Employment, Technology, and Value Chain in Indian Leather Industry

Bino Paul, Unmesh Patnaik, Jaganth G, Kamal Kumar Murari
Tata Institute of Social Sciences, Mumbai

Abstract

In the context of dynamic value chains, economic activities tend to be organised into downstream and upstream enterprises. Leather industry in India is an interesting case for a value chain that has unorganised and organized enterprises. To examine the relation between employment, technology, and buyer supplier relations in leather Industry, in India, we use a multi-database multi-method approach, setting the dynamics of value chain as a context. In order to understand the upstream of the value chain, we examine recent database on unorganized enterprises in the leather industry. First, we examine determinants of two organizational outcomes: value added and surplus. Second, we attempt to gauge if technology impacts employment. Our analysis is based on recently released National Sample Survey (NSS) 73rd Round on Unincorporated non-agricultural enterprises (excluding construction). Next to assess how does the downstream of the value chain functions with respect to select outcomes like value added, capacity utilization, capability of supply chain to reach out to customers (last mile delivery), product and process innovation, and orientation towards export, we use the recent round of World Bank Enterprise survey (2013). Employment in Indian leather sector appears to positively vary with the volume of the capital. Nevertheless, there appears to be no apparently direct relation of high elasticity between labour and technology.

Keywords: Employment, Technology, value Chains

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1. Introduction

In the emerging global economic order, a discernible volume of trade appears to have been routing through the Value Chains (VC). Positing the firm in the milieu of VC makes scope for understanding the connection between inter related markets and evolution of capabilities. Quite important, VC is quite distinct from a conventional frame of market structure wherein firms tend to be relatively more autonomous in shaping the competitiveness than in a value chain. VC seems to be an interesting case in point since it brings a rich context of buyer-supplier relations in decisions on resources such as technology and employment. In the frame of VC, many a small firms supply to a few moderately sized firms who, then, sell the value added products to very few large firms. So, the upstream is many small firms, while the end is very few large firms which facilitate the last mile delivery to the market through diverse whole/retail distributional systems.

In this paper, we study the case of Leather Industry in India as a VC. Our focus is on examining the behavior of the relationship between Performance, technology and employment amongst the upstream firms that are small that facilitate the primary supply. The core hypothesis of our research is that the buyer-supplier relation in the leather VC tend to generate contexts and incentives for the resources allocation, particularly for the technology and the labour. Presumably, if buyers want suppliers to attain higher echelons of quality, for the small suppliers who are keen to sustain in a VC it is risky to deviate from the expected magnitude of upgradation in technology and skill. Or, if buyers tend to retain the nature of the state of art due to peculiar strategic conditions, suppliers may refrain from revising the system of allocations, and, thus, generating a scenario of stationary equilibrium of factor allocation. Leaving aside above two scenarios of dynamics and stationarity, it is interesting to surmise that a few of small firms may stand out from the pool, in scale and scope. These firms may create hitherto not much practiced processes that are unique to them, shaping these processes as capabilities that form the base for innovation. We juxtapose technology-employment relations with these possibilities.

Our design of research makes use of input-output tables of India during 1993-1994 – 2013-2014, the unit records of National Sample Survey 73rd Round (2015-2016), and World Bank Enterprise Survey (2013) to understand the dynamics of value chain, performance of the firm, and relationship between technology and employment in Indian Leather Industry. The paper is organized into five section. Section 2 provides review of literature. Section 3 outline methodology. Section 4 provides findings. Section 5 concludes the paper.

2. Review of Literature

The study on Global value chains has gained tremendous attention in the recent times (Gereffi, 1994; Humprey and Schmitz, 2000; Kaplinsky, 2000; Gualani et al, 2005; Gereffi and Lee, 2012). Major international organisations like World Bank (Cattaneo et al, 2010), UNCTAD (2013), World Trade Organisation (Elms and Low, 2013) have paid more attention to the study on GVCs in the recent times (Neilson et al., 2014). Especially the study about the lead firms in the value chain, Governance structure and upgrading within in the value chains has gained more attention with respect to the studies on value chains (Gereffi et al., 2005; Gualani et al., 2005; Morrison et al, 2008; Pietrobelli and Rabellotti, 2010). Global Value chain is defined by various researchers in different ways trying to observe them in different dimensions (Chart 1). Generally, a value chain can be understood as a set of businesses, activities and relationships engaged in creating a final product (or service). It builds on the idea that a product is rarely consumed in its original form but becomes transformed, combined with other products, transported, packaged, marketed etc. until it reaches its final consumer (UNIDO, 2009).

Some of the important definitions of value chains are listed below:

Author	**Year**	**Definitions**
Kogut	1985	*The value added chain is the process by which technology is combined with material and labour inputs, and then processed inputs are assembled, marketed and distributed. A single firm may consist of only one link in the process, or it may be extensively vertically integrated, such as steel firms that carry out operations that range from mining ore to fabricating final goods*
Porter	1985	*Value chain process is defined as value creation happens at different stages but through connected stages*
Gereffi	1994	*Global commodity chain is a "production system" links the economic activities of firms to technological and organisational networks that permit companies to develop, manufacture and distribute specific commodities.*
Gereffi	1999	*Commodity chains refer to the whole range of activities involved in the design, production and marketing of a product. A critical distinction in this approach is between buyer-driven and producer-driven commodity chains*
Kaplinsky	2000	*value chain as all those activities that deliver product or service from development up to disposal after use.*
Sturgeon	2001	*sequence of productive activities leading to end use.*
Kaplinsky	2004	*describes the full range of activities that are required to bring a product or service from conception, through the intermediary phases of production and delivery to final consumers, and final disposal after use*
Gereffi and Fernandez-stark	2011	*Full range of activities that firms and workers do to bring a product from its conception to its end use and beyond.*

Chart 1: Definition of Value Chains
Source: Literature

The study on Global value chains has evolved over the years defining the value chains through different conceptual frameworks and analysing them through various dimensions. This has led to creation of multiple theories to study value chains. Concepts such as supply chain management, enterprise development, logistics, cluster development, market chains, or global commodity chains are all related to the value chain idea; depending on the scholarly approach value chain analysis can focus on many of those aspects simultaneously.

Overall the concept of global value chains emphasizes the embeddedness of local production in global markets (UNIDO, 2009). Global Production Network is defined as "an organizational arrangement comprising interconnected economic and noneconomic actors coordinated by a global lead firm and producing goods or services across multiple geographic locations for worldwide markets. These actors include different types of firms as well as nonfirm actors, such as the state, international organizations, labor groups, consumers, and civil society organizations, in diverse localities" (Yeung and Coe, 2014, pg.32). Research work done by Morrison at al, (2008) highlights the role played by global buyers and producers in shaping up globally fragmented value chain. He emphasises that these global buyers act as the major drivers of the value chains, exercising control and power over the actors participating in the value chains production process. Research work done by Humphrey and Schmitz (2002) highlights the nature of relationships that exist between various actors participating in the value chain.

A 2010 World Bank report on the post-2008 world economy further claims that 'given that production processes in many industries have been fragmented and moved around on a global scale, GVCs have become the world economy's backbone and central nervous system' (Cattaneo et al, 2010, pg.7). It has beed noted that in almost all product chains, the share of value added outside the country-of-completion has increased in the last two decades. This phenomenon highlights a transition from regional production systems to "Factory World" (Los et al., 2015). The recent report submitted by United Nations Conference on Trade and Development (UNCTAD, 2013) estimated that aroud 80 percent of international trade is now organised through global production networks mostly coordinated by lead firms that are involved in cross-border business activities. (Yeung and Coe, 2014) It has established empirically that Global Production networks(GPNs) and Global Value Chains (GVCs) are the most important organisational plaftforms through which production in primary, manufacturing and service sectors are coordnated and organised on a global basis (Ibid).

