MEASURES FOR ENHANCING PRODUCTIVITY OF LEATHER INDUSTRY
BY USING NOMINAL GROUP TECHNIQUE (NGT)

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Abstract – This study is aimed to identify the factors that influence productivity of Leather Industry. Initially, thirty leather industries have been selected. This group of industries agglomerates micro, small, medium and large. Various brain storming sessions & workshops were conducted with stake holders (owners, managerial, controlling, workers and customers). Nominal Group Technique (NGT) was used to identify the various factors of productivity enhancement. A detail study was carried out to enhance the productivity of Man, Machine, Method and Material.

Key Words: Leather Industry, Productivity Improvement, Labour, Machine, Method, Material Productivity and Nominal Group Technique (NGT)

1. INTRODUCTION

The First documented evidence of leather appears in the Hindu holy scriptures of the Vedas. The Rig-Veda has documented the use of Leather 'Mashaks' or sacks as early as 3000 B.C as well as bottles. Skin of Leather was a valuable material even from the time of God. There is a particular reference of the skin of elephant used as cloth by Lord Shiva in the Hindu epic Mahabharata. Again, Lord Shiva, the Greatest Destroyer in the Hindu Triad was used to sit on a tiger's skin for his deep meditation and penance. The most popular Indian leather products include footwear and hand bags. The footwear comes in various designs of traditional embroidery, brocade of textile, bright colors and unique designs are used.

Since the rise of civilization, animals have been part of human life, both while they are alive and also when they are dead. In their death their skins are found of various uses, especially as leather products. Leather is preserving by animal skin. The process of preserving animal skin is known as tanning. The dead skin of cattle like cow, buffalo, pig, goat, sheep, and camel is detected through specialized expertise. Then the role of salt in keeping the wet skin up to rotting. After then salted skin is dipped into the powder mixture of the bark of Tarwar plant, which produced Tannic acid to convert raw skins into leather. This treated skin is then put into a tub of lime. After a week it transforms into leather. The leather is then washed clean in a pond. To give a finish touch to the leather fiber of a fruit is boiled in castor oil. On cooling this solution is systematically applied to the leather to give it a polished, smooth look.

1.1 Leather Industry: An Indian prospective

Own raw material source - 31% of world cattle & buffalo and 21% of world goat and sheep population are housed in India. More than 2 billion sq feet of leather produced annually. 2nd largest producer of Footwear and Leather Garments. 3rd largest producer of saddler and harness items. Generating employment for 3.5 Million people, mostly from the weaker sections with 30% women predominance. Nearly 80-85% of the production is in the small / micro sector. Promising technology inflow and Foreign Direct Investment. World-class institutional support for Design and Product Development, Human Resources Development and R&D activities. Presence of support industries like leather chemicals and finishing auxiliaries. Presence in major markets-Long European experience and strategic location in Asian landmass. Apart from a significant foreign exchange earner, leather industry has tremendous potential for employment generation. Direct and indirect employment of the industry is around 3.5 million. The skilled and semi-skilled workers constitute nearly 50% of the total work force.

Agra is famous all over the world not only for the beauty of Taj, but also for footwear production. The district of Agra is situated in the extreme southwest corner of the State of Uttar Pradesh. It lies between the parallels of 26° 44' and 27° 25' north latitude, and 77° 26' and 78° 32' east meridians of longitude. Rajasthan bounds it on the west; it is bounded on the south for some distance also by Rajasthan, and thereafter by Madhya Pradesh. The district of Firozabad bounds it on the east and it is surrounded by districts of Mathura and Etah in the north.

Agra derives its name from Agra Vans (Aelo Grove), where Lord Krishna used to sport with his female friends in his boyhood and early youth on the banks of river Yamuna. Agra’s chequered history goes back to the times of Mahabharata, but its modern history begins from 1505 when Sultan Sikandar Lodi of Afghan Dynasty chose it as his capital city. Sikandrabad, the place where Akbar is buried, takes its name after him. It is during the Mughal era that Agra gained the greatest eminence. Babar defeated Sikandar Lodi at Panipat in 1526 and founded the modern Agra in 1558 on the left bank of the river Yamuna. Akbar built the fort and part of the palace inside it. The famous edifices of Fatehpur Sikri were also his creation. Jahangir, his successor, held his court most of the time. With Shah Jahan begins the greatest...
epoch of Mughal architecture. Shah Jahan built the master
piece Taj Mahal, besides many other such magnificent
buildings, such as Jama Masjid and Red Fort at Delhi. The
present day Agra is like any other leading Indian city and a
business and tourist centre. Agra went ahead in footwear
production leaving other cities behind. Nowadays, it has
become a prominent centre for footwear production.

