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ARTICLE

Technological modifications in the tanning and leather industry from pre-British to colonial Punjab

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Abstract
Hereditary artisans have been an important segment of Punjabi society since the medieval times. Pre-colonial Punjab was an agricultural province, where industrial production was largely confined to village industries, which catered to meet the demands of the local population. Tanning and leather making was one of the professions that was a traditional village industry in which the methods of production were old, and technology had not changed much from the medieval period. The onset of colonial rule introduced modified and new technologies in all industries, which invariably impacted traditional industries. The tanning and leather industry was among the village industries in which modified and new processing and production technologies were introduced. The scope of this paper is to study how the new technology in the tanning and leather industry modified the old, whether it improved the processing time, quality and quantity of products and what was the nature of its impact on the traditional artisans connected with tanning and leather in colonial Punjab.

Keywords Tanning · Leather · Technology · Artisans · Pre-British · Colonial Punjab · Impact

1 Introduction

Technological progress has been associated with the development of new products and services and has impacted processing and manufacturing. In pre-colonial Punjab, next to agriculture, artisanal industries were dominant forms of occupation and the products manufactured catered directly to the primary needs of the people. In rural areas, the artisans plied their traditional occupations uninfluenced by the outside world. Village industries were synonymous with handicrafts and the workers manufactured products at their own convenience. The production was for the consumption of people living nearby and the products had a limited market. Most of the artisanal classes in villages worked under the *sepi* system,[1] which did not require them to specialize or refine their skills because of the limited demands of the local requirements (Sharma, 1996). Thus, the technologies prevalent until the arrival of the British in Punjab had not changed much from the medieval period. However, after the onset of British rule in 1849, new technologies in almost all production industries were introduced in Punjab. There were considerable refinements in manufacturing processes, which impacted the livelihood of traditional artisans. In the initial period of the British rule, the small-scale industries were not affected much by the establishment of factories or by foreign competition (Census of India, Punjab, 1901). However, with the passage of time, the modified or new technologies began to affect traditional industries and occupations.

The tanning and leather industry was an important village industry to which hereditary classes of artisans belonging to lower castes were connected. The leather and tanning artisans produced items for the consumption of the locality in which they worked. This village industry underwent technological modifications with the introduction of chrome tanning, substitution of the tanning pit with rotating drums, and use of modern machinery for leather work and boot-making in colonial Punjab. Modern tanneries were established in

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[1] The Sepi System was an arrangement where the artisanal classes performed services based on mutual obligations for work and payment. It signified the relationship between food producing families and those who provided services.

western and central Punjab by the British. Shops for English style shoes, boots and sandals sprang up all over colonial Punjab, which exhibited an increased liking for western footwear (Latifi, 1911). Significantly, by the end of the nineteenth century, the number of traditional leather and tanning workers started declining as factory made leather items and footwear gained popularity. Many artisans changed their professions, joined the army and also emigrated to foreign countries in search of work. Between 1912 and 1939, about 12% *chamars*[2] had migrated to other countries in search of better opportunities (Sharma, 1996).

The technologies involved in tanning and leather industry in Pre-British Punjab and the technological changes introduced in the tanning and leather industry by the British in colonial Punjab is taken up for discussion in this paper.

2 Technologies of the tanning and leather industry in pre-British Punjab

Tanning was a hereditary profession in pre-British Punjab. The castes connected traditionally with the tanning of hides and skins in Punjab were the *khatik*, *chamar*, *mochi*, *dabgar*, *pasi*, *chanal* and *raigar* (Ramlal, 1938).[3] Tanning was mostly concentrated in Jullundur, Lahore, Sialkot, Delhi and Muzaffargarh divisions (Latifi, 1911). Leather from the tanned skins and hides was prepared by low caste artisans called 'bangarus'. Finally, *mochis* or cobblers, who were an integral part of almost all the villages, made shoes, *charsas*, whips and blinkers from the prepared leather (Punjab District Gazetteers, Gurdaspur, 1914).