Research on Global manufacturing value chains highlighted that industrial upgrading did not materialise to everyone those who participate in the GVCs. Only few countries have witnessed economic upgrading after participating in GVCs (Bernhardt and pollak, 2015). Participating in the Global value chain production is considered to be beneficially in multiple ways, apart from generating income it also facilitates to access external and diversified markets, technology and knowledge transfer and capability-building through learning. On the other hand participating in GVCs is always not beneficial to the actors engaged in value chain production process. There are chances that firms/countries could be locked in activities that are depended on low labour and production cost. This might not facilitate value addition or prospects for learning (Bernhardt and pollak, 2015). Cammett (2016) discovered that global apparel manufacturing tends to exploit the local institutional

assets in developing countries by either constructing or promoting regionalised production sites. Studying the effect of integration with Global Apparel Value chains with respect to Bangladesh Apparel industry, Rahman and Sayeda (2016) identified that both backward linkage with foreign suppliers for intermediate inputs and forward linkages with global retailers of apparels, positively affect the firm's output and labour productivity. While backward linkages with local suppliers had adverse effects on firm's performance. Their overall study arrives at a conclusion that success of Bangladesh Apparel Industry is attained through their forward linkages with foreign suppliers and not through the backward linkages with the local suppliers (Rahman and Sayeda, 2016).

As Dussel Peters (2008) has argued, "most research on global commodity chains [GCC] approaches the GCC framework as a 'methodology' and not a 'theory'. The result of this is vast quantities of empirical work on particular chains and the experiences of particular firms and regions in them, and relatively little theoretical work attempting to account for these findings in a systematic and integrated way" (Peters, 2008, Pg.14). Though there are voluminous amount of academic literarture added to the study on value chains, the existing value chain analysis tools are not holistic in nature and being partial in nature trying to look at only a subset of the development subspecturm. (UNDIO, 2009)

One of the dimension that got significant attention in the study of value chains is its govenance structure. Gereffi (1999) identifies two types of governance structure that exist in value chain production process namely, "Buyer Driven Commodity chains" and "Producer-driven Commodity Chains".

Value chains are generally classified into two major categories namely Producer Driver commodity chains and Buyer Driver commodity chains. The former is defined as, " those industries in which transnational corporations (TNCs) or other large integrated industrial enterprises play the central role in controlling the production system including both forward and backward linkages. " While the latter is defined as, "those industries in which large retailers, brand-named merchandisers and trading companies play the pivotal role in setting up decentralised production networks in variety of exporting countries"(Gereffi, 1994, pg. 96-97). Producer driver commodity chains are considered to be capital and technology intensive (eg. Automobile, Computers) while buyer driven commodity chains tend to be labour intensive industries (eg. Garments, Footwear). It is identified that in buyer-driven commodity chains the organization of consumption is a major determinant of where and how global manufacturing takes place. In general, buyer-driven commodity chains are often characterized by multinational corporations or vertically integrated enterprises that control the production system and allocate the production on the basis of comparative costs advantages. Often retailers, brandname merchandisers, and trading companies play a pivotal role in such chains.

In the process of building a theoretical framework for explaining governance pattern in GVCs Gereffi et al (2005) identifies three major variables that play vital role in determining the governance of activities in value chains namely, i) The complexity of transactions ii) the ability to codify transactions and iii) the capabilities in the supply base. They have also classified the value chains into five categories based on their governance process namely i) hierarchy ii) Captive iii) Relational iv) Modular and v) Market (Gereffi et al, 2005).

Producer or manufacturer-driven chains, on the other hand, are chains where firms lead and coordinate the activities of their suppliers and often those of their distributors. Producer-driven value chains tend to have high barriers of entry as they require capital and technology intensive production and economies of scale, such as in the automobile, aeronautical or electrical machinery industries (Sturgeon et al, 2009). One of the main differences between buyer-driven and producer-driven value chains is that the former often do not own production facilities, but rather act as key agents investing in design, marketing and sales.

It has been stated that participation in GVCs production increases the chances of upgradtion for firms. "Participation in global commodity chains is a necessary step for industrial upgrading because it puts firms and economies on potentially dynamic learning curves" (Gereffi, 1999, pg:39). While studying international trade and industrial upgrading in the apparel value chain, Gereffi (1999) identifies the mechanism by which organisational learning occurring in trade networks. The way in which a value chain is governed has an important effect on the scope of local firm upgrading (Humphrey and Schmitz, 2000). Humphery and Schmitz (2002) identifies four different types of upgrading happening within the value chain namely, i)Product up gradation, ii) Process up gradation, iii) Functional up gradation and iv) Chain or inter-sectoral up gradation.

Though the concept of upgrading within value chain is largely studied still the concept and its mechanism remains ambiguous (Morrison et al., 2008). Humphrey and Schmitz (2000) work on the relationship between upgrading and different patterns in the GVC governance highlighted that Global buyers tend to impede functional and inter-sectoral upgrading in local firms participating in GVCs in order to protect them from future competitions. While studying the relationship between Multinational Enterprises (MNEs) and changing patterns of global trade and its impact on economic and socio upgrading. Gereffi and Lee (2014) identified the complicated role played by GVCs in shaping economic and social upgrading in developing countries. Their study highlights that rising geographic and organisational concentration in GVCs lead to uneven distribution of upgrading opportunities mostly in favour of Rising Power (RP) firms. They acknowledge due to the power asymmetry that exists with Global buyer economic upgrading becomes quite difficult, even for the most established suppliers (Gereffi and Lee, 2014).

Bernhardt and Pollak observes that industrial upgrading did not materialise to everyone those who participate in the GVCs. Only few countries have witnessed economic upgrading after participating in GVCs (Bernhardt and pollak, 2015). Participating in the Global value chain production is considered to be beneficially in multiple ways, apart from generating income it also facilitates to access external and diversified markets, technology and knowledge transfer and capability-building through learning. Participating in GVCs is always not beneficial to the participants engaged in value chain production process. There are chances that firms/countries could be locked in activities that are depended on low labour and production cost. This might not facilitate value addition or prospects for learning (Bernhardt and pollak, 2015). Cammett (2016) discovered that global apparel manufacturing tends to exploit the local institutional assets in developing countries by either constructing or promoting regionalised production sites. Studying the effect of integration with Global Apparel Value chains with respect to Bangladesh Apparel industry, Rahman and Sayeda(2016) identified that both backward linkage with foreign suppliers for intermediate inputs and forward linkages with global retailers of apparels, positively affect the firm's output and labour productivity. While backward linkages with local suppliers had adverse effects on firm's performance. Their overall study arrives at a conclusion that success of Bangladesh Apparel Industry is attained through their forward linkages with foreign suppliers and not through the backward linkages with the local suppliers (Rahman and Sayeda, 2016).

