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SPECIAL ISSUE EDITORIAL ON MASS CUSTOMIZATION AND SUSTAINABLE VALUE SYSTEMS

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Today, new products or services must be designed to satisfy ever changing consumer demand by companies to remain competitive. Mass customization, personalized services, and integration of information and decision processes are needed to produce an increasingly diverse range of products and services. At the same time efficiency as well as flexibility of design and production processes need to be improved. Successful companies align and coordinate efforts with suppliers and clients across the value chain to achieve and sustain flexibility and efficiency during the product and service lifecycle. From design to delivery, mass customization and the delivery of sustainable value are the goals pursued by management.

This special issue provides seven research articles that span the realm of mass customization and sustainable value systems. The articles provide new solutions that enable delivery of products and services via efficient and flexible mass customization business processes. The series of research contributions are classified and summarized as follows.

Mass Customization and Sustainable Value Systems for Products

- Product design

Chiang et al. (2011) address the challenge of designing products with reduced environmental impact. Many aspects of product design impact the environment, including energy use during design, prototype construction, and material usages. The research addresses the environmental impact of a product with respect to quantities of hazardous chemicals and energy consumption during raw material extraction, manufacturing and use. The paper presents a neural network approach to create a life cycle assessment (LCA) model for an optical mouse, including a case, a circuit board, and a USB cable. Applying the LCA model to new mouse designs significantly reduces the environmental impact.

- Production and manufacturing aspect

Gu et al. (2011) present a novel approach to

control manufacturing systems. A control system is proposed based on neuro-control and hormone-regulation principles. The model is called the neuro-endocrine-inspired manufacturing system (NEIMS). The system flexibly reacts to disturbances on the production floor caused by changes in demand and malfunctioning manufacturing cells. Each shop floor cell is modeled as a separate cell with a controller, which perceives a disturbance, initiates decisions, and executes changes in the plan. On top of the cell controller is a central controller, analogous to a central nervous system. The advantage of the bio-based control system is that it can agilely regulate and coordinate volatile environments. Time-consuming message passing and communication adapt holonic manufacturing systems (HMS) and fractal manufacturing systems (FrMS) techniques. Thus, changes are noted concurrently, while each cell can synchronously interact with the recursive control system. An experimental evaluation of the proposed control system shows that the quality of planning is improved and justifies further research in this direction.

- Design tool aspect

Januszka & Moczulski (2011) present an Augmented Reality (AR) for use in the design process. Using AR techniques in CAD offers several advantages. Users preview designs in a 3D environment which enables them to interact with the design by manipulating the position and orientation of the virtual object. Thus, several design aspect can be checked interactively. Further research is aimed at refining and improving the presentation system, which is currently in an early stage of development.

Weerasinghe & Goonetilleke (2011) discuss a scientific evaluation of shoes for mass customization. The foot bed simulator invented in recent years allows a range of parameters to be studied. The simulator is used to evaluate perceived feel and center of pressure changes to changes in heel height, seat length, material, wedge angle and toe spring. This paper shows the value of the foot bed simulator in terms of research and the actual production of shoes.

Mass Customization and Sustainable Value Systems for Services

Trappey et al. (2011) have re-engineered the transformer maintenance process and business model to improve customized service delivery in the field of infrastructure and engineering asset management. The case study demonstrates that implementing an e-integration approach increases the efficiency and effectiveness of customized maintenance services which are critical in preventing expensive infrastructures from catastrofic breakdowns.

Lo et al. (2011) have collected factors related to firms implementing customized e-learning systems from a review of the literature and expert opinions, and then constructed a hierarchical factor table to structure the review. Based on the appropriateness and independence of factors, and as assessed by experts in the project promotion office of the Industrial Development Bureau (IDB) in Taiwan. The e-learning solution providers and project leaders use an Analytical Hierarchy Process (AHP) to coordinate expert responses. The factor weightings and recommendations **are** provided to ensure a successful adoption of customized e-learning systems.

Fu et al. (2011) have utilized a fuzzy analytic

hierarchy process (FAHP) to analyze decision-making patterns in regards to third-generation wireless communications (3GWC) service adoption. The decision making analysis provides customized strategic recommendations to suppliers of 3GWC services regarding marketing and resource allocation in the context of the Chinese 3GWC market. The research findings suggest that providers of 3GWC services should customize and diversify the content and applications they offer and ensure the speed and reliability of network access. In addition, handsets should be designed in accordance with consumer demand for rapid 3GWC adoption.

Amy J.C. Trappey is a Distinguished University Professor at the National Tsing Hua University in Taiwan. Dr. Trappey's research interests are in e-business, knowledge engineering and management, particularly focusing on intellectual property and patent analyses. She is the American Society of Mechanical Engineers (ASME) Fellow and the International Society of Engineering Asset Management (ISEAM) Fellow. She is also an active member of IEEE and SME.

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