

Innovation in the Pakistani Textile and Apparel Sectors: Key findings and Recommendations

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 - 4 is innovation conducive to employment creation? (a pressing need in the developing world)

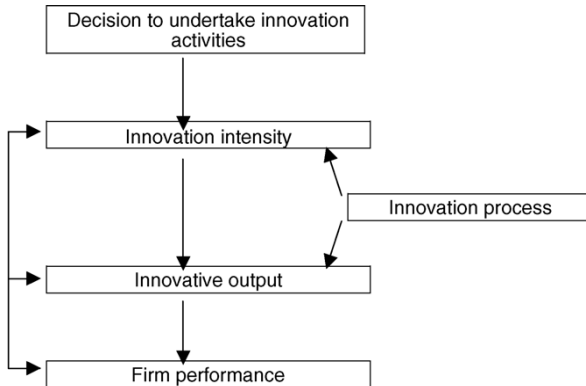
The landscape

Sample characteristics

	Obs	Size ^a	Innovation Expenditure ^b	Continuous R&D ^c	Product ^c	Process ^c	Org. Inn ^c
Total	377	348	9.30	24	33	41	30
<i>Textile</i>	306	311	8.38	19	28	38	26
<i>Apparel</i>	71	509	11.68	45	56	52	48

Note: (a) measured as total employment in 2015, (b) innovation expenditure measured as a percentage of turnover in 2015 for firms reporting positive expenditure, and (c) as a percentage.

Framework: from decision to innovate to firm performance



Engaging in innovative activities

Decision to innovate and resources devoted

	Engage in innovation	R&D intensity
<i>Firm and market characteristics</i>		
Firm size	0.27*** (0.098)	0.07 (0.306)
USA	0.68** (0.344)	-1.68 (1.035)
Europe	0.66* (0.348)	-1.76 (1.210)
Local competition	-0.42 (0.297)	1.89* (1.162)
Foreign competition	-0.52* (0.308)	0.11 (1.050)
Export intensity	--	0.20***(0.074)

Note: The parentheses contain standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

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Cost factors	-0.44* (0.242)	2.11** (0.891)
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<i>Sources of information and cooperation</i>		
Foreign suppliers	1.63*** (0.577)	--
Local suppliers	0.47 (0.345)	--
Foreign clients	1.12*** (0.433)	--
Local clients	0.41 (0.317)	--
<i>National subsidy</i>	--	-3.62** (1.666)
No. of observations	377	377

Note: The parentheses contain standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Innovation outcome

	Innovation outcome		
	Product	Process	Organizational
R&D	0.11***(0.027)	0.12***(0.028)	--

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<i>Firm characteristics</i>			
Size (t-2)	-0.09 (0.069)	0.17**(0.074)	0.15***(0.051)
Age	-0.12 (0.110)	-0.36***(0.119)	0.05 (0.090)
ISO9000	0.41*(0.230)	0.05(0.243)	0.49***(0.184)

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<i>Market orientation</i>			
Export intensity (t-2)	0.05 (0.058)	0.06 (0.062)	-0.00 (0.044)
Local competition	-0.04 (0.273)	-0.13 (0.280)	0.20 (0.211)
Foreign competition	-0.56**(0.249)	0.17 (0.249)	0.32*(0.187)
Apparel	0.58**(0.257)	-0.76**(0.317)	0.44**(0.201)
Sindh	0.62***(0.230)	-0.19 (0.251)	0.12 (0.173)

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Cost factors	-0.39*(0.206)	-0.28 (0.215)	--
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<i>Sources of information and cooperation</i>			
Foreign suppliers	0.95***(0.289)	-0.53 (0.313)	--
Local suppliers	0.51**(0.261)	-0.12 (0.283)	--
Foreign clients	0.15 (0.292)	0.88***(0.320)	--
Local clients	0.03 (0.260)	0.66**(0.290)	--

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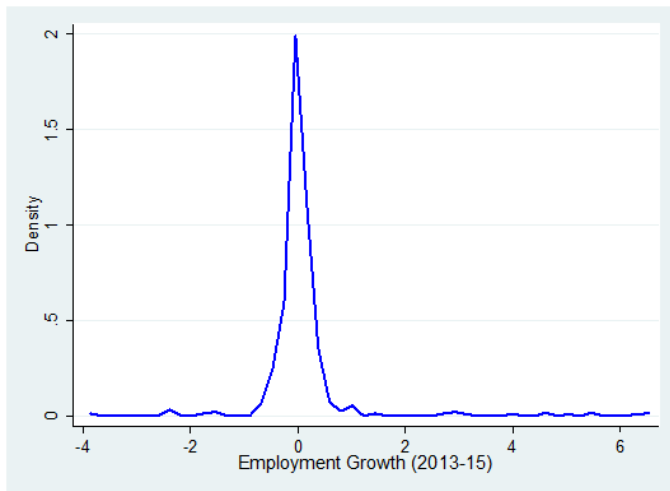
Innovation and firm performance

Firm performance

	Employment growth	Sales growth	Productivity growth
Product	-0.05 (0.045)	-0.13(0.108)	-0.19** (0.099)
Process	0.14***(0.046)	0.43***(0.100)	0.36***(0.090)
Organizational	-0.07(0.145)	0.84** (0.345)	0.80***(0.288)
Human capital	0.27***(0.049)	0.33*** (0.081)	0.26***(0.105)
Employment (t-2)	-0.38***(0.078)	0.01 (0.153)	-0.08 (0.188)
Sales (t-2)	-0.04***(0.012)	-0.88*** (0.045)	-0.68***(0.032)
Age	-0.18***(0.038)	-0.15(0.107)	-0.01(0.095)
R-squared	0.55	0.86	0.83
P	0.000	0.000	0.000
Observations	377	377	377