Learning and innovation are considered to be the two key determinants of competitiveness in the recent global economy (Morrison et al, 2008). This applies not only to technology-incentive industries such as automobile or computer, but also to firms in less technology-incentive industries or firms that try to engage themselves in global value chain production process. The success and survival of firms participating within value chain production process is depended on their ability to learn and adapt to the technological changes in the market. Participating in value chain production process also gives firm chances to learn and build new capabilities. Interaction between global buyers and local producers in Developing countries might enhance learning and innovation activities (Schmitz and Nadvi, 1999; Schmitz and Knorringa, 2001; Gereffi et al., 2005; Giuliani et al., 2005) Morrision et al (2008) defines technological capabilities as, "the skills—technical, managerial or organizational—that firms need in order to utilize efficiently the hardware (equipment) and software (information) of technology, and to accomplish any process of technological change" (Morrision et al., 2008 pg:41). But the process of transferring technology to industry or to a firm is not an easy task and requires lot of effort. Technological change is neither exogenous nor automatic in nature. It is due to the result of purposeful activities or 'technological efforts' taken by firms. Therefore, there is a need to study the vertical dimensions of capabilities that includes exploring different levels of complexity of capabilities. Different levels of complexity include looking at new capabilities whether they are routine based basic capabilities or of higher advanced innovative order (Morrision et al., 2008).

Buyer –Supplier Relations:

Not much attention has been given on studying the buyer supplier relations between small business organisation as given to large scale firms (Adams et al, 2012) Increased buyer specificity positively impacts the level of buyer-supplier relationship. Increased supplier specificity positively impacts the level of buyer-supplier relationship. There is a positive relation between the level of buyer-supplier relationship and organisational performance (Adams et al., 2012). There is a difference between the nature of relationship between the buyer and supplier with respect to the size of the firm. Small firms that engage in the value chain production process can also maintain long term relationships with their suppliers. There is a lack of information in understanding the buyer supplier relationship with respect to small business organisation (Adams et al, 2012).

Global value chains differ from traditional trade and production system in four key features namely i) Customization of production ii) sequential production decisions going from buyer to supplier iii) high contracting cost iv) global matching of production teams and ideas (Taglioni and Winker, 2016).

There is enormous volume of literature added to the study of value chains in the past three decades. Most of these studies focused more on topics like Governance, Upgrading etc. There is a lacunae in understanding labour implications that might arise out of SMEs upgrading, with respect to globalisation (Caspari, 2003). Kaplinsky (2005) argued that between the rock of oligopolistic buying power and the competition among buyers, there is a very little scope for improving labour standards (Kaplinsky, 2005). Gereffi and Memedovic (2003) raises two important questions while studying value chains in developing countries. First is the question of whether firms in India, or other developing countries, have any bargaining power within global value chains. The second is whether there is a one-to-one relation between participation in the value chain and labour standards. At a general level, the East Asian economies moved from assembling imported inputs to full-package or Original Equipment Manufacturing (OEM) production (Gereffi and Memedovic, 2003).

Labour productivity of Indian workers in leather sector tend to be lower compared with their counterparts in other countries like China, Italy France. Strict labour laws, High absenteeism and lower efficiency of workers are the major reasons for less labour productivity. Moreover the existing labour force in Indian leather industry is ageing and there is not enough addition of new skilled people to the industry, which reduces the overall labour productivity. One of the prime reason for less labour productivity in Indian leather industry is its limited automation. It is to be said that almost 80 per cent of the work done in the industry are still carried out manually.

Also, most of the Indian firms do not have in-house design facilities which curtail them from producing high value products (EXIM Report, 2015)

Leather exports across the globe have increased from US$ 149.2 bn in 2010 to US$ 217.9 bn in 2014. In the overall leather export China ranks first in the volume of export comprising of around 39.5 per cent of total export followed by Italy with 9.6 percent and vietnam at 7.6 percent while, India consitutes of around 2.5 per cent share in the overall leather export in the year 2014. Indulged in large volume of merchandise exports leather sector is ranked to be one of the top 10 foregin exchange earning sector in India. Indian leather sector is considered to be undergone drastic changes in the last few decades, evolved themseves from being a exporter of raw materials to exporter of finished value added leather products. Indian leather industry has emerged as a prominent industry both at International and domestic markets. Indian leather industry ranks second in the export of leather footwear component, leather garments and saddlery and harness; Thrid in the export of finished leather; Fourth in the export of leather goods. The industry is considered to be labour intensice sector, employing more than 2.5 million people. With an annual turnover of over US$ 12 billion, the export of leather and leather products increased manifold over the past decades and touched US$ 6.5 billion during 2014-15. The sector is also known for its consistency in high export earnings. (EXIM Report, 2015)

3. Methodology

For examining the relation between employment, technology, and buyer supplier relations in leather Industry, in India, we use a multi-database multi-method approach, setting the dynamics of value chain as a context. Foremost, to understand the nature of value chain and its dynamics in Indian leather sector, we explored the possibility of scouting data from the global value chain datasets that contain accounts of input-output transaction between economic activities, over the years and across the countries. However, this database has no separate category for leather products, it is subsumed in a compound group "manufacture of textiles, wearing apparel and leather products'. Our search for data on value chain led us to input-output tables computed by the Central Statistical Organisation (CSO), Government of India. Although input-output tables are not regularly updated on an annual interval, we picked five data series of input-output transactions published by CSO -1993-1994, 1998-1999, 2003-2004, 2007-2008, and 2013-2014. We found that there two codes that are specific to leather products and leather footwear. Assuming input output relations are linearly proportional, a static open economy is composed of supply of input and demand for output. While demand aggregates intermediate demand and final demand, the supply inputs destine to production processes in the economy[1].

[1] Leontief (1936).

Symbolically, $A_{\text{(n rows by n columns)}}\ X_{\text{(n rows by 1 column)}} + F_{\text{(n rows by 1 column)}} = X_{\text{(n rows by 1 column)}}$.

X is the vector of aggregate outputs of economic activities in a country.

AX is the intermediate demand between n industries, while F is the final demand, capturing consumption, and investment. Also, F is the aggregate of value added (output net of raw materials) in the economy

A is the matrix of input out ratios. An element in A is a_{ij}. An a_{ij} is the flow of inputs from 'i' industry to 'j' industry (X_{ij}) as a proportion of aggregate output of 'j' industry (X_j).

$$\text{Therefore, } a_{ij} = \frac{X_{ij}}{X_j} .$$

Since $X = (I-A)^{-1} F$, $\frac{\Delta X}{\Delta F} = (I-A)^{-1}$; $(I-A)^{-1}$ is known as Leontief inverse.

$I_{\text{(n rows by n columns)}}$ = Identity Matrix, $(I-A)^{-1}$ = Inverse of $I\text{-}A_{\text{(n rows by n columns)}}$

$$\frac{\Delta X}{\Delta F} = \frac{Direct\ and\ Indirect\ Effects\ in\ the\ Economy\ due\ to\ i\ th\ \ activity}{Direct\ Effects\ in\ the\ Economy\ \ due\ to\ ith\ activity}$$

= column sum of coefficients pertinent to the i^{th} industry

While column sum of $(I-A)^{-1}$, called Leontief inverse, represents backward linkage of particular economic activity, row sum is the forward linkage. We computed backward and forward linkages of leather industry from Leontief inverse for five different periods from 1993-1994 to 2013-2014. We are more interested in the dynamics of linkages over the years. Is the value chain become more backward oriented and forward oriented? If the backward linkage discernibly exceeds backward linkage, plausible interpretation is that the upstream of the value chain is more impactful than the downstream which is driven by the trade. Or, the forward linkage is visibly more than the backward linkage, downstream of the value chain gains more prominence.