In the British period, the Agra was famous in the
manufacture of leather goods. Many became millionaires by
supplying shoes & belts to British army during World War II,
continued after independence as well.

About 1956, leather industry has been established
in the form of export profession in Agra. Now days, It is
rapidly growing up to 10,000 lather industries in Agra in the
form of micro, small, medium & large scale production. At
this time, about 30 to 35 percent of population is connected
directly or indirectly through this lather industry in Agra.
Living style and education of these types of worker is not up
to mark. It is also observed that the working style of worker
is not professional into more than 80 percent lather
industries. Skilled worker is illiterate & educated worker is
not skilled.

2. PRODUCTIVITY IMPROVEMENT

A productivity measure is expressed as the ratio of
output to inputs used in a production process, i.e. output per
unit of input. Productivity is a crucial factor in production
performance of firms and nations. Increasing national
productivity can raise living standards because more real
income improves people's ability to purchase goods and
services, enjoy leisure, improve housing and education and
contribute to social and environmental programs. Productivity growth also helps businesses to be more
profitable. Basically Productivity enhancement involves
Advance Technology, Human Development and Leadership.

Agra lather industry has demanded of more lather
here to boost private capital flow in the organized segment
and enhance the productivity with future growth prospects.
The industry also wants major policy changes for creating
better infrastructure facilities, capacity building and skilled
labor development. The Centre had proposed to set up seven
mega leather clusters in Uttar Pradesh, Haryana, Tamil Nadu,
Rajasthan, Bihar, Andhra Pradesh and West Bengal.

Industry has worried over growing skilled worker
shortage and the lack of proper initiative at any level to
address this problem. "The footwear industry has required
skilled worker that for an order of five lakh pairs, a labor
force of 250-300 is needed, which is hard to come by now-a-
days due to several reasons, including other employment
routes available to workers such as under National Rural
Employment Guarantee Scheme."

Productivity enhancement is one of the measure
issues for enhancing more profit from same kinds of
resources. Productivity is affected by several factors among
others such as methods used, capital, technology,
management, equipment breakdowns and shortage of raw
materials. But, It was found during brain storming session
and workshop that following four factor plays a vital role in
the productivity enhancement of leather industry. These are
Man, Machine, Method and Material-

A-PRODUCTIVITY ENHANCEMENT

2.1 Labour Productivity:

Labor productivity, also known as workforce productivity, is
defined as real economic output per labor hour. Growth
in labor productivity is measured by the change in economic
output per labor hour over a defined period. Labor
productivity measures the hourly output of a country's
economy. Specifically, it charts the amount of real gross
domestic product (GDP) produced by an hour of labor.
Growth in labor productivity depends on three main factors:
saving and investment in physical capital, new
technology, and human capital.

Some definitions and keywords are shown in table-1.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Definitions</th>
<th>Keyword</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Leather product industry enriches the profit by minimizing excess work of labour, to increase the Labour productivity.</td>
<td>Minimizing excess work of labour [MEWL]</td>
</tr>
<tr>
<td>02</td>
<td>Labor productivity as a measure of economic performance and also environmental management has a negative impact on the labor productivity of company.</td>
<td>Economic and environmental management [EEM]</td>
</tr>
<tr>
<td>03</td>
<td>Appropriate telework hours increase labor productivity, but when telework hours are too long, telework decreases labour productivity.</td>
<td>Telework [TEL]</td>
</tr>
<tr>
<td>04</td>
<td>Culture is considered as one of the most powerful forces that shape human behavior and thereby economic activity like labour productivity.</td>
<td>Human culture [HC]</td>
</tr>
</tbody>
</table>
Several factors—such as the decline in interstate migration, rising housing costs in major cities, agglomeration, and structural changes in the developed countries that have reduced the role of manufacturing—may have contributed to the rise in the labor productivity.[5]

The economic impact of climate-change-induced labor productivity changes.[7]

Labour Productivity is lower than the opportunity cost of labour (e.g. 4 USD h⁻¹) in 10 out of 14 farms.[8]

Technological investments in Information Technology and Research & Development contribute to labour productivity growth.[9]

Access to electricity increases labour productivity significantly in the long-run.[10]

A small group of informal firms could contribute to employment and labor productivity growth.[11]

Increased labor market flexibility increases labor productivity.[12]

Relation between labor productivity and productive efficiency is verified by both input-output matrices, so productive efficiency is suggested based on input-output matrices.[13]

Temporal demand variation is a core determinant of labour productivity and different forms of flexible working significantly influence labour productivity.[14]

