DETAILED CONTENT

CHAPTER I. INTRODUCTION *1*

1 Presentation *1*

2 Objectives *2*

3 Thesis outline *2*

4 References *3*

Part 1. State of the art

CHAPTER II. THE POTENTIAL OF INDUSTRY 4.0 IN LEAN SUPPLY CHAIN MANAGEMENT

1 Introduction *9*

2 Review Methodology *9*

3 Literature Review *10*

3.1 Supply Chain Management *10*

3.2 Technological Structure *10*

3.3 Lean Manufacturing Tools *10*

3.4 Lean Supply Chain Management 4.0 *12*

4 Conclusions *12*

5 References *13*

CHAPTER III. INTEGRATING LEAN MANUFACTURING AND INDUSTRY 4.0 TECHNOLOGIES INTO THE SUPPLY CHAIN

1 Introduction *18*

2 Review methodology *19*

3 Literature review *23*

3.1 Supply chain structure *23*

3.2 Decision level *25*

3.3 Research methodology and modelling approach *27*

3.4 Waste types *28*

3.5 Development tools *29*

3.6 Practical application *31*

3.7 Benefits and SC performance *31*

3.8 Limitations *32*

4 Discussion *34*

4.1 Results remark *34*

4.2 Research gaps and future research agenda *36*

5 Conclusions *37*

6 References *39*

Part 2. Conceptual model development and validation

CHAPTER IV. DEVELOPMENT OF A CONCEPTUAL MODEL FOR LEAN SUPPLY CHAIN PLANNING IN INDUSTRY 4.0: MULTIDIMENSIONAL ANALYSIS FOR OPERATIONS MANAGEMENT

1 Introduction 48
2 Literature review 49
3 Conceptual modelling for lean supply chain planning in Industry 4.0 53
4 Lean supply chain planning model design 54
4.1 Supply chain flows 55
4.2 Risk management 56
4.3 Lean design 57
4.4 Technological structure 58
4.5 The conceptual model 59
4.6 Model validation 60
5 Conclusions 62
6 References 64

Part 3. Reference models

CHAPTER V. OPTIMISATION MODELLING FOR LEAN, RESILIENT, FLEXIBLE AND SUSTAINABLE SUPPLY CHAIN PLANNING (I)

1 Introduction 72
2 Comparative analysis 72
3 Conclusions 74
4 References 74

CHAPTER VI. OPTIMIZATION MODELLING FOR LEAN, RESILIENT, FLEXIBLE AND SUSTAINABLE SUPPLY CHAIN PLANNING (II)

1 Introduction 79
2 Literature review 79
3 Comparative analysis 80
4 Conclusions 85
5 References 86

Part 4. Optimisation model development and validation

CHAPTER VII. QUANTITATIVE INSIGHTS INTO THE INTEGRATED PUSH AND PULL PRODUCTION PROBLEM FOR LEAN SUPPLY CHAIN PLANNING 4.0

1 Introduction 91
2 Background and related literature 92
3 Methodology 94
4 Model definition 95
4.1 Problem description 95
4.2 Assumptions 97
5 Mathematical formulation 98
6 Experimentation and solution 108
6.1 Solution approach 108

6.2 Real-world case study 109
7 Conclusions 117
7.1 Implications to theory and practice 117
7.2 Key lessons learnt 118
7.3 Limitations and future research 118
8 References 118
CHAPTER VIII. NORMALISED DATA MODEL FOR CLOUD COLLABORATIVE MANUFACTURING: APPLIED TO THE FOOTWEAR INDUSTRY
1 Introduction 126
2 Literature review 126
3 Methodology 127
4 Results 128
5 Conclusions 129
6 References 129

Part 5. Conclusions and future research lines
CHAPTER IX. CONCLUSIONS AND FUTURE RESEARCH
1 Conclusions 132
2 Further research guidelines 133
3 References 134
Appendices 135
Appendix III-A. Selected literature 137
Appendix III-B. Supply chain structure 144
Appendix III-C. Decision level of the reviewed works 153
Appendix III-D. Practical application, research methodology and modelling approach 157
Appendix III-E. Lean manufacturing waste 165
Appendix III-F. Relation between I4.0 technologies and LM tools 169
Appendix III-G. Key technologies for the digital transformation of the SC and SCP process 173
Appendix III-H. Lean manufacturing tools 183
Appendix III-I. Industrial sectors 187
Appendix III-J. Benefits and SC performance 191
Appendix III-K. Main limitations of the reviewed articles 214
Appendix VII-A. Firm orders demand for the medium problem size 222
Appendix VII-B. Forecast demand for the medium problem size 224
Appendix VII-C. Capacity 226
Appendix VII-D. Operating time, production and CO2 costs ($) 229
Appendix VII-E. Sale price, inventory, backorder and C02 costs ($) 236
Appendix VII-F. Transport costs ($), delivery time, available suppliers and supply capacity 250