

# Innovation and Employment Dynamics

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## Relations between innovation behaviour and employment dynamics in Danish private sector firms

- Innovation behaviour and job dynamics over time
- Relations between product and process innovation
- Organization forms promoting learning
- Demand for qualifications and changing personnel profiles

Panel of 524 private sector firms followed over 10 years (1990-2000)

2 surveys (1996 and 2001) integrated by register data from Integrated Database of labour market research (IDA) and Business accountant data from Denmark's Statistics

### Industry of the firms ultimo 2000

Manufacturing	Construction	Trade	Other services	Business service	(N)
41.0	16.8	29.0	6.9	6.3	524

### Size of employment and industry of the firms ultimo 2000

Size	Manufacturing	Construction	Trade	Other services	Business service	All firms
< 50	30.3	73.9	70.5	72.2	62.5	54.3
50-99	17.5	13.6	13.4	16.7	12.5	15.3
100 +	52.1	12.5	16.1	11.1	25.0	30.4
(N)	211	88	149	36	32	516

## Product innovation

- Introduction of new products or services on the market, excluding minor improvements of existing products

### Product- or service innovation 1993-95 and/or 1998-2000

	Frequency	Per cent
P/S innovation 1995+2000	157	32.1
P/S innovation 1995/2000	166	34.0
Not product- or service innovation	166	34.0

- Radicalism of product innovations

### Product- or service innovation type 1993-95 and 1998 - 2000

	Local (98 – 00)	National (98 – 00)	Radical (98 – 00)	(N)
Local (93 - 95)	86.9	9.5	3.6	84
National (93 - 95)	31.6	42.1	26.3	19
Radical (93 - 95)	53.3	33.3	13.3	15
All (93 – 95)	73.7	17.8	8.5	118

- Globalisation and product innovation

### Product or service innovation 1993 – 95 and/or 1998 –2000 by ownership of firm 2000

	P/S innovation 93-95+98-00	P/S innovation 93-95/98-00	Not P/S innovative	(N)
Danish group	33.1	39.6	27.2	169
Foreign group	51.0	27.5	21.6	102
Single firm	22.2	32.9	44.9	216
All firms	32.0	34.1	33.9	487

## ➤ Innovation and employment

Employment in panel firms by product or service innovation 1993 – 95 and/or 1998 –2000 (Index 1990 = 100)

	Emp.90	Emp.91	Emp.92	Emp.93	Emp.94	Emp.95	Emp.96	Emp.97	Emp.98	Emp.99
P/S 95+00	27992 = 100	98.6	97.2	97.5	105.3	109.6	105.3	108.3	102.5	101.1
P/S 95/00	12921 = 100	103.5	101.1	96.1	101.0	105.4	104.8	114.0	106.6	105.7
Not P/S in	8985 = 100	98.9	96.9	93.3	99.7	95.7	89.7	88.5	89.0	88.7
All firms	49898 = 100	100.0	98.1	96.4	103.2	106.0	102.3	106.2	101.1	100.1

## ➤ Innovation and job dynamics

Table 2.10.1 Job creation and Job destruction in panel firms 1990 – 91 to 1993 – 94 by product or service innovation 1993 – 95 and/or 1998 –2000

	<i>Jobs 1990 – 91</i>		<i>Jobs 1991 – 92</i>		<i>Jobs 1992 – 93</i>		<i>Jobs 1993 – 94</i>	
	Created	Destructed	Created	Destructed	Created	Destructed	Created	Destructed
<b>PS95+00</b>	4.1	5.5	3.1	4.6	4.6	4.3	9.5	1.4
<b>PS 95/00</b>	7.6	4.1	4.9	7.2	3.9	8.8	9.4	4.3
<b>Not PS</b>	7.4	8.5	5.5	7.6	6.2	9.9	12.0	5.1
<b>All firm</b>	5.6	5.6	4.0	5.8	4.7	6.5	9.9	2.8

Table 2.10.2 Job creation and Job destruction in panel firms 1994 – 95 to 1998 – 99 by product or service innovation 1993 – 95 and/or 1998 –2000

	<i>Jobs 1994 – 95</i>		<i>Jobs 1995 – 96</i>		<i>Jobs 1996 – 97</i>		<i>Jobs 1997 – 98</i>		<i>Jobs 1998 – 99</i>	
	Create	Destruct	Create	Destruct	Create	Destruct	Create	Destruct	Create	Destruct
<b>PS95+00</b>	6.4	2.3	3.0	6.9	5.2	2.3	2.9	8.3	3.9	5.3
<b>PS 95/00</b>	7.7	3.3	4.4	5.1	12.3	3.5	4.6	11.1	4.8	5.6
<b>Not PS</b>	8.5	12.5	3.9	10.2	5.2	6.6	5.9	5.3	6.1	6.4
<b>All firm</b>	7.1	4.3	3.5	7.0	7.1	3.3	3.8	8.6	4.5	5.6