Understanding the unintended consequences of management strategies for improving labor productivity is crucial to enhance the stability of in regard to safety and productivity.[15]

The major factors limiting the growth of firms in the leather industry were access to capital, high per capita cost, shortage of skilled labour, taxation and regulations, appreciating rupee, competition from imports and high employee cost.[16]

Capital, short of skilled labour, taxation and regulations [CHSLTR]

2.2 Machine Productivity:

Machine Productivity is the measuring of a machine's proficiency in converting the raw inputs into a useful product. The critical element of cost efficiency is termed as Productivity. It is calculated by dividing the average output each period by the cost incurred in consuming the resources in the same period. The critical element of cost efficiency is termed as Productivity. It is calculated by dividing the average output each period by the cost incurred in consuming the resources in the same period.

There are several machines that are used in the factories for different purposes. Let us take the example of a sewing machine in the factory. This machine is used for stitching the garments in the factories. There are some data essentially required for the calculation of Machine Productivity in the factory. The following data is to be considered while calculating the machine productivity: 1. The total stitching machines in the line need to be counted. 2. The output of the line at the end of every day needs to be counted. In other words, the produced garments in the factory need to be calculated. 3. The timing of the shifts in hours and total hours of working in the factory needs to be noted down. In this case, the machine productivity can be calculated by using the formulae given below:

Machine Productivity = \frac{\text{No. of total garments produced}}{\text{No. of total stitching machines used}}

Table 2: Machine Productivity Definitions and Keywords

<table>
<thead>
<tr>
<th>S. No.</th>
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<th>Keyword</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>The milling accuracy and surface quality are usually regarded as the indicators of product quality, and these indicators are affected by CAD/CAM, machining parameters of CNC controller, servo loop, and feed drive system, etc. A data driven method to predict machining quality of product by ANFIS model. This predicted system can help user to achieve the required product quality and machining productivity.[18]</td>
<td>ANFIS Model [ANFISM]</td>
</tr>
</tbody>
</table>
2.3 Method Productivity:

This productivity method places an emphasis on setting daily, weekly, monthly and yearly goals. Its process then helps us organize our thoughts and streamline the path to our goals. Essentially, it is meant to make our workflow more efficient and expedite the work process.

A report by (Riley, 2012) outlined that higher productivity leads to improved competitiveness, trade performance, higher profits, low average costs, higher wages and economic growth. Hence for sustainability of a nation’s economy, manufacturing industries should be nurtured for global market competitiveness. This means in the manufacturing sector, productivity has a positive and significant relationship to performance measurement for process utilization, process output, product cost, and work in process inventory and on time delivery (Mwinyihija, 2014). (Teklemariam, 2004) linked productivity with utilization of resources in a company which means one can achieve the maximum possible with minimum resource. A system is deemed productive if it takes less time to achieve the desired results. (29)

Table 3: Method Productivity Definitions and Keywords

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Definitions</th>
<th>Keyword</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>In method productivity a Lean - Six Sigma to create an enhanced productivity framework for complex manufacturing [30]</td>
<td>Lean - Six Sigma [LSS]</td>
</tr>
<tr>
<td>02</td>
<td>To develop a method to determine the optimal design of a new shopping centre based on the method productivity that is, taking into account both its attractiveness and the forecast costs. [31]</td>
<td>Attractiveness and the forecast costs [AFC]</td>
</tr>
<tr>
<td>03</td>
<td>A 3dimensional building information modeling assisted method productivity measurement prototype for field labour. [32]</td>
<td>3dimensional building information modeling [BIM]</td>
</tr>
</tbody>
</table>
04 By various well logging and mud logging curve data, summarizes the typical curve type, and made use of a mathematical method to form quantitative characterization in method productivity for tight sandstone reservoir.[33]

Logging curve [LC]

05 For method productivity, identify areas were analyzed to using method study principles in production unit. By this method improvement has been achieved through reducing travel time by locating new space for the off-loading site near the production department. [34]

Method study & Time Study [MS & TS]

06 Quantitatively and qualitatively evaluate to the motivation of the employees of three Portuguese Small and Medium Enterprises (SMEs) with the statutes of Excellence to improve the method productivity.[35]

Motivation of employees [ME]

07 Employers should always be care full about his competitors by improving method productivity. [36]

Competitors [COMP]

08 Employers should form a team, which assure the quality of product to enhance the method productivity.[37]

Quality of product [QP]

09 Improving shop floor layouts by using string diagram technique and ARENA software to enhance method productivity. [38]

String diagram technique and ARENA software [SDT&S]

10 The work content & variability reduction of MCV model for main assembly line in auto mobile industry improve the method productivity.[39]

Work content & variability reduction [WCVR]

11 For improving method productivity in gas-water wells, Darcy law, the law of conservation of mass, mathematical models of steady-state and unsteady-state seepage considering stress sensitivity of reservoirs and seepage capability changes of gas-water two phases could be established.[40]

Darcy law and stress sensitivity [DLSS]

2.4 Material Productivity:

Material productivity is expressed as the amount of economic output generated (in terms of GDP) per unit of materials consumed. It plays important role in cost of production. It depends upon how material is effectively utilized in its conversion into finished product. It can be increased by using skilled workers, adequate machine tools, good design of product etc.