In order to understand the upstream of the value chain, we look into recent database on unorganized enterprises in leather industry. We follow a two-layer approach. First, we examine determinants of two organizational outcomes: value added and surplus. Second, we attempt to gauge if technology impacts

employment. Our analysis is based on recently released National Sample Survey (NSS) 73rd Round on Unincorporated non-agricultural enterprises (excluding construction). The database captures the data that was collected during 2015-2016. While this database captures unincorporated non-agricultural enterprises, we delimit analysis to Division 15 (Manufacture of Leather and related Products) of National Industrial Classification (NIC) 2008. We aggregated codes of division15 (five digit codes from 15111 to 15209) of NIC 2018 to create the data of leather industry (Table 1, Appendix). Table 1 provides list of variables and respective descriptions. The list contains continuous variables, dichotomous variables, and relative measures.

Next to assess how does the downstream of the value chain functions with respect to select outcomes like value added, capacity utilization, capability of supply chain to reach out to customers (last mile delivery), product and process innovation, and propensity to export, we use the recent round of World Bank Enterprise survey, capturing the data that was collected in 2013. Presumably, downstream enterprises tend to orient towards forward linkages more than being engaged in backward linkages., mostly represented by organized enterprises. Although the data contains diverse economic activities, our analysis is limited to the leather industry. Variables in the analysis are of three types: continuous, dichotomous, and relative measures. Table 2 provides list of variables and respective description. All continuous variables and relative measures given in Tables 1 and 2 were transformed to logarithmic scale. Tables 3 and 4 provide structure of econometric models applied to these two data sets.

Table 1

Structure of National Sample Survey 73rd Round (2015-16) data used in this Paper

Serial Number	Variable	Description
Continuous Variables		
1	GVA	Receipt-(Operating expenses + distributive expenses +t oll +tax) (during last 30 days)
2	LAB	Full Time + Part Time Employees (during last 30 days)
3	CAPITAL	Owned + Hired + net additions to owned assets during last 365 days
4	SURPLUS	Net Surplus (during last 30 days)
Relative Measures		
1	PRODUCTIVITY	Gross Value Added Per Employed
2	CAPLAB	Assets per Employed
3	WAGERATE	Compensation per Employed
4	PROFSHARE	Surplus as a proportion of Gross Value Added
5	WAGESHARE	Compensation as a proportion of Gross Value Added
Dichotomous Variables (Yes 1, No=0)		
1	SECTOR	Is the enterprise located in the rural?
2	SOCDUM	Does the owner of the enterprise belong to social disadvantaged groups
3	ESTAENT	Is the enterprise an establishment ?
4	COMPUTER	Does the enterprise use computer?
5	ENTGROWTH	Has the enterprise been expanding over the last 3 years
6	ACT	Is the enterprise registered under any act
7	CONTRACT	Is the enterprise part of any contract with buyer or supplier?
8	SOLIDWDUM	Does the enterprise have the provision for solid waste management?
Multiple Category Variable		
1	STATENAME	Location of the enterprise (36 States or Union Territories in India)

Table 2
Structure of World Bank Enterprise Survey 2013 used in this study

Serial Number	Variable	Description
Continuous Variables		
1	VALUEADD	Value Added (Sales minus Cost)
2	LASTMILE	How many days, on average, elapse from the day the customer places the order
3	CAPACITY	The Capacity Utilization (%)
4	LABNOW	Permanent, Full-Time Employees At End Of Last Fiscal Year
5	CAPITAL	Net Book Value Of Machinery Vehicles, And Equipment In Last Fiscal Year
6	FIRMAGE	Age of the Firm
7	HUMANCAP	Average Years Of Education For Typical Production Worker
Relative Measures		
1	LABPROD	Labour Productivity (Value Added per Employee) (VALUEADD/LABNOW)
2	CAPLAB	Capital Labour Ratio (Capital per Employee) (CAPITAL/LABNOW)
3	WAGESHARE	Share of Wage in Value Added
4	WAGERATE	Wage per Employee
Dichotomous Variables		
1	AGGLOMERATION	location has at least 1 Million Population
2	LARGEFIRM	part of Large Firm
3	QUALITY	has an Internationally-Recognized Quality Certification
4	WEBSITE	has the website
5	EXPORT	does export or consider entering the foreign Trade
6	ASSOCIATION	membership in Industry association
7	SPECHCAP	Formal Training Programs For employees
8	INTNATMARKET	Main market for establishment's main product is international
9	TECHLICF	Use Technology Licensed from a Foreign-Owned Company
10	COMPINF	Compete Against Unregistered or Informal Firms
11	PRODINNOV	Introduced new or significantly improved products or services
12	PROCESSINNOV	Introduced any new or significantly improved methods of manufacturing products or offering services

Table 3
Structure of Econometric Models applied to NSSO 73rd Round (2015-16)

Serial Number	Variable	Scale of Measurement
Dependent variables		
1	LNGVA	Continuous
2	LNSURPLUS	Continuous
3	LNLAB	Continuous
Independent Variables		
1	LNLAB	Continuous
2	LNCAPITAL	Continuous
3	LNFIRMAGE	Continuous
Independent Variables (Control)		
1	SECTOR	Continuous
2	SOCDUM	Continuous
3	ESTAENT	Continuous
4	COMPUTER	Continuous
5	ENTGROWTH	Continuous
6	ACT	Continuous
7	CONTRACT	Continuous
8	SOLIDWDUM	Continuous

Source: based on Table 1

Table 4
Structure of Econometric Models applied to World Bank Enterprise Data (2013)

Serial Number	Variable	Scale of Measurement
Dependent Variables		
1	LNVALUEADD	Continuous
2	LNLASTMILE	Continuous
3	LNCAPACITY	Continuous
4	PRODINNOV	Dichotomous
5	PROCESSINNOV	Dichotomous
6	EXPORT	Dichotomous
Independent Variables		
1	LNLABNOW	Continuous
2	LNCAPITAL	Continuous
3	LNFIRMAGE	Continuous
4	LNHUMANCAP	Continuous
Independent Variables (Control)		
1	INTNATMARKET	Dichotomous
2	TECHLICF	Dichotomous
3	COMPINF	Dichotomous
4	AGGLOMERATION	Dichotomous
5	LARGEFIRM	Dichotomous
6	QUALITY	Dichotomous
7	WEBSITE	Dichotomous
8	ASSOCIATION	Dichotomous
9	SPECHCAP	Dichotomous

Source: based on Table 2

4. Findings

As shown in Table 5, for leather and leather products, during 1993-94 – 2003-2004, the backward linkage exceeded the forward linkage. However, post 2003-2004, the forward linkage overshot the backwards linkage. Moreover, the magnitude of backward linkage had consistently dropped during 1998-1999 - 2013-2014, while the pattern of forward linkage appears to be a cyclical one. Nevertheless, with respect to leather footwear, throughout the period of analysis, the backward linkage remained greater than the forward linkage. Although there appears to be no discernible consistent pattern of inter temporal change in backward linkage, during 1998-1999 – 2007-2008, the magnitude of linkage had subsided. Conversely, during 2003-2004 – 2013-2014, the forward linkage had increased from 1.02 to 1.42. In nutshell, notwithstanding period irregularities in pattern, for both the activities, the value chain seems to be inclined towards the downstream, destining to the final demand.

Table 5
Backward and Forward Linkages

	Leather and Leather Products		Leather Footwear	
Year	Backward Linkage	Forward Linkage	Backward Linkage	Forward Linkage
1993-1994	2.46	1.57	2.27	1.42
1998-1999	2.54	1.69	2.3	1.02
2003-2004	2.31	1.56	2.25	1.02
2007-2008	1.92	2.08	1.39	1.07
2013-2014*	1.57	1.75	1.57	1.42

Note: Backward Linkage (Column Sum of Leontief Inverse) Leather and Leather Products
Forward Linkage (Row Sum of Leontief Inverse) Leather and Leather Products.
Source: Computed from Input-Output Tables, Ministry of Statistics and Programme Implementation, Government of India (http://www.mospi.gov.in), * Kanhaiya Singh, M R Saluja (2016)

Tables 6, 7, 8, and 9 provide descriptive Statistics (Mean, Standard Deviation, Minimum, and Maximum) and distribution of dichotomous variables for the both the datasets.

