

Digitalization and Exports

- A case of Indian Manufacturing MSMEs

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Contents

- Current status of digitalization in India
- Contribution of Digital Services to Exports from India
- Determinants of Digitalization
- Role of Digitalization in influencing export performance
- Concluding Remarks and Policy Implications

Introduction

- Various facets of digitalization such as internet penetration, ICT development - extremely low in India (PayPal, 2019).
- Digitalization is particularly low amongst Indian manufacturing firms (Chaudhary, 2019).
- Covid-19 – led to a greater level of digitalization of firms across the world, however, the digitalization levels of Indian MSMEs are still quite low (WTO, 2020).

Literature Review

- A few studies have explored the impact of digitalization on the export performance of firms
 - at the global level (Atasoy, 2021; Portugal-Perez & Wilson, 2012; Tee et al, 2020; Trașcă et. al., 2019)
&
 - at the Indian level (Bhat, 2015; Banga & Banga, 2020; Gautam, 2017; Gopalan et al., 2022; Lal, 2004)
- None of these studies focus on the Indian manufacturing MSMEs.
- Literature gap exploring the role of digitalization on export market entry of MSME firms.

Contribution to the Literature

- Firm-level assessment by using the CMIE's Prowess database.
- Different measures of digitalization covering both capital expenditure & recurring expenditure of the firm.
- Endogeneity & unobserved heteroscedasticity tackled by employing the System Generalized Method of Moments.
- Impact of digitalization on the export market entry decision by using Dynamic Probit Regression Model.
- Controlling for a wide range of covariates ~ trade, labour productivity, size, age of the firm, servicification, extent of market competition, and firm-level profits.

Research Objectives

- What are the reasons for the low levels of digitalization in India?

Identification & evaluation of the factors affecting the adoption of digitalization by Indian manufacturing MSMEs?

- What is the nexus between *digitalization and exports* in the context of Indian manufacturing MSME firms?
- What is the role of digitalization in facilitating *export market entry* for these firms?

Data

- World Bank's **World Integrated Trade Solutions (WITS)** database on international trade (2008-2018)
- OECD's **Trade in Value Added (TiVA)** database on international trade(2008-2018)
- CMIE's **Prowess** firm level database on financial performance of over 40,000 firms belonging to the organized sector. A continuous time series data (1988-2019) and entails information on digital infrastructure of firms.