<table>
<thead>
<tr>
<th>S. No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>The auto-regressive distributed lag model to investigate the dynamic impacts of energy intensity for secondary industry (SEI), tertiary industry value added per GDP (TVA), trade openness (TO) and domestic extraction per capita (DEC) on material productivity.[41]</td>
<td>Auto-regressive distributed lag model [ARDL]</td>
</tr>
<tr>
<td>02</td>
<td>Critical to monitor the intensity of natural resource usage when producing intermediate or final goods. Discovering which socio-economic variables influence the Material Productivity indicator and explain differences between economic units is, nowadays, a key issue.[42]</td>
<td>Socio-economic variables [SEV]</td>
</tr>
<tr>
<td>03</td>
<td>The material productivity of the urban ecosystem is analyzed using the background of urban metabolism and urban ecology.[43]</td>
<td>Urban metabolism and urban ecology [UMUE]</td>
</tr>
<tr>
<td>04</td>
<td>Environmental tax reform (ETR), a shift in taxation towards environmental taxes, has been implemented on a small scale in a number of European countries for increasing carbon and material productivity.[44]</td>
<td>Environmental tax reform [ETR]</td>
</tr>
<tr>
<td>05</td>
<td>Product performance and process versatility are key characteristics of composites but there is a trade off with material productivity and</td>
<td>Product performance and process versatility [PPPV]</td>
</tr>
</tbody>
</table>
consistency. [45]

06 There has been an increasing emphasis on its planned development, aimed at optimum utilization of available raw materials for maximizing the returns, particularly from exports in the form of material productivity. [46]

Planned development, aimed [PDA]

07 By the ABC (Always Better Control) analysis to minimize the inventory cost such as labor cost, material cost etc. to the improve of material productivity; [47]

Always Better Control analysis [ABC]

08 Employer should always be analyze the VED analysis (Vidal Essential Desirable) to enhance the material productivity. [48]

VED analysis [VEDA]

3. METHODOLOGY:

Nominal Group Technique (NGT)

Since interactive management provides a general and flexible for conducting a process of inquiry to assist groups to deal with complex issues. A set of 30 domain experts derived from leather industries, government departments in the planning and administration of leather industries including authors were selected on the basis of a second generation system design paradigm, which supports a consensus-driven interactive-iterative process. The methodology of content analysis and Nominal Group Technique (NGT) has therefore been utilized to obtain the elements for improvement of labour productivity in leather industry;

Three workshop sessions in two stages were organized in order to examine the priority of elements of productivity improvement in leather industry. Four important aspects from the point of view of the productivity improvement in leather industry were prioritized and agreed upon by domain experts

1. Labour Productivity
2. Material Productivity
3. Machine Productivity
4. Method Productivity

In the second stage of the exercise, the domain experts were called upon to identify at least three elements that they considered to be most important for improvement of labour productivity in leather industry;

For this purpose following trigger question was posed to them:

Which of the elements according to you has the greatest potential on the improvement of labour productivity in leather industry? Give a list of at least three elements. An integrated list was clarified, merged, edited and key worded. This reduced the total number of elements from 42 to 90. A list of such elements along with their codes and keyword is depicted in Table-5.

Table 5: Integrated descriptive elements for improvement of labour productivity in leather industry