Table 6
Descriptive Statistics of Unorganised Sector Leather Enterprises in India (2015-2016)

Serial Number	Variable	Transformed Variable (LN=Logarithm)	Observations	Mean	Standard Deviation	Minimum	Maximum
1	GVA	LNGVA	715	9.93	1.29	5.19	14.44
2	SURPLUS	LNSURPLUS	715	9.47	1.04	5.30	13.96
3	LAB	LNLAB	716	1.04	0.94	0.00	4.38
4	CAPITAL	LNCAPITAL	716	12.27	1.61	6.21	17.27
5	FIRMAGE	LNFIRMAGE	716	2.14	0.85	0.00	4.72
Relative Measures							
1	PRODUCTIVITY	LNPRODUCTIVITY	715	8.89	0.70	5.19	11.38
2	CAPLAB	LNCAPLAB	716	11.23	1.29	5.78	14.94
3	WAGERATE	LNWAGERATE	435	8.09	0.90	4.61	10.45
4	WAGESHARE	LNWAGESHARE	434	-0.97	0.73	-4.06	-0.10
5	PROFSHARE	LNPROFSHARE	435	-0.74	0.48	-3.17	1.97

Note: see Table 1 for description of variables
Source: Computed from unit records of National Sample Survey 73rd Round (2015-2016)

Table 7
Distribution of dichotomous variables:
Unorganised Sector Leather Enterprises in India (2015-2016)

Serial Number	Variable	Observations	Yes (%)
1	SECTOR	716	21.37
2	SOCDUM	716	67.6
3	ESTAENT	716	56.15
4	COMPUTER	716	6.84
5	ENTGROWTH	679	26.22
6	ACT	716	33.66
7	CONTRACT	716	28.49
8	SOLIDWDUM	716	9.64

Note: see Table 1 for description of variables
Source: Computed from unit records of National Sample Survey 73rd Round (2015-2016)

Table 8
Descriptive Statistics of Organised Sector Leather Enterprises in India (2015-2016)

Serial Number	Variable	Transformed Variable (LN=Logarithm)	Observations	Mean	Standard Deviation	Minimum	Maximum
1	VALUEADD	LNVALUEADD	89	17.35	1.83	13.20	22.61
2	LASTMILE	LNLASTMILE	94	3.84	0.77	1.61	5.48
3	CAPACITY	LNCAPACITY	94	4.36	0.36	2.30	4.61
4	LABNOW	LNLABNOW	97	4.24	1.17	1.79	6.91
5	CAPITAL	LNCAPITAL	58	15.78	1.79	11.41	20.50
6	FIRMAGE	LNFIRMAGE	97	2.72	0.69	0.69	4.14
7	HUMANCAP	LNHUMANCAP	93	2.24	0.21	1.61	2.56
Relative Measures							
1	LABPROD	LNLABPROD	89	13.08	1.39	9.49	17.24
2	CAPLAB	LNCAPLAB	58	11.54	1.50	6.68	13.82
3	WAGESHARE	LNWAGESHARE	85	-1.52	1.11	-5.26	0.80
4	WAGERATE	LNWAGERATE	90	11.52	1.06	8.47	15.17

Note: see Table 2 for description of variables
Source: Computed from unit records of World Bank Enterprise Survey (2013)

Table 9
Distribution of dichotomous variables:
Organised Sector Leather Enterprises in India (2013)

Serial Number	Variable	Observations	Yes (%)
1	AGGLOMERATION	97	48.5
2	LARGEFIRM	97	29.9
3	QUALITY	97	48.5
4	WEBSITE	97	57.7
5	EXPORT	97	47.4
6	ASSOCIATION	97	74.2
7	SPECHCAP	97	49.5
8	INTNATMARKET	97	41.2
9	TECHLICF	97	13.4
10	COMPINF	97	42.3
11	PRODINNOV	97	55.7
12	PROCESSINNOV	97	53.6

Note: see Table 2 for description of variables
Source: Computed from unit records of World Bank Enterprise Survey (2013)

Table 10 provides estimates of four models. First two models feature determinants of value added (LNGVA), while other two models provide determinants of surplus (LNSURPLUS). It is important to note that model 1 precludes dichotomous variables from the analysis. However, model 2 combines variables in model 1 with dichotomous variables. For both the models, age of the enterprise (LNFIRMAGE) turns out to be not statistically significant. For model 1, labour (LNLAB) accounts for the largest chunk of explanation for variation in value added, reporting a partial elasticity of 0.97. Although the impact of capital (LNCAPITAL) is not as ostensible as that of labour, it significantly explains some variation in value added (partial elasticity is 0.20). However, combining dichotomous variables with these explanatory variables, as in the case of model 2, partial elasticities with respect to labour and capital drop by a few points, and, thus, leaving some space for other explanations emanating from dichotomous variables. While four dichotomous variables (ESTANET (0.3), ENTGROWTH (0.21), COMPUTER (0.19), ACT (0.16)) report statistically significant positive coefficients, one dichotomous variable (SOCDUM) reports statistically significant negative value (-0.11). Positive coefficients clearly imply that if an enterprise leans more towards formalisation through changing enterprise from own account to establishment (ESTANET), envisaging that the enterprise is on expansion (ENTGROWTH), having more usage of computer (COMPUTER), and compliance to the legal caveats and acts (ACT), value added tends to go up. Negative sign of SOCDUM says that if the owner of enterprise is from social disadvantaged groups, value added tends to be lower than that of enterprises owned by others.

For models 3 and 4, while labour (LNLAB) emerges as most impactful in explaining variation in surplus earned by enterprises (LNSURPLUS) (partial elasticities of 0.55 and 0.54, respectively), impact of capital (LNCAPITAL) is higher in model 3 (partial elasticity =0.23) than that of model 4 (partial elasticity =0.14). However, for model 3, age of enterprise (LNFIRMAGE) shows a statistically significant positive coefficient (partial elasticity =0.08). As regards dichotomous variables, as model 2, model 4 also lends evidence for direct relation between proclivity towards formalization of enterprise and surplus (LNSURPLUS), albeit variation in the order of coefficients. Estimates of model 4 are distinct from model 2 on two major aspects: (a) for model 4, ESTANET turns insignificant, while COMPUTER reports the highest coefficient among dichotomous variables (0.39), (b) impact of resources like capital and labour seem to be more on value added than on surplus earned by enterprises. Moreover, SOCDUM retains negative sign in model 4, as well (-0.14).

