

## CONTENTS

RESUMEN .....	ii
RESUM.....	iii
ABSTRACT.....	iv
ACKNOWLEDGMENTS.....	v
INDEX OF FIGURES .....	ix
INDEX OF TABLES .....	x
CHAPTER I.....	11
1 Introduction.....	11
1.1 Presentation.....	12
1.2 Objectives of the doctoral thesis and research questions.....	13
1.3 Research methodology .....	13
1.4 Structure of the doctoral thesis.....	14
1.5 References.....	18
CHAPTER II.....	21
2 A general overview of the industry 4.0 concept for production management and engineering.....	21
2.1 Introduction .....	22
2.2 Literature review .....	23
2.2.1 Definitions and concepts .....	23
2.2.2 Conceptual frameworks.....	24
2.3 Production planning in the industry 4.0 context.....	26
2.4 Conclusions .....	27
2.5 References.....	28
CHAPTER III .....	31
3 Implementing industry 4.0 principles .....	31
3.1 Introduction .....	34
3.2 Methodology.....	35
3.3 Literature review .....	36
3.4 Discussion .....	67
3.5 Conclusions .....	70
3.6 References.....	71
CHAPTER IV .....	91

4	A general outline of a sustainable supply chain 4.0 .....	91
4.1	Introduction .....	92
4.2	Review methodology .....	93
4.3	Literature review .....	95
	4.3.1 Taxonomy .....	95
	4.3.2 Discussion .....	112
4.4	Conclusions .....	114
4.5	References .....	115
	CHAPTER V .....	123
5	A conceptual framework for smart production planning and control in Industry 4.0 .....	123
5.1	Introduction .....	124
5.2	Literature review .....	126
5.3	Reference architectures for Industry 4.0 .....	133
5.4	Conceptual proposal .....	141
5.5	Results remarks .....	150
5.6	Conclusions .....	153
5.7	References .....	154
	CHAPTER VI .....	161
6	Smart production planning and control 4.0: a strategical and tactical optimisation approach .....	161
6.1	Introduction .....	162
6.2	Literature review .....	163
6.3	Proposal .....	169
	6.3.1 Model formulation .....	172
	6.3.2 Solution approach .....	187
6.4	Numerical experimentation .....	188
6.5	Conclusions .....	195
6.6	References .....	197
	Appendixes .....	205
	CHAPTER VII .....	212
7	Conclusions and future research lines .....	212
7.1	Research contributions .....	213
7.2	Future research lines .....	216