

Summary

The requirements of the age of Industry 4.0 could be considered in the following areas: technology, strategy, structural solutions, and social attitudes and competencies are connected with the necessity of transformation of organisations both in the context of changes directed at the implementation of innovative solutions associated with digitalisation and new technologies, as well as changes in management methods. To meet these requirements and be able to exist and stay on the market, organisations are forced to adapt constantly to the new reality, which often requires changes in the strategy of operation and the business model. These changes determine the emergence of a new type of organisation, considered SMART. These organisations use technologies that allow new manufacturing methods and production and information management. These changes aim to improve the organisation's functioning regarding process optimisation, flexibility, rapid response to environmental changes, quality, efficiency, and effectiveness. Meeting these requirements can impact the development of technological potential and building the technological advantage of SMART organisations in the age of Industry 4.0. It can achieve higher levels of technological advantage and, thus, competitive advantage in the age of Industry 4.0.

The main objective of the dissertation was, *identification and characterisation the conditions of technological advantage of SMART enterprises and to assess the dependence of the level of competitive advantage on the level of technological advantage of these enterprises.*

The layout of the dissertation is strictly subordinated to the realisation of the objectives of the work, the verification of the set research hypotheses and the answer to the prepared research questions. The dissertation begins with an introduction, and then we can distinguish two theoretical parts, which include the first two chapters and an empirical part containing chapters 3 and 4. The dissertation ends with a conclusion.

The first chapter discusses the essence of the age of Industry 4.0 in developing this concept and identifies its technological and non-technological requirements. Against this background, the SMART organisation is defined, and its key areas are characterised as open culture, open resources and open knowledge. The final part of this chapter analyses the evolution of the management process in the SMART organisation and presents the business models of the age of Industry 4.0. The second chapter contains in the first part an explanation of the concepts of competitiveness, competitive advantage and the conditions for building the

competitive advantage of SMART enterprises in the age of Industry 4.0. The next part of this chapter defines technological advantage, characterises the process of building this advantage, and then presents the conditions for building technological advantage. The chapter concludes with a proposal of the author's tool for assessing the level of technological advantage of SMART enterprises in the age of Industry 4.0. The third chapter opens with a characterisation of the automotive industry in Poland as an operating environment for the surveyed enterprises and a description of the research procedure, including the research techniques used. It is followed by a discussion of cognitive gaps, research problems defined in the form of questions, the main objective and specific objectives, the main and specific hypotheses and the research model, and the operationalisation of individual variables. The next section of this chapter describes the statistical measures and tools used to analyse the data obtained. The chapter concludes with a characterisation of the enterprises under study. The fourth chapter of the dissertation presents the results of empirical research. The first part of the chapter contains a statistical analysis of the data and a comparative analysis of the conditions for building a technological advantage by the SMART enterprises under study, followed by a dependence analysis allowing for the verification of the hypotheses. The last part of this chapter presents the author's procedure for proceeding in the process of building a technological advantage.

The dissertation ends with conclusions, research limitations, and recommendations for further research in the analysed area. An integral element of the work are appendices containing a survey questionnaire and a tool for determining a SMART enterprise's current level of technological advantage in the age of Industry 4.0.

The knowledge systematised in the dissertation on the conditions for building a technological advantage of SMART enterprises in the age of Industry 4.0, the proposed research model and the research tool can become a contribution to further research by both the author and other researchers. In turn, for practitioners, including representatives of enterprises, the developed tool for assessing the technological potential and the procedure for proceeding in the process of building the technological advantage of a SMART enterprise in the age of Industry 4.0 can support decision-making in building the technological potential of the enterprise by the technological and non-technological requirements of the age of Industry 4.0.