Table 10
Determinants of Value Added and Surplus

	Model 1	Model 2	Model 3	Model 4
	LNGVA	LNGVA	LNSURPLUS	LNSURPLUS
LNLAB	0.965*** (0.0333)	0.825*** (0.0392)	0.551*** (0.0363)	0.538*** (0.0428)
LNCAPITAL	0.198*** (0.0205)	0.128*** (0.0251)	0.226*** (0.0202)	0.139*** (0.0257)
LNFIRMAGE	0.0293 (0.0301)	0.000721 (0.0287)	0.0804*** (0.0301)	0.0322 (0.0293)
SECTOR		-0.0209 (0.0646)		-0.0128 (0.0649)
SOCDUM		-0.110** (0.0553)		-0.143** (0.0606)
ESTAENT		0.295*** (0.0632)		-0.0850 (0.0650)
COMPUTER		0.190** (0.0786)		0.377*** (0.117)
ENTGROWTH		0.207*** (0.0551)		0.259*** (0.0595)
ACT		0.156*** (0.0549)		0.141** (0.0610)
CONTRACT		-0.0696 (0.0525)		-0.0757 (0.0599)
SOLIDWDUM		-0.00534 (0.0671)		-0.00777 (0.0719)
Constant	6.434*** (0.250)	7.290*** (0.382)	5.946*** (0.249)	7.096*** (0.390)
STATENAME (dummies for states)	No	Yes	No	Yes
Observations	715	678	715	678
R-squared	0.76	0.82	0.57	0.67

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: see Table 3 for the structure of the model
Source: Computed from unit records of National Sample Survey 73rd Round (2015-2016)

The message we carry forward from Table 9 points to sensitivity of enterprise's performance to its proclivity towards formalization. It appears this aligns with the pattern presented in Table 1 on emerging contexts of increasing thrust on forward linkages in value chains of leather industry in India. Given these patterns and inferences, it is important to understand determinants of performance by organized enterprises in Indian Leather Industry. To capture performance of enterprise, we use three dependent variables: value added (LNVALUEADDED), supply chain response time to reach out to the customer (LNLASTMILE), and capacity utilization (LNCAPACITY). For each dependent variable, we specify two models (Model 5 and Model 6). Both of these models have labour (LNLABNOW), capital (LNCAPITAL), age of enterprise (LNFIRMAGE), and human capital (LNHUMANCAP) as explanatory variables. However, model 5 does not have any dichotomous variables, while model 6 has nine dichotomous variables. With respect to models 5 and 6, labour (LNLABNOW) emerges as most impactful (showing partial elasticities of 0.76 and 0.43, respectively), followed by capital (LNCAPITAL) (showing partial elasticities of 0.32 and 0.31, respectively). Amongst dichotomous variables in model 6, formal training programmes for the production labour by enterprises (SPECHCAP), a

proxy for specific human capital, and identity of being part of a large firm carry statistically significant positive coefficients (0.73 and 0.8, respectively). Intuitively, these inferences seem to point towards more forward linkage orientation in the downstream phase of leather value chain in India.

Models 7 and 8 capture determinants of enterprise's response time to the customer (LNLASTMILE) (more means less efficiency), an indicator for the efficiency of supply chain. While model 7 precludes any dichotomous variables, model 8 combines continuous and dichotomous variables. Estimates with respect to model 7 show that only coefficients of years of schooling of employees (LNHUMANCAP), a proxy for human capital, and age of firm (LNFIRMAGE) are statistically significant, while coefficients of capital (LNCAPITAL) and labour (LNLABNOW) are not statistically significant. Quite important, older the enterprise is, it takes more time to reach the customer (a partial elasticity of 0.34), while more the human capital of enterprise is it takes less time to be closer to the customer (a partial elasticity of -1.2). For model 8, while inferences of model 7 are valid, use of technology licensed from a foreign owned Company (TECHLICF) significantly reduces response time in supply chain (coefficient = (-) 0.73).

Models 9 and 10 explain the determinants of capacity utilisation (LNCAPACITY). For model 9, capacity utilization tends to inversely vary with the age of the firm (a partial elasticity of (-) 0.13), while it is positively related to human capital of the enterprise (LNHUMANCAP) (a partial elasticity of 0.63). In model 10, amongst independent variable only human capital turns statistically significant (a partial elasticity of 0.72).

Quite unequivocally, human capital of the enterprise turns out to be an important determinant in attaining capacity utilization and reducing the lag to reach the customer. This conveys a clear message that human capital in enterprises seems to play pivotal role in enterprise's performance. For an unorgsnised enterprise in leather Industry, in India, to transform towards an organised one, human capital seems to play crucial role.

Table 11
Determinants of Value Added, Supply Chain Response, and Capacity Utilisation

	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
	LNVALUEADD	LNVALUEADD	LNLASTMILE	LNLASTMILE	LNCAPACITY	LNCAPACITY
LNLABNOW	0.764*** (0.174)	0.427** (0.165)	-0.00659 (0.0871)	-0.00422 (0.0984)	0.0292 (0.0515)	0.0190 (0.0412)
LNCAPITAL	0.323** (0.125)	0.314*** (0.108)	0.0208 (0.0668)	0.00771 (0.0718)	0.0475 (0.0420)	0.0587 (0.0405)
LNFIRMAGE	0.359 (0.247)	0.204 (0.258)	0.314** (0.148)	0.361** (0.167)	(-)0.133* (0.0689)	-0.0735 (0.0728)
LNHUMANCAP	0.360 (0.927)	-0.260 (0.778)	-1.223** (0.468)	(-) 1.100 *(0.55)	0.630** (0.312)	0.720*** (0.255)
INTNATMARKET		0.611 (0.455)		0.145 (0.235)		-0.104 (0.101)
TECHLICF		0.678 (0.553)		-0.731** (0.332)		-0.0834 (0.180)
COMPINF		0.274 (0.362)		0.227 (0.207)		0.179 (0.140)
AGGLOMERATION		0.320 (0.344)		-0.134 (0.211)		-0.158 (0.131)
LARGEFIRM		0.799* (0.400)		0.0396 (0.226)		-0.141 (0.109)
QUALITY		0.421 (0.369)		0.292 (0.207)		0.125 (0.125)
WEBSITE		0.218 (0.413)		-0.357 (0.239)		-0.210 (0.145)
ASSOCIATION		0.491 (0.315)		-0.0178 (0.242)		0.250 (0.173)
SPECHCAP		0.730* (0.364)		0.00464 (0.216)		-0.0228 (0.112)
Constant	7.222*** (2.598)	8.554*** (2.227)	5.405*** (1.439)	5.267*** (1.652)	2.386*** (0.745)	1.888** (0.785)
Observations	57	54	58	55	57	54
R-squared	0.531	0.711	0.21	0.361	0.212	0.415

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: see Table 4 for the structure of the model
Source: Computed from unit records of World Bank Enterprise Survey (2013)

While capital and labour are generic resources to enterprises, differential growth in the enterprise tends to emerge from diverse sources, in particular innovation and outward orientation. Presumably, these factors are not necessarily condition by generic resources. To gauge these aspects, we use models 11, 12 and 14 that preclude generic resources while having other important determinants of product innovation (PRODUCTINNOV), process innovation (PROCESSINNOV), and orientation towards export (EXPORT). Since these variables are dichotomous in nature, we use logit regression to estimate the model, generating odds ratios and marginal effects.

For product innovation (model 11), three variables turn out to be significant positive predictors: technology licensed from a foreign owned Company (TECHLICF), enterprise having website (WEBSITE) and formal training programmes by the enterprise (SPECH), reporting odds ratios 6.1(marginal effect=0.31), 4 (marginal effect=0.23), and 2.8 (marginal effect=0.17), respectively.

With regard to the process innovation (model 12), two variables report statistically significant positive odds ratios:

enterprise being part of a large firm (LARGEFIRM) (odds ratio =3.85, marginal effect =0.24) and training programmes by the enterprise (SPECH) (odds ratio =5.4, marginal effect =0.3). Estimates of Models 10 and 11 unequivocally underline the primacy of human capital formation by the enterprises to engage in process and product innovation.

For model 13, explaining the orientation towards export (EXPORT), main market for establishment's main product is international (INTNATMARKET) appears to exhaust most of the impact, reporting an extremely high odds ratio and marginal effect.