## Process innovation: New technologies New organization forms

### ICT and employment dynamics

- Introduction of new information and communication technology, excluding upgrading of already existing systems

#### ICT innovation 1993-95 and 1998 - 2000

	Yes (98 – 00)	No (98 – 00)	D't k(98–00)	(N)
Yes (93 - 95)	67.5	31.3	1.2	323
No (93 - 95)	41.4	56.9	1.7	174
D't k. (93 - 95)	62.5	37.5	0.0	16
All (93 – 95)	58.5	40.2	1.4	513

- P/S Innovation and ICT innovation

#### P/S Innovation and ICT Innovation

	ICT Inno. 95+00	ICT Inno 95/00	Not ICT Inno.
P/S Inno. 95+00	65.3	32.0	2.7
P/S Inno. 95/00	47.2	35.9	17.0
Not P/S Inno.	20.9	38.0	41.1

➤ ICT innovation and employment in panel firms

Employment in panel firms by ICT innovation 1993 – 95 and / or 1998 – 2000 (Index 1990 = 100)

	Emp.90	Emp.91	Emp.92	Emp.93	Emp.94	Emp.95	Emp.96	Emp.97	Emp.98	Emp.99
ICT 95+00	29664 = 100	100.6	98.5	97.1	104.3	108.5	103.7	106.0	102.1	102.3
ICT 95/00	15774 = 100	99.4	96.1	91.6	96.2	98.9	97.5	107.0	99.3	96.6
Not ICTin	4137 = 100	95.9	100.3	101.2	110.9	101.1	102.2	95.2	94.9	94.1
All firms	49575 = 100	99.8	97.9	95.7	102.3	104.8	101.6	105.4	100.6	99.8

➤ Hiring and separations in panel firms

Hiring and Separations in panel firms 1990 – 91 to 1993 – 94 by ICT innovation 1993 – 95 and/or 1998 – 2000

	1990 – 91		1991 – 92		1992 – 93		1993 – 94	
	Hiring	Separati	Hiring	Separation	Hiring	Separation	Hiring	Separation
<b>IT95+00</b>	18.2	16.0	16.7	16.6	14.8	16.1	13.7	15.6
<b>IT 95/00</b>	21.7	19.1	18.5	19.1	16.2	21.3	16.3	18.9
<b>Not ICT</b>	29.2	24.0	19.0	21.5	24.2	22.6	20.8	22.8
<b>All firm</b>	20.2	17.7	17.4	17.8	16.1	18.3	15.1	17.2

	1994 – 95		1995 – 96		1996 – 97		1997 – 98		1998 – 99	
	Hiring	Separati	Hiring	Separati	Hiring	Separati	Hiring	Separati	Hiring	Separati
<b>IT95+00</b>	20.4	-	20.5	18.2	14.3	15.6	17.8	-	17.5	17.5
<b>IT 95/00</b>	21.9	-	21.1	20.3	17.4	17.6	26.5	-	18.8	18.0
<b>Not ICT</b>	31.9	-	27.8	24.0	26.4	27.1	22.2	-	22.5	21.2
<b>All firm</b>	21.8	-	21.3	19.3	16.2	17.1	20.9	-	18.3	18.0

## Organization forms promoting learning

- Theoretical aspects and organizational dimensions in the learning organization

Theoretical aspects	Organizational dimensions
Organic and integrative organization	Cross occupational working groups Integration of functions Delegation of responsibility Planned job rotation
Quality management	Quality circles/groups Systems for collection of employee proposals
HRD and compensation	Education activities tailored to the firm Long term educational planning Wages based on results
External relations	Closer cooperation with customers Closer cooperation with subcontractors Closer cooperation with knowledge institutions

- Additive index for 1993-95 and for 1998-2000
- High developed: 6 – 12 dimensions adapted

### Learning organization development 1995 and/or 2000

	Frequency	Per cent
High dev. learning org. 1995+2000 (1)	190	36.3
High dev. learning org. 1995/2000 (2)	189	36.1
Not high dev. Learning org. (3)	145	27.7

➤ Learning organization and product innovation

Logistic regression of learning organization development on P/S innovation 2000.

