive action after an undesirable situation. But the higher direct price is only one of the bad consequences of inappropriate resources utilisation. Worse quality, worse time to market, decreased flexibility, environmental risks and other 'drawbacks', are other implications of poor resources utilisation that can become more important than the direct price itself. Indeed, all of them belong to the set of factors that contribute to potentiate the sale of a product or a service to the market. The negative implications for the enterprises that do not look for the better utilisation of its resources are quite high. So, the way is to think/plan and act (not react) faster and beyond than the common in order to promote the desired resources utilisation.

Several integrated philosophies and/or tools have been developed since the fifties and successfully implemented by the enterprises to promote better resources utilisation. Such as, e.g., in a chronological ordering: just in time (including kaizen and lean philosophies), enterprise information systems, quality management (QM) systems, project management, environmental management systems, global supply chain, concurrent engineering, networking, and agile/virtual enterprise. Then, the way is to make use of them when adequate to a particular case of each enterprises, and to keep researching for better and/or complementary tools that can contribute for the improvement of resources utilisation. This special issue intends to give a contribution in the field, not merely academic, but applicable to the enterprises, as we will expose about the contents of the papers in the next section.

The resources, for which the contributions for their utilisation improvement are presented, are of the following types: man-machine system, enterprise as a whole, production line, raw materials, processes, and service providers, which gives a good representation of resources utilisation efficiency problem for different types of resources.

3   Volume's contribution

In this section, we summarise the contribution of the six papers of this volume along the context in which they fall. The papers' contributions could be classified in two main fields: the first related to the measures to support the decision in the resources management; and the second related to algorithms applicable to the process optimisation.

The contribution of Lyonnet et al. (2016) and Brkić et al. (2016) are classified within the first field (measures to support the decision in the resources management); and the remaining papers, Silva et al. (2016), Pinto et al. (2016), Mota and Vaz (2016), and Pires et al. (2016), are classified within the second field (algorithms applicable to the process optimisation).

The first field is more directed with new management highlights that the authors of the papers propose to assist the decision making process in order to improve the resources utilisation. In a short, the first field represents new measures for improving resources management. In the case of the first paper (Lyonnet et al., 2016), the measure proposed is related to the identification of that that can be called 'critical resources' and in the second paper (Brkić et al., 2016), the measure proposed is related to the identification of QM critical factors.

The second field is associated with new algorithms developed by the authors to contribute to the improvement of some aspects of processes, which should result in better use of resources. The first paper in this field (Silva et al., 2016), is addressing the line balancing problem, the second one (Pinto et al., 2016) is referring the nesting problem (NP), the third one (Mota and Vaz, 2016) the semi-infinite programming (SIP) problems as a tool for processes optimisation problems, and the last one (Pires et al., 2016) presents a tool for resources system selection based on a distributed processing task plan. Indeed, all of them bring new algorithms as contributions to improve the production process of the enterprises as a form of the resources utilisation improvement.

3.1   Measures to support the decision in the resources management

The paper of Lyonnet et al. (2016) address the problem of identifying critical resources in an enterprise, where the authors define a critical resource as the resource which generates the larger performance loss. Big interest in identifying critical resources is in helping managers to focus more effectively on resources that penalise the company's global performance. The authors present an original method/model, based on a multi-criteria approach, to identify the critical resources taking into account not only the material resources, but also the human resources of a company, and for this purpose, it can be expressed as a combination of human-machine data. The method is supported by a criticality matrix using eight criteria involved in the company's global performance. A real enterprise application was realised and the results have been analysed. According to the authors, the method of prioritisation of critical resources plays a crucial role in ensuring the availability for production and in meeting the customer's requirements. The benefits are related to the measures needed to implement in the enterprises in order to improve its resources utilisation.

