

**Integration of Knowledge Management and
Enterprise Resource Planning for Advanced
Production Management**

by

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Master of Science in Electromechanical Engineering



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**Faculty of Science and Technology
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Abstract

Integration of Knowledge Management and Enterprise
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Based on the characteristics of manufacturing, from the points of view in Enterprise Resource Planning (ERP), Knowledge Management (KM) and Intelligent Decision Support Systems (IDSS) concepts, firstly, this research proposes a relationship model of ERP with critical success factors and production forecast capability along with production process by the integration of theory and empirical study of knowledge. By means of questionnaires with hypothesis testing which are then analyzed by SPSS, influence pattern that fits the development of manufacturing enterprise as well as fulfills the improvement of production forecast capability is summarized as the main conclusion. It is concluded that manufacturing enterprises could effectively improve their product forecast capability by means of better control on human, production management and technique factors. The nine influence factors have significant effect on the improvement of product forecast capability of enterprises. This research provides theoretical complement and practical tools for Chinese manufacturing enterprises to use ERP with KM and IDSS to achieve the purpose of improving enterprise production development.

Secondly, this research has designed an integration structure of knowledge based on the unified framework that has the capability to analyze and design manufacturing

systems. It presents a global view of the integrated production forecast information system in ERP, KM and IDSS, and describes different activities using IDEF modeling technique. Starting from the production process of ERP database, the author performs research on knowledge sharing of ERP, KM and IDSS integration and increasing production forecast capability. It is innovated to realize the issues about knowledge sharing, accuracy of production forecast and other applications. IDEF models can be translated into information analysis tools. These features make the integration structure of knowledge a powerful tool for analyzing, designing and forecasting.

Finally, the author uses Grey System to design the KM-Optimal Screening Model and to definite forecast ranges by Excel, to achieve objective of framework of the integration knowledge-sharing in the ERP, KM, and IDSS information system, and to highlight the importance of Knowledge Management in manufacturing enterprises.

Grey forecasting model is based on Chinese automotive manufacturing production data. It's concluded that Grey forecasting requires few data samples, and prediction accuracy is better than linear regression and exponential smoothing methods, which are commonly used recently. Grey forecasting is easy to calculate. It's suitable for manufacturers to conduct for a preliminary demand forecast. It has been proved that KM-Optimal Screening Model can select and analyze raw data from ERP system to identify a more precise range. The required value in real production can be strictly controlled within the reduced range. KM can limit the range of IDSS, which ensures that there won't be huge mistake or deviation in decision made by IDSS.

This research has investigated from the aspects of ERP, KM, IDSS system integration and knowledge transformation to build an integration structure of knowledge based on the unified framework, improve manufacturing enterprises' support towards KM and decision making, improve the intelligent level of IDSS, thus to thoroughly improve the accuracy rating of product forecasting, so that they would be able to enable more accurate, faster and better response to market.

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LIST OF ABBREVIATIONS



BI	Business Intelligence
BOM	Bill of Material
CAD	Computer Aided Design
CSFs	Critical Success Factors
DSS	Decision Support System
EDI	Electronic data interchange
ERP	Enterprise Resource Planning
FK	Foreign Keys
GM	Grey System
HR	Human Resource
IDEF0	Integration Definition for Function Modeling
IDEF1X	Integration Definition for Information Modeling
IT	Information Technology
IDSS	Intelligent Decision Support System
JIT	Just-In-Time
KM	Knowledge Management
KMO	Kaiser-Meyer-Olkin
KMS	Knowledge Management System
MCDM	Multiple Criteria Decision Making
MRP	Material Requirements Planning
OLAP	On-Line Analysis Processing
PDM	Product Data Management
RDF	Resource Description Framework
SCM	Supply chain management
VIF	Variance Inflation Factors

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DEDICATION

The author wishes to dedicate this thesis To My Parents.