(Odd ratio, 95% confidence interval, estimates, chi-square and P-value)

Variables	Effect	Lower 95%	Higher 95%	Estimate	Chi-sq	P-value
Dev. 1 vs. 3	5.9	3.6	9.7	0.91	49.1	<.0001
Dev. 2 vs. 3	2.3	1.4	3.7	-0.05	0.1	0.7257

➤ Learning organization and employment

Employment in panel firms by learning organization development 1995 and/or 2000 (Index 1990 = 100)

	Emp.90	Emp.91	Emp.92	Emp.93	Emp.94	Emp.95	Emp.96	Emp.97	Emp.98	Emp.99
LO 95+00	35175 = 100	100.7	98.5	96.6	103.2	108.3	104.3	106.9	102.6	102.3
LO 95/00	12309 = 100	98.7	95.7	91.9	98.6	96.3	94.6	102.9	95.7	92.7
Not LO	4391 = 100	97.4	97.2	100.9	108.4	107.6	104.0	105.1	104.9	102.1
All firms	51875 = 100	99.9	97.7	95.8	102.6	105.4	102.0	105.8	101.1	100.0

## Demand for qualifications and changing personnel profiles

### ➤ Hiring of higher educates in learning organizations

Hiring of higher educated relative to all hiring in panel firms by learning organization development 1995 and/or 2000 (Index 1990 = 100)

	H90-91	H91-92	H92-93	H93-94	H94-95	H95-96	H96-97	H97-98	H98-99	H99-00
LO 95+00	12.1	13.0	12.4	14.5	11.9	17.0	20.3	16.9	23.7	25.3
LO 95/00	8.9	10.8	9.3	13.8	10.8	13.9	15.3	9.3	18.7	19.4
Not LO	6.0	3.8	6.1	9.8	7.0	10.0	8.6	8.2	11.6	10.3
All firms	10.6	11.5	10.9	13.7	11.1	15.5	17.7	13.8	21.2	22.5

### ➤ Hiring of women in learning organizations

Hiring of women relative to all hiring in panel firms by learning organization development 1995 and/or 2000 (Index 1990 = 100)

	H90-91	H91-92	H92-93	H93-94	H94-95	H95-96	H96-97	H97-98	H98-99	H99-00
LO 95+00	34.2	31.7	35.2	35.4	33.8	34.3	33.7	35.4	35.5	37.5
LO 95/00	33.8	32.4	31.5	33.8	27.6	28.5	28.0	30.8	30.2	29.4
Not LO	23.9	24.7	20.8	23.2	20.2	26.4	20.2	21.3	20.9	19.3
All firms	33.0	31.2	32.5	33.3	30.8	32.1	30.7	32.7	32.6	33.9

➤ Changing personnel profiles

Share of higher educated, skilled and unskilled employees in firms with learning organization development 1995 and 2000 (LO95+00)  
(Percent vertical)

	Shr.90	Shr.91	Shr.92	Shr.93	Shr.94	Shr.95	Shr.96	Shr.97	Shr.98	Shr.99
Higher Educat	14.6	14.9	15.6	16.3	16.1	17.1	17.8	17.9	21.6	22.5
Skilled Empl	42.1	43.3	43.4	43.9	43.5	43.1	42.8	42.7	39.8	39.9
Un-skilled	43.3	41.8	41.0	39.8	40.4	39.8	39.4	39.4	38.6	37.7
All Empl	34310	34544	33814	33213	35513	37487	36679	37584	36084	35969

Hiring and Separation rates for higher educated in panel firms 1990 – 91 to 1993 – 94 by development of learning organization 1993 – 95 and / or 1998 –2000

	1990 – 91		1991 – 92		1992 – 93		1993 – 94	
	Hiring	Separati	Hiring	Separation	Hiring	Separation	Hiring	Separation
<b>LO95+00</b>	15.7	14.1	14.2	12.9	11.5	12.2	12.6	13.7
<b>LO 95/00</b>	19.4	16.2	18.6	16.8	13.6	15.5	18.9	17.2
<b>Not LO</b>	27.4	21.1	12.2	15.4	15.6	14.3	28.7	20.0
<b>All firms</b>	16.8	14.8	15.0	13.7	12.1	12.9	14.6	14.7

	1994 – 95		1995 – 96		1996 – 97		1997 – 98		1998 – 99	
	Hiring	Separati	Hiring	Separati	Hiring	Separati	Hiring	Separati	Hiring	Separati
<b>LO95+00</b>	14.3	-	19.6	16.4	16.6	14.5	14.3	-	17.9	15.6
<b>LO 95/00</b>	20.0	-	23.0	18.6	20.8	16.7	15.1	-	21.9	19.6
<b>Not LO</b>	21.5	-	28.2	27.0	21.1	22.8	16.5	-	23.5	23.1
<b>All firms</b>	15.7	-	20.6	17.3	17.6	15.3	14.6	-	18.9	16.8