

Results The frequencies reported in each of the categories analyzed do not correspond to the total of studied Industry 4.0 cases. In this way, it is emphasized that the breadth of Industry 4.0 implementation in organizations goes beyond a specific application of a certain types of technology, extending to a holistic and integrated approach to technologies that meet all the needs of a digital production system. This result reinforces the breadth of the Industry 4.0 concept, which goes beyond the traditional areas of manufacturing and technology, confirming its broader concepts that refer to value added across the value chain [6]. This characteristic is due to the fact that Industry 4.0 cases observed are always aimed at promoting the flexibility of manufacturing systems (Flexible Manufacturing Systems). Contributions of Industry 4.0 to operations management The analysis of Industry 4.0 cases distribution in the areas of operations management indicates a greater cases concentration in the technology management, followed by Just-in-Time manufacturing and supply chain management areas (Table 3). This is the case of the German crane company Wolffkran that has equipped its cranes with the industrial router that can be controlled remotely offering greater flexibility for the production. This is a consequence of the fact that many cases incorporate more than one area of operations management and use several technologies simultaneously. This difference in the frequency distribution is confirmed by the Chi-square test, which indicates a presence of dependence between frequency of cases and OM areas ($\chi^2 = 38.36$; 4; p-value 0.01). Another case reported by ThyssenKrupp presented contributions in both areas, technology management and Just-in-Time manufacturing. In addition, the company incorporates the Just-in-Time manufacturing area through the implementation of predictive maintenance into the system. All the analyzed cases present application in the area of technology management.

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