


Chapter 5

Autopoietic Cognitive Systems in Management Applications: A Critical Review

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ABSTRACT

This chapter presents the study of available literature describing autopoietic systems using the systematic mapping study method. Using the knowledge domain visualization technique, the areas of application for management cognitive systems and described therein self-sufficient processes responsible for the success of an organisation were presented. In the study, the research domains considered from the perspective of autopoiesis, such as cognitive computing (CC), information system (IS), communications systems, and Social Systems, were isolated. The study demonstrated that systems implemented based on CC in connection with IS are recommended for management systems. Research confirmed that CC applications using cognitive systems in autopoietic cognitive systems solutions constitute a developing field. Finally, specific and practical applications of cognitive technologies capable of being translated into the economic success of enterprises were indicated.

INTRODUCTION

Recently, two mutually complementary empirical research methods related to the critical reviews of literature have been developed – Systematic Mapping Study (SMS) and Systematic Literature Review (SLR). Both allow a structured review of publications in a specific research area and determining the state of knowledge. SMS is focused on the quantitative assessment of the investigated issue and the generalization of a large volume of publications in order to create a visual representation indicating the differences in the frequency of the occurrence of research streams. SLR is responsible for the analysis and integration of knowledge contained in the literature on this subject, operating on a smaller, more

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detailed scope of publications in order to generate knowledge on a certain research topic (Kuhrmann, Fernández, & Daneva, 2017; Petersen, Feldt, Mujtaba, & Mattsson, 2008). The difference between both methods can be characterized in several aspects:

1. **Aim and Scope of the Study:** The main purpose of SMS is to maintain a broad research perspective and to identify the main topics which may form the basis for detailed research. The aim of SLR is detailed research, analysis of its results and, in effect, establishing evidence which can initiate further detailed research.
2. **Research Questions:** SMS is focused on general issues facilitating the identification of unexplored areas in a broad perspective. SLR is focused on detailed, narrow questions, analysing and aggregating results related to specific research questions.
3. **Search Process:** SMS and SLR use automated search techniques. SMS questions are limited to overview issues, without introducing manual search techniques. SLR questions analyse the research found and described in detail as well as its context. Additional in-depth questions are possible for additional explanations.
4. **Outcome Assessment Process:** SMS uses a wide range of questions while assessing the relevance and potential usefulness of results, the analysis is general, based on metainformation with a high level of generality. When assessing the results, SLR refers to the specific context of the ecosystem of the phenomenon under study; it takes into account the details and restrictive qualitative criteria based on categories with small portions.
5. **Data Analysis Process:** SMS analyses bibliographic information of the publication and basic information about the described study. In addition to bibliographic data, SLR analyses also the data referring to the methods and results of each study, the context of application and the effects of the study.
6. **Conclusions:** SMS visualizes the results using diagrams without going into their details. Additional description may include e.g. the methods applied, relations and connections between obtained research results. SLR focuses on full tabular synthesis of the results and qualitative assessment of the research sample. The presentation of results may give the impression of being too detailed and scrutinised, however these details are important in future applications of the results.

The aim of the chapter was to identify, in the field of social and information sciences, publications on systems with the characteristics of autopoiesis, and to isolate from them literature describing managerial applications of such systems, having additional features of Cognitive Systems. The first part of the chapter presents theoretical considerations about autopoiesis systems and their application in management systems in the context of cognitive systems. Then, literature research techniques, research questions and the search process are described. The systematic Mapping Study and Systematic Literature Review methods were presented. Using the Knowledge Domain Visualization technique, the areas of application of management cognitive systems and the self-sufficient processes responsible for the success of the organization described in them were presented. Finally, specific and practical applications of cognitive technologies that can translate into the economic success of enterprises were indicated.

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