Table 12

Determinants of Innovation and Export

	Model 11		Model 12		Model 13	
	PRODUCT INOVATION		PROCESS INOVATION		EXPORT	
	Odds ratio	Marginal Effects (dy/dx)	Odds ratio	Marginal Effects (dy/dx)	Odds ratio	Marginal Effects (dy/dx)
INTNATMARKET	0.07***	-0.45	1.42	0.06	162.96 ***	0.66
TECHLICF	6.10**	0.31	1.40	0.07	0.12**	-0.27
COMPINF	0.63	-0.08	1.57	0.08	1.39	0.04
AGGLOMERATION	0.89	-0.02	0.40	-0.17	0.47	-0.10
LARGEFIRM	2.36	0.14	3.85 **	0.24	0.63	-0.06
QUALITY	1.28	0.04	1.36	0.06	0.74	-0.04
WEBSITE	4.0**	0.23	1.22	0.04	0.27*	-0.17
ASSOCIATION	2.63	0.16	2.28	0.15	0.39	-0.12
SPECHCAP	2.75*	0.17	5.4***	0.30	1.58	0.06
Constant	0.39		0.13***		1.01	
Observations	91		91		91	
Pseudo R-squared	0.26		0.22		0.41	

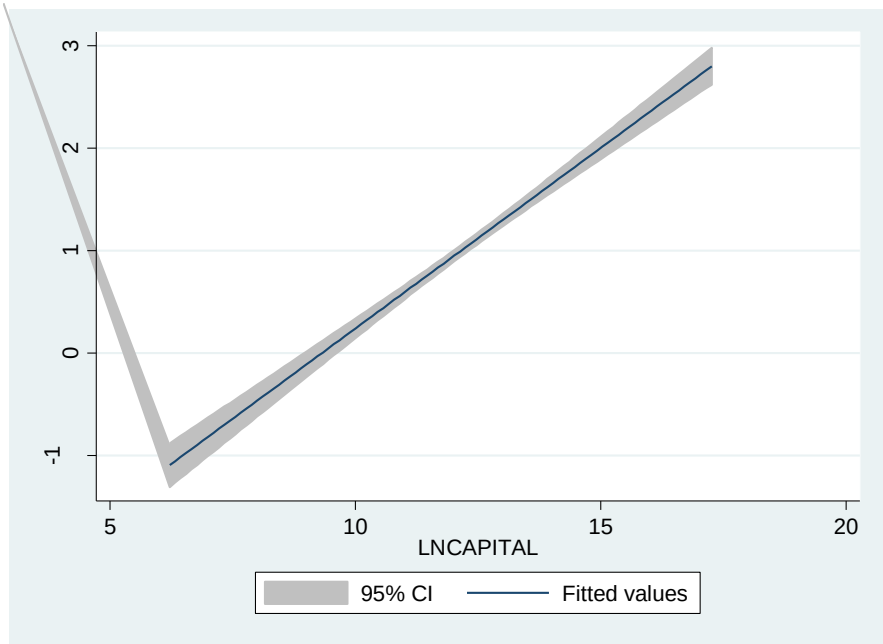
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: see Table 4 for the structure of the model

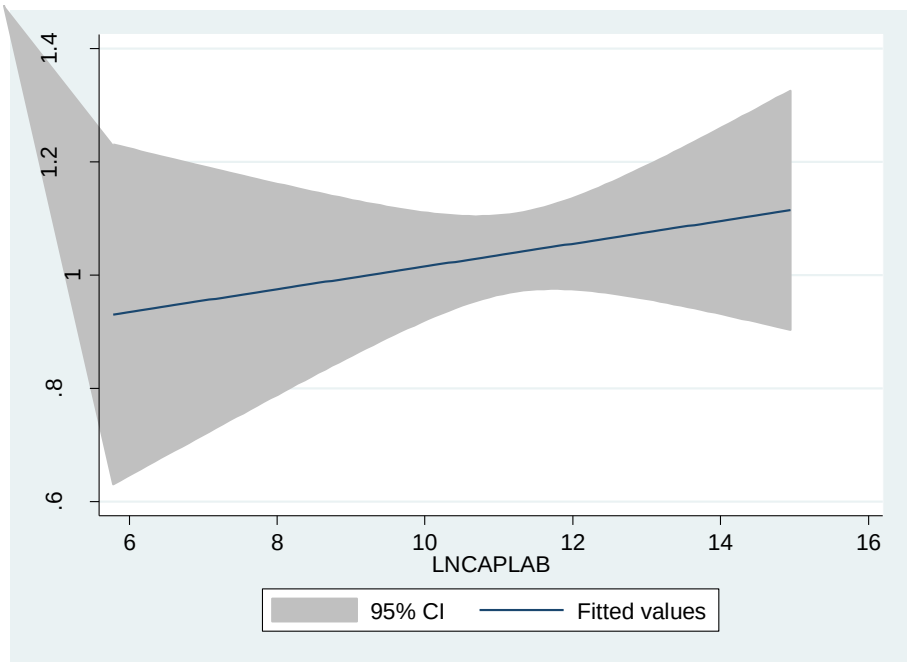
Source: Computed from unit records of World Bank Enterprise Survey (2013)

Drawing cues from the previous discussion on inferences and patterns, it is vividly clear that in leather industry in India, given the context of forward linkage orientation of the value chain, upstream firms tend to formalise their functioning in order to accomplish higher order performance. In downstream firms that are organised in nature a prominent factor that drives innovation is the human capital, giving skilled labour a clear leverage over other resources in setting the trajectories of growth. Plotting labour (LNLAB) against capital (LNCAPITAL) testify that there seems to be a direct relation between labour and capital (Figure 1). The same is valid for orgnaised segment of leather manufacturing, as well (Figure 1, Appendix) However, when we plot labour against capital per labour (LNCAPLAB), a proxy for technology, the pattern is not as convincingly direct as in the case of previous figure (Figure 2). Figure 3 shows the direct relation between capital per labour and average productivity of labour (LNPRODUCTIVITY). Further, productivity positively varies with wage rate (LNWAGERATE) (Figure 4).



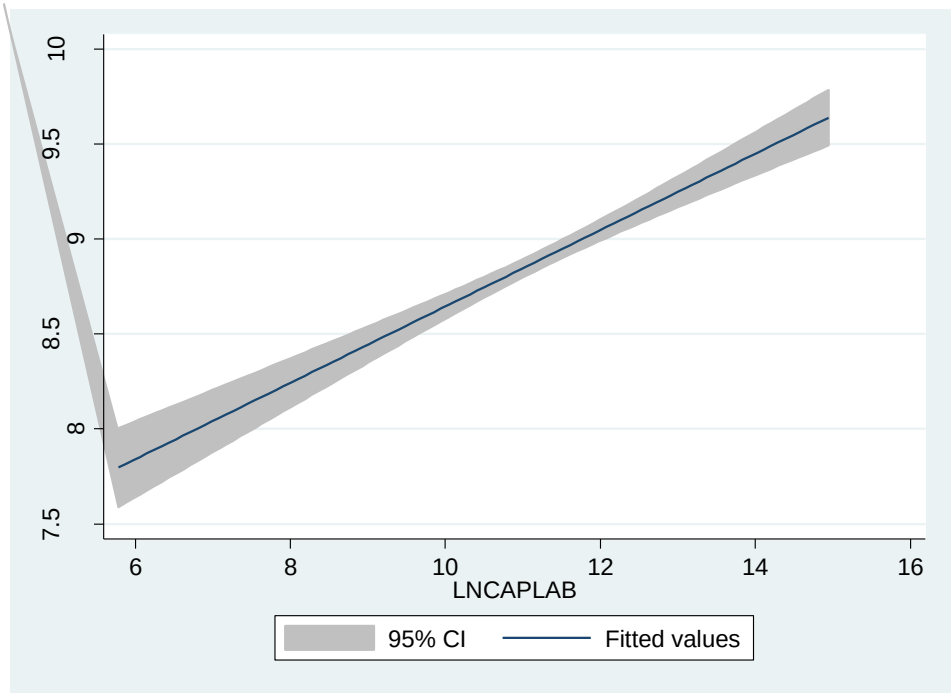
Source: Computed from unit records of National Sample Survey 73rd Round (2015-2016)
N=715

