TABLE OF CONTENTS

Chapters	Titles		Page No.
	Acknowledgements		i
	Abstract		iii
	Table of contents		viii
	List of tables		xii
	List of figures		xiv
	List of symbols		xvi
	List of abbreviations		xviii
Chapter 1	**Introduction**		**1-8**
	1.1	Introduction	1-3
	1.2	Objectives of the Research	3-4
	1.3	Scope of the Research	4-5
	1.4	Organisation of the research	5-8
	1.5	Bibliographical note	8
Chapter 2	**Literature review**		**9-30**
	2.1	Introduction	9-11
	2.2	International and national studies on assessing the impacts of rural road construction	11-14
		2.2.1 International studies	11-13
		2.2.2 National Scenario	13-14
	2.3	Methodological approaches used to assess the impacts rural road construction	14-31
		2.3.1 Quantitative methods	14-20
		2.3.1.1 Experimental designs/techniques	14-15
		2.3.1.2 Quasi-Experimental designs/techniques	15-20
		2.3.2 Qualitative methods	20-21
		2.3.3 Fuzzy based multicriteria evaluation techniques	21-26
		2.3.4 Computational intelligence approach	26-27

	2.4	Existing Research Gap	27-29
	2.5	Summary	29-30
Chapter 3	**Identification of socio-economic indicators using mixed-method approach of PCA and fuzzy-TOPSIS**		**31-58**
	3.1	Introduction	31-35
		3.1.1 Significance of rural road impact assessment indicators	34-35
	3.2	Methodology	35-39
		3.2.1 Case study	35-36
		3.2.2 Selection of criteria/indicator	36-38
		3.2.3 Data collection	39
	3.3	Methods	40-56
		3.3.1 Mixed method approach	40-41
		3.3.2 Principal component analysis	41-47
		3.3.3 Fuzzy-TOPSIS for ranking the indicators	47-56
	3.4	Result and discussion	56-57
	3.5	Summary	57-58
Chapter 4	**Assessment of socio-economic impacts of rural road construction**		**59-90**
	4.1	Introduction	59-62
	4.2	Methodology	62-67
		4.2.1 Study Area	63-65
		4.2.2 Selection of SEIA criteria/sub-criteria	65-67
	4.3	Materials and methods	67-77
		4.3.1 Adaptive Neuro-fuzzy Inference System (ANFIS)	67-70
		4.3.2 Subtractive clustering algorithm	70-71
		4.3.3 Fuzzy Delphi	71-74
		4.3.4 Determination of sample	75-76
		4.3.5 Acquisition of data	76-77
	4.4	Model assessment	78-80
		4.4.1 Model Development (Training) for ANFIS	78-80
		4.4.2 Model evaluation criteria	80
	4.5	Results and discussion	80-89

	4.6	Summary	89-90
Chapter 5	**Impact of rural road construction on the local livelihood diversification**		**91-93**
	5.1	Introduction	91-93
	5.2	Diversification Literature review	93-95
	5.3	Materials and methods	95-97
		5.3.1 Study area	95-96
		5.3.2 Data collection	96-97
	5.4	Data analysis	97-100
		5.4.1 Diversification variables	97-99
		5.4.2 Diversification variables employed for the study	99-100
	5.5	Measurement of degree of livelihood diversification	100-105
		5.5.1 Application of fuzzy approach in group data assessment	100
		5.5.2 Fuzzy Shannon's diversification measure	100-103
		5.5.2 Econometric Models	103-105
	5.6	Result and discussion	105-112
		5.6.1 Livelihood/income Diversification Measure	105-111
		5.6.2 Impact of livelihood diversification on household income	111-112
	5.7	Summary	112-113
Chapter 6	**Exploring negative impacts of rural roads using fuzzy multicriteria approach**		**114-134**
	6.1	Introduction	114-118
		6.1.1 Negative impacts of rural roads	114-118
	6.2	Methodology	118-121
		6.2.1 Case study and data collection	119-121
	6.3	Data analysis	121-132
		6.3.1 Application of fuzzy TOPSIS approach	121-128
		6.3.2 Application of improved fuzzy weighted average (FWA) approach based on left and right score	128-132
	6.4	Result and discussion	132-134
	6.5	Summary	135

Chapter 7	**Conclusion**	**136-145**
	7.1 Conclusions	136-144
	7.2 Future scope	144-145
	References	**146-163**
	Appendices	**164-181**
	Appendix I: Assessment of Socio-Economic and Environmental Impacts of PMGSY Roads in Rajasthan (questionnaire for focus group discussion-habitation level)	164-171
	Appendix II: Assessing livelihood diversification (questionnaire for focus group discussion-habitation level)	172-174
	Appendix III: Assessment of negative impacts of PMGSY roads (questionnaire for focus group discussion-habitation level)	175-180
	Appendix IV: Road network map	181
	List of publications	182-183
	Brief biography of the candidate	184
	Brief biography of the supervisor	185-187
	Brief biography of the co-supervisor	188