India's Export Performance at a Glance

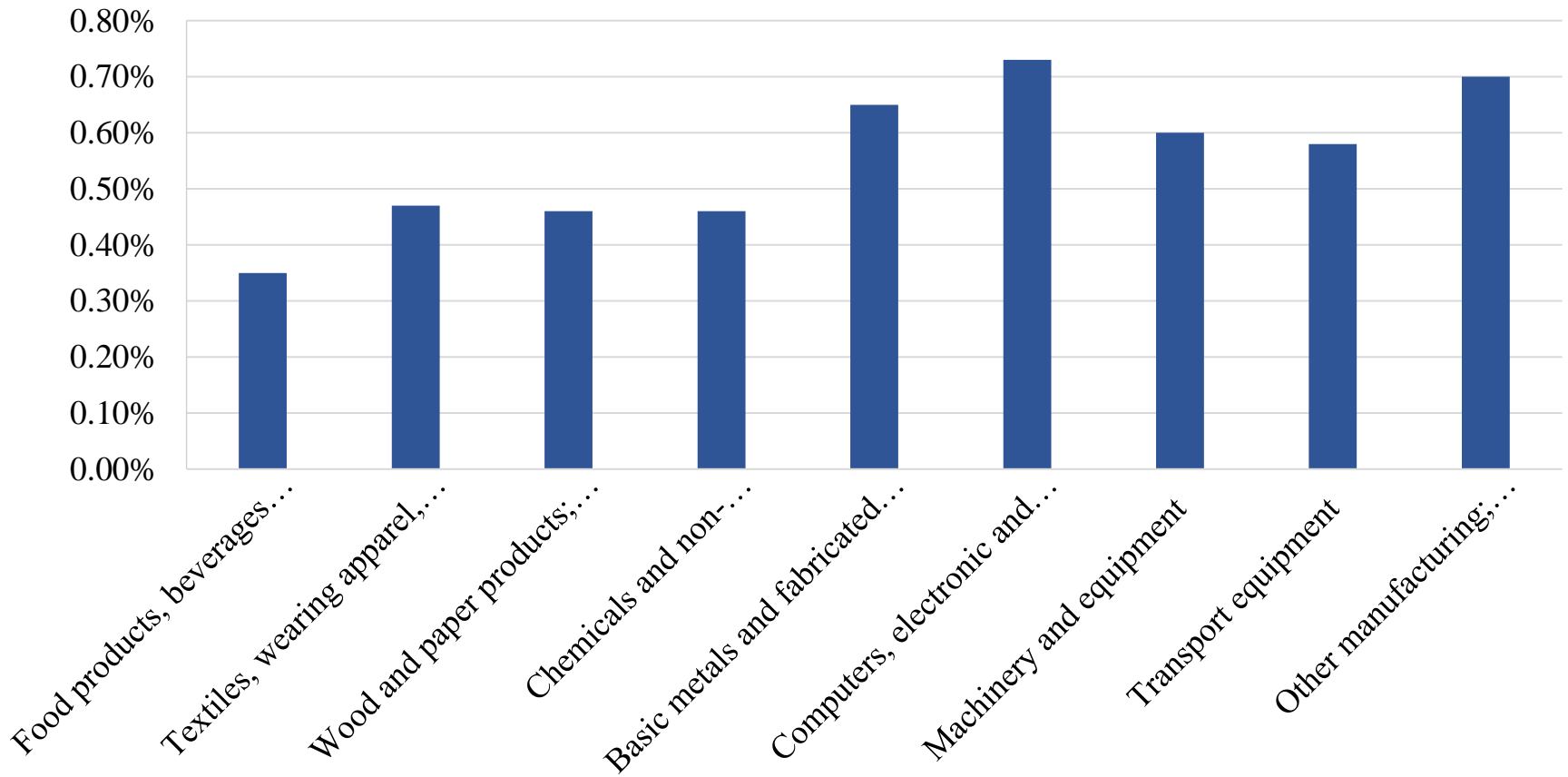
Year	India's global exports (USD Bn)	India's (%) share in global exports
1990	18	1.30
1995	32	0.68
2000	42	0.67
2005	100	0.99
2010	220	1.48
2015	264	1.64
2020	275	1.63

Value added by Digital Services in Mfg. and Total X (% share)

Manufacturing Exports			
<i>Country/ Year</i>	<i>2008</i>	<i>2013</i>	<i>2018</i>
<i>DEU</i>	1.9	2.1	2.6
<i>JPN</i>	1.5	1.6	1.3
<i>KOR</i>	1.4	1.3	1.2
<i>MEX</i>	1.0	1.2	1.2
<i>GBR</i>	2.0	1.8	2.3
<i>USA</i>	1.4	1.4	1.7
<i>BRA</i>	2.4	1.4	1.4
<i>CHN</i>	1.3	0.8	1.1
<i>IND</i>	0.6	0.5	0.5
<i>IDN</i>	1.2	1.1	1.1
<i>PHL</i>	0.9	0.6	0.6

Total Exports			
<i>Country/ Year</i>	<i>2008</i>	<i>2013</i>	<i>2018</i>
<i>DEU</i>	3.1	3.4	4.4
<i>JPN</i>	1.9	2.0	2.0
<i>KOR</i>	1.9	1.9	2.0
<i>MEX</i>	0.9	1.1	1.1
<i>GBR</i>	5.3	5.4	6.6
<i>USA</i>	2.9	3.3	4.3
<i>BRA</i>	2.9	1.5	2.0
<i>CHN</i>	1.6	1.3	2.6
<i>IND</i>	13.0	12.8	14.3
<i>IDN</i>	1.5	1.5	1.7
<i>PHL</i>	3.7	4.7	5.8

