



**ULBS**

Universitatea "Lucian Blaga" din Sibiu



Interdisciplinary Doctoral School

PhD Domain: Engineering and Management

PhD Thesis - Abstract

**INTEGRATION OF KNOWLEDGE MANAGEMENT AND  
QUALITY MANAGEMENT FOR R&D CENTERS OF  
AUTOMOTIVE INDUSTRY**

PhD Student:

**ING. SERGIU ȘTEFAN, NICOLAESCU**

conducător științific:

**PROF.UNIV.DR.ING. CLAUDIU VASILE, KIFOR**

SIBIU 2019



# ABSTRACT

*The product development from R&D centers has entered a critical dimension that is shaped by the customer's desired increase of quality, the innovation that is requested by the market and the fast development that is urged by business management.*

*The thesis presents a multidisciplinary research which has as main objective solving key issues identified in the literature review and especially in Research & Development centers of the automotive industry.*

*In order to fulfill the customer exigencies and the demands from corporations' higher management to reduce time of development and maintain quality, it is needed a solid and flexible design of products. The necessary capabilities within the organization are achieved by exploiting knowledge and through execution of quality actions in the early stages of development.*

*The first part of research presents a model that manages quality activities from project development of new products, following Design for Six Sigma (DFSS) methodology, being also capable to manage and create knowledge through knowledge management (KM). The focus of DFSS-KM integrated model is in creating a strong and flexible product design and capitalization of knowledge received during interaction with the customer, spread of employee's knowledge inside the organization and avoid previous mistakes. The new quality model is called QEC, coming from the three areas of improvements: Quality, Employee and Customer.*

*It is examined the role of improvement and application of Design for Six Sigma methodology in the automotive industry and is presented a case study that can be used as a guide for Define, Measure, Analyze, Design, Verify (DMADV) applicability in software development projects of research and development centers.*

*The second part is providing a framework for the deployment of Big Data Analytics on data generated by Human Capital, with different channels of data transformation. The framework is used to case-study the evaluation of employees and to understand and predict which and why the employees are leaving the organization. The integrated DFSS-KM model is optimized by using the extracted business intelligence during the decision-making process (ex: the level of quality can be assessed or improved based on the evaluation of team members; the*

*knowledge sharing can be correctly planned and handled for the employees considered with risk to leave the company).*

*Based on the needs of knowledge-based organizations, with a case study on R&D centers of the automotive industry, a new Human Capital Analysis Model is introduced. The model includes an original methodology for evaluating the performance of employees and an adaptive scoring algorithm which reflects both employees' improvement and lack of performance. The raw data gathered from the organization is transformed in key performance indicators (KPIs), analyzed from multiple perspectives: Technical skills, Soft skills & Motivation, Achievements and extra involvement of employees.*

*To support and validate the model, a flexible software tool that gathers data from organizations in an automatic way—through adapted connectors—and generates abundant results on the measurement and distribution of employees' performances was created. The main challenges of human resource departments—the quantification of human resource performance, the distribution of performance, and the early identification of employees intending to leave the workforce—are handled through the presented IT platform. The insights are presented on different granularity levels, from organization view down to department, group, and team.*

*Investing in or self-developing of advanced tools for Big Data processing as well as applying machine learning algorithms for predictive analysis is providing to HR managers useful insights and a competitive advantage on the market.*

*A model for the integration of knowledge management and quality methodologies, as well as the creation of a framework for applying Big Data analytics inside an organization, are covered in the presented work.*

*The result is a global model which improves product quality, employee's professional growth, and, also integrates the knowledge management techniques. The model is studied and validated inside an R&D center of a prestigious automotive organization. It is designed to be used by management of the organization and is proved to be effective based on the evaluation of quality, cost and time of real projects.*

**Keywords:** *Quality, Design for Six Sigma, Knowledge Management, Big Data Analytics, Integrated Model, Organizational performance, Research & Development.*

*“Intelligence is the ability to adapt to change”*

Stephen Hawking

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