The paper of Brkić et al. (2016) explores the relation between QM critical factors and total factor productivity (TFP). The biggest importance of this study is in helping managers to allocate their limited resources to those QM categories which have a significantly positive influence on TFP. In this pioneer study, the data were collected in the period 2004 to 2009 from Serbian industrial enterprises certified according to ISO 9001, with a total number of 176 observations, and statistical techniques, such as validity and reliability testing and multiple regression, were used. This paper has proved that enterprises having above average score for a certain QM factor register statistically significant positive and negative differences in TFP against average productivity of all enterprises. The results are not only important for the Serbian enterprises but also as an indicator for other ones in other countries. The benefit of this research, in that way, contributes to improving manufacturing enterprise resource utilisation.

3.2 *Algorithms applicable to the process optimisation*

The paper of Silva et al. (2016) addresses the problem of line balancing (LBP) and presents a software application using a genetic algorithm specially developed to assist this kind of problems. In spite of the research of the topic being on the beginning, the paper presents a promissory genetic algorithm to solve the LBP and the software tool developed represents a 'user-friendly' application. The software tool has potential to be used by the companies after some improvements in data input interface, considering other concurrent tools. Achieved results demonstrate advantages over heuristic methods as it is possible to obtain more than one solution and good efficiency values for the production line. Moreover, for complex problems it is more practical to use the developed application, since the user does not need to perform the heuristic and analyse its results, which may be error prone and time consuming. These benefits are related with the improvement of resources utilisation, namely, with the reduction of idle time for the production line and of the time spent to perform the line balancing task.

The paper of Pinto et al. (2016) explores the NP on leather hides that consist in determining the best way to place a set of small irregular objects within a regular or irregular surface. The NP is a combinatorial optimisation problem. More precisely, it is a cutting and packing problem. The NP arises in many industries like footwear, the production of car seats and the textile industry. The authors proposed and analysed two original algorithms with promising results: a constructive algorithm and a local search method. The test instances were well thought and the results are very well exposed and analysed. The algorithms were applied into industrial context. So, the adequacy of the research for the enterprises that deal with the same kind of problems, is evident and with promising benefits. These benefits are related to the improvement of resources utilisation, namely, with the reduction of raw material needed (in this case leather) and into time spent, either to perform the nesting (pieces layout) either by the reduction of the number of tasks to perform.

The paper of Mota and Vaz (2016) treats the SIP problems, specifically the subset of problems with a finite number of variables subject to an infinite number of constraints. In their work the authors propose a new algorithm of reduction type method, based on a penalty technique to solve SIP problems. The numerical results with 117 test problems from the SIPAMPL database show that the proposed technique presents a moderate success rate. According to the authors, the algorithm can be used to solve problems of several areas of engineering, such as robot trajectory planning, production planning,

design of digital filters, and air pollution control, with economic impact. Depending the problem, the benefits are related to the improvement of resources utilisation, e.g., minimising the stacks height, and minimising the travel time of the robot trajectory.

The paper of Pires et al. (2016) focuses on the problem of the resources system selection in distributed/agile/virtual enterprise (D/A/VE). The paper presents exhaustively the development of a prototype/demonstrator tool to perform the selection of resources for D/AVE with the following features: pre-selection of resources with and without integration of the value analysis (VA), and the final selection of resources given to those referred cases. This tool incorporates a new algorithm, based on VA, to perform the pre-selection of resources, whose simulation results and its consistency had demonstrated advantages on VA incorporation and the validity of the tool (Pires, 2012). Real benefits of the tool pass through prosecuting the resources selection process quicker and more efficient for improving the specificities of the manufacturing resources utilisation in D/A/VE, namely within the dimensions of quality, synergies, financial, production capacity and cost of the solutions in the resources selection.

4 Summary

To summarise this editorial, we attempted to briefly chart out some developments in related areas of improving manufacturing enterprise resources utilisation. As this field is a 'never ending story', novel questions and problems stem requiring equally novel solutions.

At the end, the guest editors hope, and would like, that this special issue will be useful, meeting the expectations of the authors and wider readership and serving for enhancing the individual and collective learning, theoretical insight and practical applications, and to incentive further scientific development and creation of new papers.

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