VA by Digital Services in Exports within the Mfg. Sub-sectors of India (2018, %)



Empirical Investigation

MSME Definition

As per the MSME Development Act, 2006

MSME Classification			
Classification	Micro	Small	Medium
<u>Manufacturing Enterprises</u>	Investment < Rs. 25 lakhs	Investment < Rs. 5 crores	Investment < Rs. 10 crores
Services Enterprises	Investment < Rs. 10 lakhs	Investment < Rs. 2 crores	Investment < Rs. 5 crores

Digital Infrastructure/Intensity

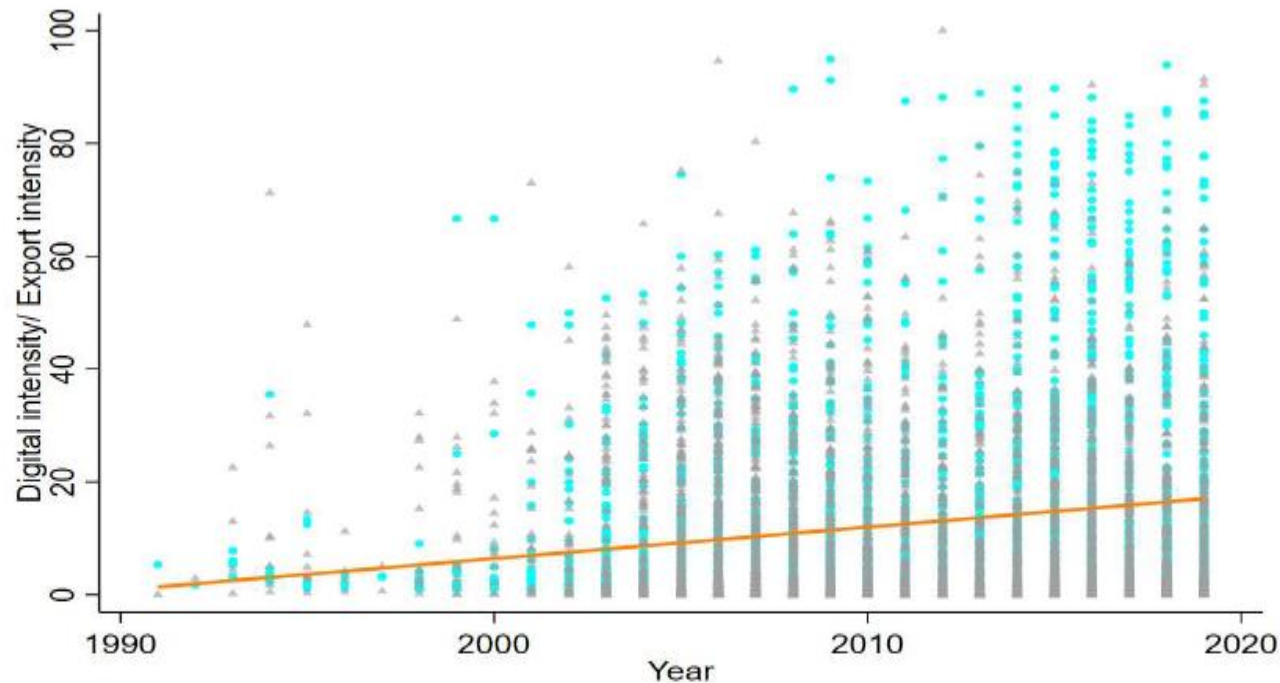
1	$(\text{Computer and IT systems} / \text{Expenditure on Plant and Machinery}) * 100$
2	$(\text{Computer and IT systems} + \text{Software} / \text{Expenditure on Plant and Machinery} + \text{Software}) * 100$
3	$(\text{Computer and IT systems} + \text{Software} + \text{Expenditure on ISPs for Internet} / \text{Expenditure on Plant and Machinery} + \text{Software} + \text{Expenditure on ISPs for Internet}) * 100$