Figure 1: LNCAPITAL and LNLAB



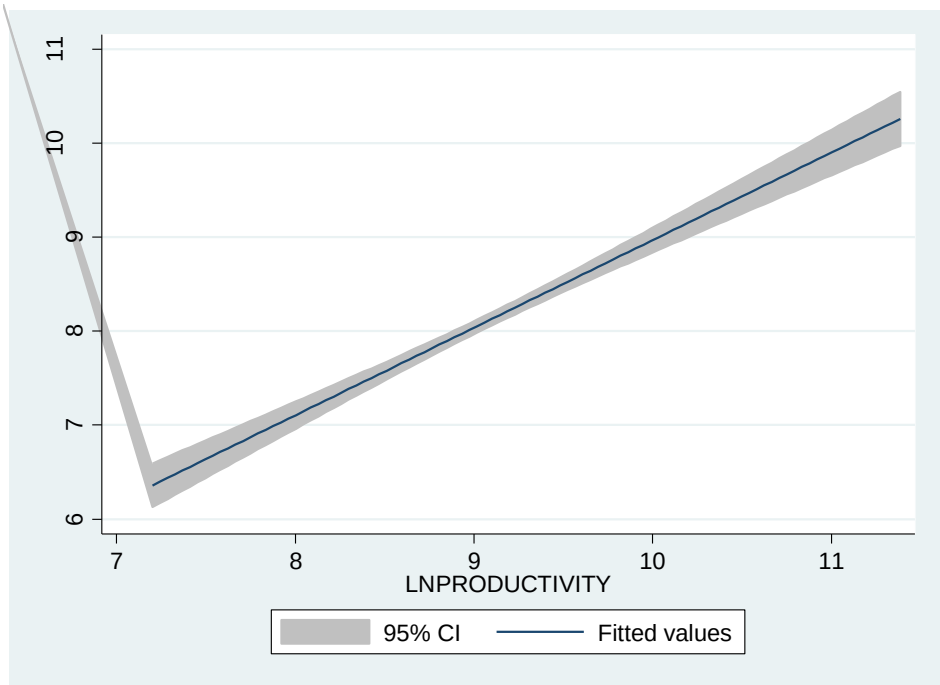
Source: Computed from unit records of National Sample Survey 73rd Round (2015-2016)
N=715

Figure 2: LNCAPLAB and LNLAB



Source: Computed from unit records of National Sample Survey 73rd Round (2015-2016)
N=715

Figure 3: LNCAPLAB and LNPRODUCTIVITY



Source: Computed from unit records of National Sample Survey 73rd Round (2015-2016)
N=434

Figure 4: LNPRODUCTIVITY and LNWAGERATE

5. Conclusion

Our analysis reveals that leather industry in India tends to create forward linkages over the years, producing the dynamics in the value chain. In the context of emerging dynamics of value chain, inferences in this point to that part from generic resources like capital and labour, performance of upstream unorganized enterprises appears to be significantly driven by enterprise's proclivity towards formalising through transforming own account units to establishment that are digital and compliance driven. Once these enterprises transform to formal ones, drawing cues our analysis organised enterprises, it is vividly clear that firms need to invest on human capital and learning processes. Further, employment in Indian leather sector seems to positively vary with the volume of the capital Presumably, this may be because the industry has remained labour intensive over the years. Nevertheless, there appears to be no ostensibly direct relation of high elasticity between labour and cpital per labour. Amongst patterns and inferences discussed in this paper, we wish to posit the pivotal role of human capital in the sector, against the backdrop a dynamic value chain, as the core issue of policy relevance.

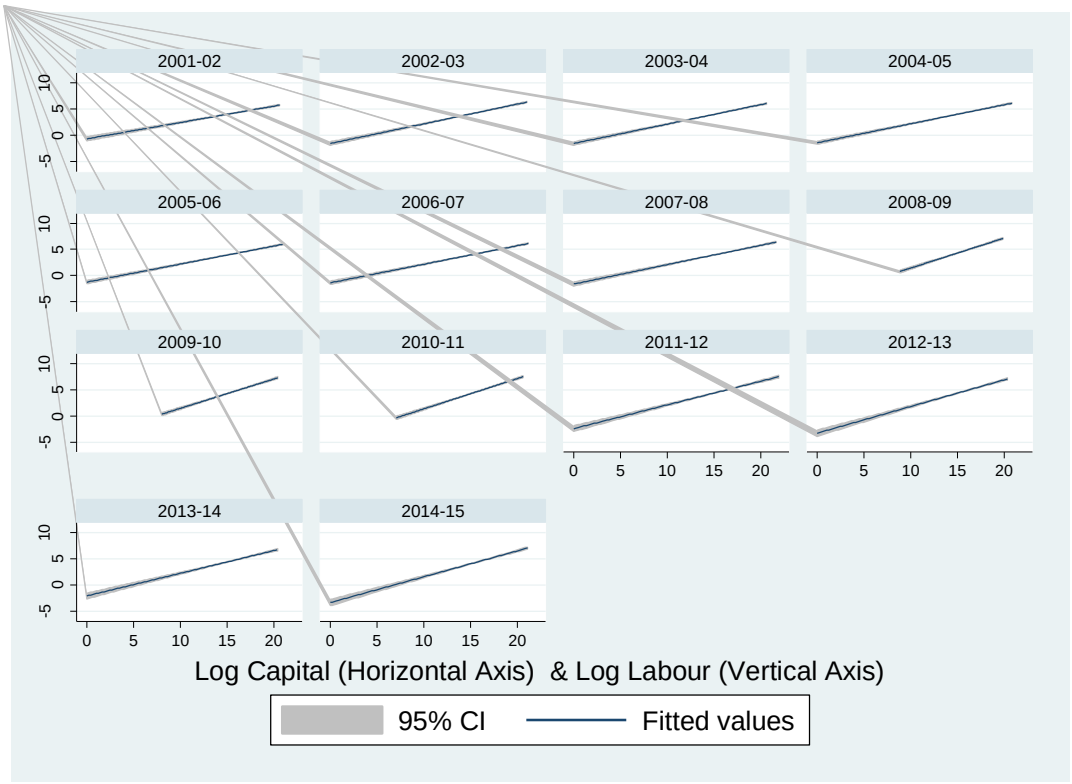
Appendix

Table 1

Classification of Unorganized Enterprises in Indian Leather Sector as per Indian National Industrial Classification 2008

Enterprise's Major Activity (NIC 2008)	Percent (N=716)
15201	37.99
15121	23.04
15202	10.61
15122	9.92
15129	8.24
15209	5.59
15123	1.54
15119	0.84
15114	0.70
15116	0.70
15111	0.28
15112	0.28
15115	0.28
Total	100

Source: Computed from unit records of National Sample Survey 73rd Round 2015-2016



N= 11,823

Source: Computed from Annual Survey of Industries Unit records (Leather Industry)

Figure 1: Capital and Labour in organized leather industry in India

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