# **Contents**

			rage
	Figure	es and Tables	Х
	Abbre	viations	XIV
	Data S	Source	XV
1	Intro	DUCTION: PERSPECTIVES ON GERMAN INDUSTRY AND ITS	1
	Сом	PETITIVENESS	
	Gunt	er Lay and Philip Shapira	
	1.1	German Industrial Competitiveness in Context	1
	1.2	The German Investment Goods Sector	6
		Overview of Innovation in Production	9
	1.4	Bibliography	16
2		DIFFUSION OF NEW PRODUCTION CONCEPTS IN GERMANY	19
		n Kinkel and Jürgen Wengel	
	2.1	Introduction	19
	2.2	Principles of New Production Concepts	20
	2.3	Implementation of New Production Concepts	22
	2.4	Diffusion and Structural Characteristics of Manufacturers	25
	2.5	<b>y</b>	27
	2.6	Conclusions	29
	2.7	Bibliography	30
3	PERF	DRMANCE IMPACTS OF NEW PRODUCTION CONCEPTS	31
	Gunte	er Lay, Carsten Dreher and Steffen Kinkel	
	3.1	Introduction	31
	3.2	New Production Concepts and Productivity	33
	3.3	New Production Concepts and Quality	35
	3.4	New Production Concepts and Inventory Savings	36

			Page
	3.5	Trouble of the will reduction concepts by	37
		Industry and Employment Size	
	3.6	T Promise District of New Houderion	39
		Concepts for Individual Manufacturers	
	3.7		41
	3.8	Bibliography	41
4		RACTION OF PROCESS AND PRODUCT INNOVATION	43
		ter Lay	
	4.1		43
	4.2	New Production Concepts and Product Innovation	44
	4.3	- Tours of Concepts of Trouget	47
		Development Timing	
		Conclusions	51
	4.5	Bibliography	52
5	NEW	PRODUCTION CONCEPTS AND EMPLOYMENT	53
	Gunt	er Lay	
	5.1	Introduction	53
	5.2	Development of Employment in Manufacturers: Users and	54
		Nonusers of New Production Concepts	
	5.3	Employment, New Production Concepts, and the Effects of	55
		Alternative Business Strategies	
	5.4	Differences between Cost-Oriented and Performance-	59
		Oriented Business Strategies in Shaping Production	
		Concepts	
	5.5	Importance of Cost-Oriented and Performance-Oriented	60
		Strategies in the Realization of New Production Concepts	
	5.6	Conclusions	62
	5.7	Bibliography	63
5	Worl	KER PARTICIPATION AND PROCESS INNOVATIONS	65
	Jürge	n Wengel and Werner Wallmeier	
	6.1	Introduction	65
	6.2	Participatory Organizational Culture and Business	66
		Performance	
	6.3	Employee Participation and Success in Techno-	69
		Organizational Innovation Projects	
	6.4	Conclusions	<i>7</i> 7
	6.5	Bibliography	78

78

_			Page
7		BILITY AT WORK	79
		er Lay and Claudia Mies	
	7.1	Introduction	79
	7.2		80
	7.3	Use of Flextime by Establishment Size, Industry and Strategic Orientation	82
	7.4	Influence of Product and Type of Manufacturing on the Implementation of Flextime Models	84
	7.5	Influence of Work Organization on the Use of Flextime Models	86
	7.6	Conclusions	88
	7.7	Bibliography	89
8		VATION VERSUS EMIGRATION - NEW PRODUCTION EPTS AND TRANSBORDER RELOCATION	91
		EPIS AND I KANSBURDEK RELOCATION n Kinkel	
	8.1		01
	0.1	Extent of Actual and Planned Relocations	91 91
	8.3		91
	8.4		95 95
			93 97
		Production Relocations and Productivity Conclusions	102
			102
	8.7	Bibliography	104
9		PRODUCTION CONCEPTS AND SERVICE ORIENTATION: CASE OF TELESERVICE	105
		en Dreher, Gunter Lay and Thomas Michler	
	9.1	Introduction	105
	9.1	The Diffusion of Teleservice	105
	9.2	Teleservice Use by Industry and Establishment Size	
	9.5 9.4	Teleservice: An Alternative to an Internal Service	107
	9.4	Department?	110
	9.5	The Future Development of Teleservice in German	110
		Industry	
	9.6	Conclusions	111
	9.7	Bibliography	112

## VIII

10	Engr	DOM COMMAN Pro Common of Common of T	Page
ΙU		RONMENTAL PRACTICES IN GERMANY'S INVESTMENT	113
	GOODS SECTOR Jürgen Fleig		
	10.1	Environmentally Clean Production in German Industry?	113
	10.2	Dissemination of Dry Processing Technologies Dissemination of Environmental Audits	116
			118
	10.4	Conditions of Application and Effects Conclusions	119
		Bibliography	123 123
11		TION OF NEW PRODUCTION CONCEPTS IN EAST GERMANY	125
	Gunt	er Lay	123
	11.1	Introduction	125
	11.2	The Modernization of Production in the New Länder	127
	11.3	Manufacturing Productivity in East Germany	129
	11.4	Conclusions	133
	11.6	Bibliography	134
12	- NOMOTION OF CITY IN THE NEW LANDER		137
	Jürgen Wengel		
	12.1	Introduction	137
	12.2	The CIM Program and Its Context in the New Länder	138
	12.3	The Coverage of the CIM Promotion Scheme	142
	12.4	Project Management in CIM-Promoted and Non-Promoted Establishments	145
	12.5	The Impact of the Promotion on the Firms	148
	12.7	Conclusions	153
	12.8	Bibliography	154
13	IMPLI	CATIONS FOR MODERNIZATION STRATEGIES AND STUDIES	159
	Gunte	er Lay, Carsten Dreher and Philip Shapira	10,
	13.1	Introduction	159
	13.2	German Competitiveness, Industrial Strategy and Business	160
		Performance: Recasting the Debate	100
	13.3	Implications for Management, Policy and Research	164
	13.4	Bibliography	169