Empirical Exercise 1

Determinants of Adoption of Digitalization for a Manufacturing MSME by using Fixed Effects Panel Data Regression Model

$$\begin{aligned} \text{Digital Intensity}_{i,t} = & \alpha + \beta_1 \text{Exporter}_{i,t-1} + \beta_2 \text{Service} \\ & \text{Intensity}_{i,t-1} + \beta_3 \text{Importer (Services)}_{i,t-1} + \beta_4 \text{Tech KH}_{i,t-1} + \\ & \gamma \text{ control variables} + u_i + \epsilon_{ijt} \end{aligned}$$

Digital intensity & export intensity of Indian incorporated MSMEs (1990-2019)



Where  indicates fitted values of digital intensity,  indicates export intensity and  indicates digital intensity of firms over the 1990-2019 time period.

Source: Authors' calculations from Prowess database

Empirical Exercise 2

Testing for the Differences in Export Intensity Across Low and High Digital Intensity Firms

Variable	T stat for H_0	Significantly different means?
Low Digital Intensity	4.30***	Yes
High Digital Intensity		

Note: H_0 : Export Intensity₀ = Export Intensity₁
 H_a : Export Intensity₁ > Export Intensity₀

Empirical Exercise 3

Digital Intensity & Export Intensity of a Manufacturing MSME by using System Generalized Method of Moments

$$\text{Export Intensity}_{i,t} = \alpha + \beta_1 \log(\text{Digital Intensity}_{i,t}) + \beta_2 \text{Export Intensity}_{i,(t-1)} + \sum \phi Z_{i,t-1} + \mu_t + \mathfrak{S}_j + \epsilon_{ijt}$$

VARIABLES	Export Intensity (t)					
	(1)	(2)	(3)	(4)	(5)	(6)
Log (Digital Intensity 1)	1.9860** (0.8310)			1.1874 (1.0611)		
Log (Digital Intensity 2)		1.5305** (0.7698)			0.9730 (1.1275)	
Log (Digital Intensity 3)			1.6477*** (0.5593)			1.7085** (0.7751)
Technical knowhow	1.0671*** (0.0960)	1.0625*** (0.0924)	1.0852*** (0.0782)	1.4528** (0.6198)	1.2944* (0.7353)	1.2198* (0.7132)
Export Intensity (t-1)	0.6270*** (0.0608)	0.6226*** (0.0595)	0.6398*** (0.0624)	0.1473 (0.0987)	0.1390 (0.0963)	0.1627* (0.0914)
Export Intensity (t-2)	0.0680 (0.0500)	0.0611 (0.0487)	0.0847 (0.0541)	0.0162 (0.0463)	-0.0044 (0.0459)	0.0530 (0.0445)
Log (Labour Productivity)	4.9979*** (1.6956)	4.6725*** (1.5882)	6.7368*** (1.8454)	6.0972** (2.5102)	6.5677** (2.6086)	7.4867*** (2.7279)
Importer (Services)	1.5295** (0.5943)	1.3875** (0.5637)	1.2723** (0.6131)	1.1525 (1.7129)	-0.0407 (1.6767)	0.4939 (1.4354)
Service input intensity	0.1526** (0.0773)	0.1489* (0.0767)	0.1435* (0.0805)	0.1996 (0.1434)	0.1982 (0.1801)	0.1779 (0.1574)
Importer (Goods)	0.5631 (3.0448)	-2.1236 (3.0246)	-1.6549 (2.9880)	0.4881 (3.6812)	-1.9625 (4.5934)	-2.0408 (4.9588)
Size (log(Sales))	-1.6236 (1.0073)	-1.0705 (0.9740)	-2.2712** (1.1265)	-3.4806 (2.2533)	-3.8311* (2.0459)	-3.2778 (2.0617)
Age square	-0.0001 (0.0002)	-0.0000 (0.0002)	0.0002 (0.0003)	0.0038 (0.0080)	0.0025 (0.0082)	0.0023 (0.0076)
Debt to Equity Ratio	0.0005 (0.0356)	0.0017 (0.0342)	0.0208 (0.0411)	0.0619* (0.0346)	0.0296 (0.0513)	0.0377 (0.0410)

