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EDITORIAL

Intelligent decision making for service and manufacturing industries

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This special issue is based on the 5th Institute of Industrial Engineers Asian Conference (IIEAsia2016) and the 7th Forum for Council of Industrial Engineering and Logistics Management Department Heads (CIEDH2016). The two conferences were organized by Department of Industrial and Manufacturing Systems Engineering, The University of Hong Kong. Most papers of this issue are selected from the best papers of the conferences through a regular review process.

Today's manufacturing and service systems are merging; we have facing more systems that have both service subsystems and manufacturing subsystems (Wang et al. 2014). These systems are working in a more dynamic and uncertain environment. Besides traditional properties of systems, such as efficiency and cost, other properties, such as synchronization (Lin et al. 2018), robustness (Zhou et al. 2017) and resilience (Zhou et al. 2019), have also become concerns of designers and users of systems. Advanced methodologies, such as big data, Internet of things, and cloud computing, have been adopted to improve systems and make decisions for every component/process of systems (Kusiak 2014; Kuo and Kusiak 2018). Decision making is to find an optimal decision from different candidate decisions and thus its essence is optimization. The objective of this special issue is to investigate different decision-making problems in the manufacturing and service industries by addressing various challenging issues, such as dynamic customers' demand, real-time data, and changing production conditions. This special issue includes twelve excellent papers, each of which gives contributions to one or several challenging issues in service and manufacturing systems. These papers can be classified into three categories, i.e., product systems, manufacturing systems and logistics systems; each category includes four papers.

The first category studies involve novel decision making methods to design various products, including physical products and service products. The paper "Application of combined Kano model and interactive genetic algorithm for product customization" by Dou, Zhang and Nan, considers the customer satisfaction level in the product design problem; in particular, it proposes a novel intelligent optimization algorithm by integrating the interactive genetic algorithm and a customer satisfaction evaluation model. This work is a good attempt on the service-oriented manufacturing industry. The paper "The optimal time to make a risky investment under a permanent exit option" by Li, Wang, Ni, Chu and Li, focuses on service product design; in particular, it optimizes the decisions of investment projects with consideration of the uncertain market and the exit option. The paper "Modeling and prediction of fatigue life of robotic components in intelligent manufacturing" by Bi and Meruva, introduces the concept of asperity contact and adopts a novel method to model and predict fatigue life of actuators which are important components of any machines or robots. This is not a direct product related study; while, the method of this paper can be employed to investigate wear of products. The paper "Transformative innovation: turning commoditised products into radically high-valued products" by Li and Tan, presents an empirical framework of transformative innovation to assist designing high-value innovative products by addressing market risk and technology risk through digitization and internet of things. This novel framework adopts emerging technologies to help startups and small and medium-sized enterprises to identify critical elements and activities in product innovation.

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The second category investigates different decision-making problems for manufacturing systems. The paper "Cloud manufacturing based service encapsulation and optimal configuration method for injection molding machine" by Zhang, Xi, Yang, Tao and Wang, uses the cloud manufacturing and IoT Technologies to improve the resources sharing and integration in the injection molding industry; a novel framework including mathematical model and intelligent optimization algorithm based on these advanced technologies is presented to address the dynamic task orders, real time production data and dynamic machine capacities. The paper "Constrained dynamic multi-objective evolutionary optimization for operational indices of beneficiation process" proposes a constrained dynamic multi-objective mathematical model to optimize the operational indices of the beneficiation system in an uncertain environment and also designs a dynamic multi-objective optimization algorithm based on prediction mechanism and multiple population strategy to solve the model; statistical experimental results indicate the effectiveness and efficiency of the proposed algorithm. The paper "An effective metaheuristic algorithm for flowshop scheduling with deteriorating jobs" by Wang, Huang and Wang, addresses the deterioration effect in the modern complex manufacturing system; multi-verse optimizer is designed to solve the problem and obtain satisfactory performance through comprehensive experiments. The paper "Manufacturing synchronization in a hybrid flowshop with dynamic order arrivals" by Chen, Wang, Kong, Huang, Dai and Shi, studies the synchronization problem in a manufacturing system with consideration of dynamic order arrivals; it decomposes the dynamic scheduling problem into a series of static sub-problems, each of which is formulated into a minimization model and further optimized by a novel genetic algorithm. This study notices the negative impact of bottleneck and suggests a corresponding strategy to handle it.

The third category examines different decision-making problems for logistics service systems. The paper "Dynamic pricing model for less-than-truckload carriers in the Physical Internet" by Qiao, Pan and Ballot, addresses a dynamic decision-making problem for logistics service providers in the context of the physical internet. It investigates the dynamic and stochastic environment of the logistics system and adopted an auction mechanism to optimize two pricing strategies for carriers. The paper "An efficient auction mechanism for regional logistics synchronization" by Chu, Xu, Cai, Chen and Qin, studies the regional logistics synchronization problem and designs a novel auction mechanism; furthermore, the auction mechanism is combined with vehicle routing problem faced by the third party logistics company which is solved by three swarm intelligence based algorithms. The paper "Internet of Things (IoT) driven Kanban system for reverse logistics: solid waste collection" by Thürer, Pan, Qu, Luo, Li and Huang, designs a control system, i.e., Kanban system for the solid waste collection problem by addressing its stochastic demand feature; furthermore, this Kanban system is driven by the IoT technology. The paper "Optimization based transportation service trading in B2B e-commerce logistics" by Zhang, Huang, Xu and Zhao, investigates the e-commerce transportation service trading problem in the B2B environment; in particular, it builds a framework for the problem with consideration of it key features and further develops a mathematical model to optimize the order-routing matching problem. This paper also discusses the uncertain environment including the fluctuated demand and imbalance issue.

We notice that although these papers deal with different manufacturing and service systems, many of them have involved the IoT technology, cloud manufacturing, dynamic data, uncertain customers' demand and multiple objectives. We believe that the rapid development of new technologies brings not only new challenges to the systems, but also new methods to solve these challenges.

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