Performance Measurement System for Supply Chain 5.0: Empirical evidence from PLS-PM and Fuzzy Delphi Method

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Abstract. Nowadays, organizations are required to compete in a highly dynamic and complex business environment. The COVID-19 pandemic, as a global crisis, had an extreme impact on manufacturing systems worldwide. In response, scholars and academics introduced the fifth industrial revolution [1]. Industry 5.0 (I5.0) represents a new paradigm that aims to improve and complement the digital features of Industry 4.0 by implementing three fundamental principles: resilience, sustainability, and human-centricity [2]. Due to the integration of I5.0 paradigm in Supply Chain (SC) activities, various sectors have undergone radical changes, collectively known as Supply Chain 5.0 (SC5.0) [3]. This new paradigm aims to ensure the resilience, sustainability, and human-centricity of SC organizations, and enhance SC performance [4]. An important condition to achieve high performance standards is being able to effectively assess and monitor organization's performance [5]. Therefore, Performance Measurement Systems (PMS) emerge as an effective tool for organizations to gain competitive advantages and ensure continuous performance monitoring. PMS is defined as a set of metrics and measures used to evaluate the efficiency and effectiveness of past actions [6]. To ensure that the PMS remains relevant and effective, it should be dynamic and able to be modified and adapted to business changes [7, 8]. Therefore, our research project aims to develop effective PMS that accurately assess SC performance in the context of SC5.0 paradigm. To achieve this aim, a structured approach is adopted. First, A review of existing PMS is conducted, supported by an adapted set of criteria to measure their effectiveness in the context of SC5.0. Then, the interactions between PMS components and SC5.0 principles are studied using Partial Least Squares Path Modeling (PLS-PM). Building on these findings, A PMS for SC5.0 and its associated evaluation model are developed, with fuzzy Delphi method adopted to address uncertainty and ensure expert consensus. The proposed PMS provide a theoretical tool for assessing the performance of SC5.0 systems; thus, their practical validation and the integration of advanced technologies define the core objective of the next phase of our research project. This future stage will ensure the system's effectiveness, intelligence, and adaptability in real-world SC environments aligned with I5.0 principles.

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