Empirical Exercise 4

Digital Intensity & Export Market Entry by using a dynamic Probit regression model

$$\text{Export market entry}_{i,t} = \alpha + \beta_1 \log(\text{Digital Intensity}_{i,t}) \times \\ \text{Technical knowhow}_{i,t} + \sum \phi Z_{i,t-1} + u_t + \mathfrak{S}_j + \epsilon_{ijt}$$

VARIABLES	Export Market Entry					
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Digital Intensity 1)	0.0853*** (0.0107)			0.0721*** (0.0117)		
Log(Digital Intensity 2)		0.0785*** (0.0101)			0.0689*** (0.0111)	
Log(Digital Intensity 3)			0.0781*** (0.0101)			0.0683*** (0.0111)
R&D Intensity	-0.7706 (1.4596)	-0.6561 (1.3718)	-0.6509 (1.3724)	-0.7044 (1.3806)	-0.5719 (1.3525)	-0.5700 (1.3519)
Exporter (Goods & Services) (t-1)	2.5135*** (0.0396)	2.5081*** (0.0392)	2.5078*** (0.0392)	2.5076*** (0.0401)	2.5023*** (0.0397)	2.5019*** (0.0397)
Log(Labour Productivity) (t-1)	0.0096*** (0.0031)	0.0102*** (0.0031)	0.0101*** (0.0031)	0.0086*** (0.0030)	0.0092*** (0.0031)	0.0091*** (0.0030)
Importer(Services)(t-1)	0.2547*** (0.0322)	0.2439*** (0.0315)	0.2448*** (0.0315)	0.2713*** (0.0328)	0.2624*** (0.0321)	0.2629*** (0.0320)
Services Input Intensity (t-1)	0.0137*** (0.0047)	0.0107 (0.0125)	0.0105 (0.0125)	0.0113** (0.0054)	0.0015 (0.0127)	0.0013 (0.0127)
Importer(Goods)(t-1)	0.3386*** (0.0313)	0.3410*** (0.0307)	0.3403*** (0.0307)	0.3163*** (0.0321)	0.3158*** (0.0315)	0.3153*** (0.0315)
Log(Gross Fixed Assets) (t-1)	0.0857*** (0.0147)	0.0776*** (0.0142)	0.0775*** (0.0142)	0.0793*** (0.0149)	0.0712*** (0.0144)	0.0710*** (0.0143)
Age (t-1)	-0.0022** (0.0009)	-0.0019** (0.0009)	-0.0019** (0.0009)	-0.0013 (0.0010)	-0.0011 (0.0009)	-0.0011 (0.0009)
Debt to Equity ratio (t-1)	-0.0012 (0.0013)	-0.0011 (0.0013)	-0.0011 (0.0013)	-0.0012 (0.0013)	-0.0011 (0.0013)	-0.0011 (0.0013)

Summary and Policy implications

- The study demonstrates how digitalization is no longer an option, but a necessity for MSMEs to survive & thrive.
- Prior exposure to Intl. markets, ↑ed L productivity, innovation capability, & servicification – imp. for MSME X.
- Digitalization as a tool for promoting X market entry – has the potential to improve the overall X performance of the Indian economy.

However,

Are Indian MSMEs capable of digitalization?

- Policies need to be more inclusive for benefits to reach the MSMEs {greater focus on services sector, ↓ in procedural complexities, ↑ in awareness, top X ~ top MSME firms (for mfg. but not svcs.)}

Thank you