



An Analysis of Industry 4.0 Training Guidelines Based on Four General Theories of Administration

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Abstract. Advances in production systems have stimulated the need for organisations to remain competitive. Quick responses of the productive systems are characterised as an essential element due to the globalised market marked by constant changes. In particular, the last years have been characterised by the digitisation and innovation of processes and business models, also known as the fourth industrial revolution or Industry 4.0 (KUSIAK, 2018). Development and training programs related to disseminating and implementing concepts associated with Industry 4.0 have become imperative in this scenario. Human knowledge development on the Industry 4.0 theme is gaining increasing prominence, making it necessary to identify and analyse the most appropriate and efficient ways to transfer knowledge to professionals in training (HELMING et al., 2019).

“Main Challenges and Best Practices to Be Adopted in Training for Industry 4.0” identified the main challenges and validated the best practices to be adopted in training for managers not skilled with the subject in a broad view and “Training for Managers Not Skilled in Industry 4.0 Basis: What is the Most Suitable Content to Be Covered?” validated the content to be offered in training for the target audience mentioned. In this study, the guidelines proposed in these two papers were analysed based on Four General Theories of Administration: Organizational Development Theory, Sociotechnical Theory, Contingency Theory, and Ambidextrous Theory. This analysis assumes special relevance due to managers’ fundamental role in the performance of an organization, which has been studied since the Classical School of Administration.

Regarding the Organizational Development Theory, Beckhard (1969) argues it valorises the analysis of the internal and external environment and makes use of the behavioural sciences, values, strategies and techniques oriented to changes in the work environment with the objective to make the organisation more effective and adaptable to changes. The analysed training guidelines are aligned with this theory since they help managers unfamiliar with Industry 4.0 concepts to think about its impacts in the business model of their companies and break some possible misconceptions on this subject, such as the perception that the adoption and application of Industry 4.0 is a quick and standardised process, among others.

Concerning Sociotechnical Theory (RICE, 1958), the analysed training guidelines are aligned with the technical and social subsystems. The training content discussed in Industry 4.0 pillars, such as Smart Factory, Systems Integration, Modularity, Decentralization, Smart Products, and Product Customization help managers to understand the technical subsystem. On the other hand, training content related to the insertion of sustainability and Corporate Social Responsibility in the context of Industry 4.0, Industry 4.0 impacts on business management models and human resources



management and the importance of intrapreneurship in Industry 4.0 reality are aligned with Sociotechnical Theory principles.

The Theory of Contingency deals with a functional relationship “if-then” type between the conditions of the environment and the appropriate administrative techniques for the achievement of the organisation's objectives (BURNS; STALKER, 1961; LAWRENCE; LORSCH, 1967; WOODWARD, 1965). In the analysed training guidelines, the training can be deepened and detailed according to the organisation and specific characteristics of the target audience. In this way, a functional relationship is considered between the environmental conditions and the detailed elaboration of the development program in a contingent way (contingent training).

Finally, the analysed training guidelines relate to both exploration and exploitation concepts based on the Theory of Organizational Ambidexterity (DUNCAN, 1976). Dealing with developing new ideas and concepts in a disruptive or revolutionary way, the training guidelines relate to the exploration concept. The exploitation concept is related to the analysis of the current scenario of the organizations in which the professionals in training perform their jobs in order to identify potential gains in an incremental way due to Industry 4.0 implementation.

Based on this scenario, it is possible to infer the analysed training guidelines are aligned with the General Theories of Management. From a practical point of view, this result validates these training guidelines from the School of Administration perspective and corroborates their use by consultants or professionals who work with managers' development for Industry 4.0. From a theoretical point of view, researchers can use the presented results as a guide for future research work. As for originality and relevance, the lack of research on the managers' development for Industry 4.0 and the absence of similar work in scientific databases stand out.

Keywords: Industry 4.0; Training; Management; General Theories of Administration.

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