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Elements</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>To have a better infrastructural support</td>
<td>Infrastructural Support [IS]</td>
</tr>
<tr>
<td>02</td>
<td>To have provision for learning</td>
<td>Provision for Learning [PL]</td>
</tr>
<tr>
<td>03</td>
<td>To have provision for continuous evaluation system</td>
<td>Continuous Evaluation System [CES]</td>
</tr>
<tr>
<td>04</td>
<td>To have provision for staff development program</td>
<td>Staff Development Program [SDP]</td>
</tr>
<tr>
<td>05</td>
<td>To insure better quality of life</td>
<td>Better Quality of Life [BQL]</td>
</tr>
<tr>
<td>06</td>
<td>To have provision for medical facility</td>
<td>Medical Facility [MF]</td>
</tr>
<tr>
<td>07</td>
<td>Provision for incur raging workers to learn through training</td>
<td>Learn Through Training [LTT]</td>
</tr>
<tr>
<td>08</td>
<td>Emphasis on adult education program</td>
<td>Adult Education Program [AEP]</td>
</tr>
<tr>
<td>09</td>
<td>Provision for transportation facility</td>
<td>Transportation Facility [TF]</td>
</tr>
<tr>
<td>10</td>
<td>Provision for continuous assessment system</td>
<td>Continuous Assessment System [CAS]</td>
</tr>
<tr>
<td>11</td>
<td>Improper working posture</td>
<td>Working Posture [WP]</td>
</tr>
<tr>
<td>12</td>
<td>To develop an ability to work with inter-disciplinary group</td>
<td>Inter – Displanary Group [IDG]</td>
</tr>
<tr>
<td>13</td>
<td>To create an understanding of professional responsibility</td>
<td>Professional Responsibility [PR]</td>
</tr>
<tr>
<td>14</td>
<td>Insufficient salary structure as per work</td>
<td>Insufficient Salary Structure [ISS]</td>
</tr>
<tr>
<td>15</td>
<td>Provision for documentation facility</td>
<td>Documentation Facility [DF]</td>
</tr>
<tr>
<td>16</td>
<td>To inculcate in an individual the spirit of truthfulness</td>
<td>Spirit of Truthfulness [ST]</td>
</tr>
<tr>
<td>17</td>
<td>Opportunity to each worker for extracurricular activities</td>
<td>Extracurricular Activities [EA]</td>
</tr>
<tr>
<td>18</td>
<td>Insecure of the job</td>
<td>Job Insurity [JI]</td>
</tr>
<tr>
<td>19</td>
<td>Emphasis on integrated education</td>
<td>Integrated Education [IE]</td>
</tr>
<tr>
<td>20</td>
<td>Lack of Training Programme</td>
<td>Training Programme [TP]</td>
</tr>
<tr>
<td>21</td>
<td>Provision for financial support</td>
<td>Financial Support</td>
</tr>
</tbody>
</table>
In the final stage of exercise, the domain experts were called upon to rank the elements using NGT. The use of NGT incorporated asking the domain experts to rank the elements that they considered to be most important for improvement of labour productivity. Finally 13 factors were considered. A list of such elements is presented in table-6.

### Table 6: Elements Definitions and Keywords

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Elements</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Lack of professional attitudes</td>
<td>Professional Attitudes [PA]</td>
</tr>
<tr>
<td>02</td>
<td>Improper quality of Life</td>
<td>Quality of Life [QL]</td>
</tr>
<tr>
<td>03</td>
<td>Lack of Training Programme</td>
<td>Training Programme [TP]</td>
</tr>
<tr>
<td>04</td>
<td>Improper working environment and time</td>
<td>Working Environment and Time [WET]</td>
</tr>
<tr>
<td>05</td>
<td>Lack of labour and skilled worker</td>
<td>Labour and Skilled Worker [LSW]</td>
</tr>
<tr>
<td>06</td>
<td>Exertion by Government rules</td>
<td>Government Rules [GR]</td>
</tr>
<tr>
<td>07</td>
<td>Improper working posture</td>
<td>Working Posture [WP]</td>
</tr>
<tr>
<td>08</td>
<td>Insecure of the job</td>
<td>Job Insurity [JI]</td>
</tr>
<tr>
<td>09</td>
<td>Insufficient incentive to staff</td>
<td>Insufficient Incentive [II]</td>
</tr>
<tr>
<td>10</td>
<td>To inculcate in an individual the spirit of truthfulness</td>
<td>Spirit of Truthfulness [ST]</td>
</tr>
<tr>
<td>11</td>
<td>Availability of land, man, material, equipments &amp; machine</td>
<td>Land, Man, Material, Equipments &amp; Machine [LMMEM]</td>
</tr>
<tr>
<td>12</td>
<td>Repeated work</td>
<td>Repeated Work [RW]</td>
</tr>
<tr>
<td>13</td>
<td>Insufficient salary structure as per work</td>
<td>Insufficient Salary Structure [ISS]</td>
</tr>
</tbody>
</table>

### 4. CONCLUSION

It is evident from this brief review that manpower plays a vital role in the productivity improvement of leather industry. Thirteen elements have been identified for improvement of labour productivity in the city of Taj. The involvement of the satisfied worker in decision making along with the other stakeholders makes a significant improvement in productivity of machine, method and material also. This methodology will help management in enforcing suggested initiatives for worker productivity improvement.

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