Note: This stage is estimated using instrumental variables two-stage least squares (IV 2SLS). The parentheses contain bootstrapped standard errors (100 replications). Significance levels are reported based on bootstrapped standard errors (100 replications). ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Growth distribution



Determinants of employment growth

Employment growth 2013-15

	^a Tech. Inn	^a Cont. R&D	^a Inn. investment
Size	-0.901*** (0.124)	-0.898*** (0.120)	-0.895*** (0.118)
Size squared	0.034** (0.014)	0.047*** (0.016)	0.034* (0.013)
Age	-0.800*** (0.280)	-0.895*** (0.269)	-0.753*** (0.272)
Age squared	0.062 (0.045)	0.078* (0.043)	0.046 (0.043)
Size*Age	0.112*** (0.035)	0.082** (0.037)	0.114*** (0.036)
Observations	377	377	377
R-squared	0.672	0.669	0.679

Note: The parentheses contain robust standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

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Age squared	0.062 (0.045)	0.078* (0.043)	0.046 (0.043)
Size*Age	0.112*** (0.035)	0.082** (0.037)	0.114*** (0.036)
Innovation (a)	1.684*** (0.430)	1.905*** (0.410)	0.091*** (0.020)
Innovation*Size	-0.048 (0.057)	-0.136** (0.056)	-0.003 (0.002)
Innovation*Age	-0.452*** (0.101)	-0.372*** (0.122)	-0.023*** (0.005)
Observations	377	377	377
R-squared	0.672	0.669	0.679

Note: The parentheses contain robust standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Defining Young Innovative Companies

$$YIC_{it}^E = \begin{cases} 1 & \text{if } \text{age}_{it} < 10 \ \& \ \text{employment}_{it} < 50 \ \text{or } 250 \ \& \ \text{Tech. Inn} = 1 \\ & \text{or Cont. R\&D} = 1 \\ & \text{or R\&D intensity} \geq 5\% \\ 0 & \text{otherwise} \end{cases}$$

Determinants of employment growth

Employment growth 2013-15

YICs:	^a Tech. Inn		^a Cont. R&D		^a Inn. investment	
	Empl<50	Empl<250	Empl<50	Empl<250	Empl<50	Empl<250
Size	-0.799*** (0.134)	-0.842*** (0.132)	-0.752*** (0.128)	-0.803*** (0.127)	-0.684*** (0.144)	-0.817*** (0.128)
Size squared	0.034*** (0.012)	0.036*** (0.012)	0.032** (0.012)	0.033*** (0.012)	0.030** (0.012)	0.034*** (0.012)
Age	-0.947*** (0.275)	-0.946*** (0.276)	-1.036*** (0.258)	-0.990*** (0.263)	-0.908*** (0.282)	-0.892*** (0.272)
Age squared	0.089* (0.046)	0.083* (0.047)	0.106** (0.042)	0.092** (0.044)	0.093** (0.044)	0.072 (0.046)
Size*Age	0.063* (0.035)	0.072** (0.034)	0.060* (0.034)	0.070** (0.034)	0.048 (0.036)	0.075** (0.034)
Innovation (a)	0.146** (0.058)	0.160*** (0.060)	0.086 (0.072)	0.096 (0.075)	0.006** (0.003)	0.008** (0.003)
YIC ^E	0.371 (0.267)	0.197 (0.151)	0.891** (0.419)	0.568** (0.276)	1.239** (0.558)	0.519** (0.238)
Observations	377	377	377	377	377	377
R-squared	0.640	0.638	0.647	0.641	0.660	0.645

Note: The parentheses contain robust standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Job creation by different types of firms

Employment creation 2013-15

Types	Mean growth in employment in %	Mean net employment creation
Total sample	9.5	24.77
Young (<10 years old)	53	25.15
Small (<50 employees)	26	11.96
Medium (= 50 but <250 employees)	-3.5	00.18
Large (= 250 employees)	-12	84.36
Small and Young	79	35.83
Technological innovators	13	53.47
Continuous R&D performing	23	118.87
Non-innovators	05	-05.15
YIC^E (a)	183	80.73
YIC^E (b)	248	136.57
YIC^E (c)	366	164.00

Key lessons

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- Firms receiving R&D subsidy invest less in innovation.
- Foreign knowledge flows, firm size and exporting leads to more investment in innovation activities.
- Firms facing competition from foreign competitors invest less, whereas, those facing competition from local competitors invest more in innovation.
- Firms facing competition from foreign competitors are less likely to introduce new products but are more likely to introduce managerial innovation.

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- On job trainings that facilitate **multi-tasking** is crucial for both employees to retain jobs when there is automation, and for firms to not lose productivity when new products are introduced.
- A negative impact of foreign competition on innovation suggests that Pakistani firms are not competitive in international market: need to **promote innovations that upgrade Pakistani products in global value chain**.

Thank you

For feedback:
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Defining types of innovation

- A product innovation is the market introduction of a **new or significantly** improved good with respect to its **capabilities, user friendliness, components/materials**.
- A process innovation is the implementation of a **new or significantly** improved **production process, distribution method, or supporting activity**.
- Organizational innovation is a **new organizational method** in enterprise's **business practices, workplace organization or external relations** that has not been previously used by enterprise.
- A marketing innovation is the implementation of a **new marketing concept or strategy** that differs significantly from enterprise's existing marketing methods and which has not been used before.