		Page
Apper	ndix: Study Methodology	171
Steffe	n Kinkel and Martin Dreher	
A.1	Introduction	171
A.2	Survey Objectives and Target Industries	172
A.3	Address Sources and Sample Design	174
A.4	Response Rate and Structure of the Data Base	174
A.5	Characteristics of Survey Respondents and Comparison	176
	with Parent Industry Population	
A.6	Weighting Scheme and Transferability of the Survey	179
	Results to the Parent Population	
A.7	Bibliography	181
Contr	ibutors	183
	nnovations in Production Group at the Fraunhofer ute for Systems and Innovation Research	187

# Figures and Tables

# LIST OF FIGURES

1-1	Employment in Cormony Lawrence	Page
1-2		7
1-2	Gross value added in the German investment goods sector, 1980-1996	7
1-3	Employment change in the German investment goods sector, 1980-1996	8
2-1	Diffusion and the structural characteristics of investment goods manufacturers	26
2-2		27
2-3	Current and planned applications of individual elements of new	
	production concepts	28
3-1	Self-assessment of profitability by establishments in the German	32
	investment goods sector, 1995	32
3-2	Value added per employee and use of new production concepts	34
	(comparison of average values)	J <del>-</del> T
3-3	Reject rates (percent) and use of new production concepts	35
	(comparison of average values)	00
3-4	Inventory levels (in days) and use of new production concepts	37
	(comparison of average values)	
3-5	Use of teamwork and productivity, quality, and flexibility, for Type	40
	1 and Type 2 manufacturers (average values)	
4-1	Sales growth and the share of innovative products. German	44
	investment goods sector, 1995	• •
4-2	Product innovations and use of new production concepts	46
4-3	Product innovation development times and product complexity,	48
	development type, and establishment size	.0
4-4	Development times for new products, by use of selected new	50
	production concepts.	20

		Page
5-1	Employment trends among users and nonusers of new production concepts	55
5-2	Employment trends, new production concepts, and strategic orientation	57
5-3	Strategic orientation and the use of elements of new production concepts	61
5-4	Quantitative importance of cost-oriented and performance-oriented strategies in the implementation of new production concepts	62
6-1	Participatory orientation of organizational culture and business performance	68
6-2	Participation of different staff groups with techno-organizational innovations	70
6-3	Project teams and employee participation, by project types	72
6-4	PPC projects: Difficulties in implementation and employee participation	74
6-5	Goal attainment in PPC projects and employee participation	76
7-1	Diffusion of flexible working time concepts in the German investment goods industry	81
7-2	Use of flextime models in the German investment goods industry, by establishment size	83
7-3	Use of flexible work times in the German investment goods industry, by competitive strategies	84
7-4	Use of flextime by differences in product and manufacturing characteristics	85
7-5	Flextime and decentralization of planning and control functions in the German investment goods industry	87
7-6	Flextime and task integration in the German investment goods industry	87
7-7	Flextime and the use of teamwork in the German investment goods industry	88
8-1	Actual and planned production relocations abroad, investment goods sector	92
8-2	Production transfers already made, differentiated by strategic orientation and product complexity	94
8-3	Lead times and product development times related to production relocation and product complexity	96
8-4	Production strategies distributed between relocation and the introduction of new production concepts	98
8-5	Average productivity correlated with production relocation and the use of new production concepts	99
8-6	Productivity related to production strategy and product complexity	101
8-7	Productivity and lead times related to the use of new production concepts	102
	TV44TPW	

## XII

		Page
9-1	Diffusion of teleservice in the German investment goods sector	107
9-2	The state of the s	108
9-3	The state of the s	109
9-4	Teleservice use by establishment size, within investment goods sector	109
9-5	F In obtinoit goods sector	111
10-1	Investment share for environmental conservation in German industry, 1979-1994	114
10-2	Dissemination of dry processing in the German investment goods sector	117
10-3	Diffusion of environmental audits by employment size for	119
	manufacturers in the German investment goods sector	
10-4	Dissemination of environmental audits by industry, German	120
	investment goods sector	
10-5	Present and expected profit-situation of the businesses and use of environmental audits	121
10-6	Effects of environment-audits and dry processing technologies on economic features	122
11-1	Diffusion of selected manufacturing technologies in the old and new federal Länder	128
12-1	Indirect-specific promotion of computer integrated manufacturing (CIM)	140
12-2	Size of CIM-promoted establishments	143
12-3	Impact of promotion on CIM project management	146
12-4	CIM project management structures, non-promoted establishments compared with promoted establishments	148
12-5	CIM project cost structures in promoted and non-promoted establishments	149
12-6	Dynamics of CIM implementation in promoted and non-promoted establishments	150
12-7	Economic situation and employment in promoted and non-promoted establishments	152
A-1	Composition of responses	176
A-2	Representiveness of survey respondents, by participation in the	177
	BMBF CIM promotion program	1,,
A-3	Relative distribution of weighted database, by employment size	180
A-4	Relative distribution of weighted database, by industry	181
	c	

#### XIII

#### LIST OF TABLES

		Page
2-1	Diffusion of new production concepts in the German investment goods sector, 1995	23
11 1		132
11-1	Comparison of productivity-relevant factors in East and West	152
	German establishments	
A-1	Definition of the investment goods sector used in the ISI survey	173
A-2	Selection and adjustment of the establishment sample, ISI survey	175
A-3	Survey respondents and parent population, by regional location and	178
	industry	
A-4	Survey respondents and parent population, by regional location and	178
	employment size	