Deciphering Information Quality: Unraveling the Impact of Information Distortion in the UK Aerospace Supply Chains

Authors : Jing Jin

Abstract : The incorporation of artificial intelligence (AI) and machine learning (ML) in aircraft manufacturing and aerospace supply chains leads to the generation of a substantial amount of data among various tiers of suppliers and OEMs. Identifying the high-quality information challenges decision-makers. The application of AI/ML models necessitates access to 'high-quality' information to yield desired outputs. However, the process of information sharing introduces complexities, including distortion through various communication channels and biases introduced by both human and AI entities. This phenomenon significantly influences the quality of information, impacting decision-makers engaged in configuring supply chain systems. Traditionally, distorted information is categorized as 'low-quality'; however, this study challenges this perception, positing that distorted information, contributing to stakeholder goals, can be deemed high-quality within supply chains. The main aim of this study is to identify and evaluate the dimensions of information quality crucial to the UK aerospace supply chain. Guided by a central research question, "What information quality dimensions are considered when defining information quality in the UK aerospace supply chain?" the study delves into the intricate dynamics of information quality in the aerospace industry. Additionally, the research explores the nuanced impact of information distortion on stakeholders' decision-making processes, addressing the question, "How does the information distortion phenomenon influence stakeholders' decisions regarding information quality in the UK aerospace supply chain system?" This study employs deductive methodologies rooted in positivism, utilizing a cross-sectional approach and a mono-quantitative method -a questionnaire survey. Data is systematically collected from diverse tiers of supply chain stakeholders, encompassing end-customers, OEMs, Tier 0.5, Tier 1, and Tier 2 suppliers. Employing robust statistical data analysis methods, including mean values, mode values, standard deviation, one-way analysis of variance (ANOVA), and Pearson's correlation analysis, the study interprets and extracts meaningful insights from the gathered data. Initial analyses challenge conventional notions, revealing that information distortion positively influences the definition of information quality, disrupting the established perception of distorted information as inherently low-quality. Further exploration through correlation analysis unveils the varied perspectives of different stakeholder tiers on the impact of information distortion on specific information quality dimensions. For instance, Tier 2 suppliers demonstrate strong positive correlations between information distortion and dimensions like access security, accuracy, interpretability, and timeliness. Conversely, Tier 1 suppliers emphasise strong negative influences on the security of accessing information and negligible impact on information timeliness. Tier 0.5 suppliers showcase very strong positive correlations with dimensions like conciseness and completeness, while OEMs exhibit limited interest in considering information distortion within the supply chain. Introducing social network analysis (SNA) provides a structural understanding of the relationships between information distortion and quality dimensions. The moderately high density of 'information distortion-by-information quality' underscores the interconnected nature of these factors. In conclusion, this study offers a nuanced exploration of information quality dimensions in the UK aerospace supply chain, highlighting the significance of individual perspectives across different tiers. The positive influence of information distortion challenges prevailing assumptions, fostering a more nuanced understanding of information's role in the Industry 4.0 landscape.

Keywords : information distortion, information quality, supply chain configuration, UK aerospace industry