Tanning was performed by the indigenous bag tanning method. Leather was made from the hides of buffalo, cow, goat, sheep, deer, horse, ass and camel. In the pre-tanning process, the skin of the animal was removed through flaying[4] using primitive tools and then it was rubbed with salt and placed in the sun (Ramlal, 1938).The tanneries received the skins and hides mostly in the wet salted conditions, where unwanted hair, flesh and other proteinaceous materials were removed by dipping them in a mixture of lime, barley and salt for 4 to 5 days. The skins were then taken out and rubbed with wood ash to loosen the hair and then a piece of wood was used to scrape off the hair. The hides were again soaked in a mixture of barley and salt for 5 days and the process was repeated (Baden-Powell, 1872). Fleshing was done over a slab by the tanners (Ramlal, 1938). Next, the hides were afforded resistance against bacterial degradation through the action of tannin. In Punjab, tannin was obtained from the bark of the *Nilotica* tree (Kikar-*Acacia arabica*), which was common in Ambala, Sialkot, Multan and Rawalpindi. In the Kangra Hills, the bark of the wig plant (Tung-*Rhus cotinus*) was used to prepare tannin. Besides the wig plant, the barks of the cassia tree (Amaltas-*Cassia fistula*) and of the pine tree (Chir-*Pinus longifolia*) were used as tanning agents in Kangra, while Indian gooseberry (Amla-*Phyllanthus emblica*), black myrobalan (Harrar-*Terminalia chebula*), jujube tree (Ber-*Zizyphus jujuba*) and bastard myrobalan (Bahera-*Terminalia belerica*) barks were used as tanning agents in Hoshiarpur (Latifi, 1911; Census of India, Punjab, 1911).

The tanning process was commenced by putting the hides in a series of pits containing the tannin liquors in the increasing order of concentrations for 2 to 3 days. Next, the pelts were hung on wooden beams. These were worked vigorously with tannin by hands. This step was called the bag stage (Ramlal, 1938). The total duration of the vegetable tanning alone took around 2 months (Baden-Powell, 1872).

During the Sikh rule in Punjab (1799–1849), a variety of leather articles were prepared like saddles, fancy boxes, gloves, purses, waist-belts, sword-scabbard, shields, bridles and *hukkas* (Punjab District Gazetteer, Lahore, 1883). These were made in Kangra, Hoshiarpur, Garhshankar, Gujrat, Bannu, Derajat, Multan, Kasur, Sialkot and Lahore (Hunter, 1887; Punjab District Gazetteers, Rawalpindi, 1901). As per the Government of India, Labour Investigation Committee, 1946, other important leather articles in Punjab were shoes, drums, bolting, thongs, whips, bokas and charsas, oil jars, and bottles. The chief towns for manufacture of these articles during the first half of nineteenth century were Kalanaur in Rohtak district, Dinanagar in Gurdaspur, Lahore, Gujrat, Sirsa, Wazirabad and Delhi (Latifi, 1911).

[2] *Chamar* is a scavenging or leather worker caste in northern India whose hereditary occupation is tanning leather. The name is derived from the Sanskrit word *charmakara* ("skin worker").

[3] The *mochis* were both Hindus and Muslims. In the eastern Punjab, the term was applied to skilled workmen making country shoes. In the western part, however, it was used to designate a worker in leather, be he a tanner or a shoe-maker; *chamrang* was the Muslim hide tanner encountered mostly in Sailkot; *dabgar* was an allied caste that was mainly Muslim, who-'se traditional occupation was confined to a work in raw hides; *chanals* were professional skinners of the Simla hills; and *raigars* were traditionally saltpetre makers, but in the Hissar district also undertook tanning.

[4] The flaying (skinning the carcass) and curing (initial treatment) to keep the hide in good condition was defective in practice. The workers were ignorant and did not take proper care of carcasses during flaying and during transportation to the tanneries. They used blunt knives while flaying and transported carcasses carelessly dragging them in soil, which resulted in cuts and marks on the skins and hides. They sold hides in green condition without removing flesh so that they could get more money as the hides were sold by weight (RamlalAnand, 1938).

3 Modified and new technologies in tanning and leather industry in colonial Punjab

Under the British, after the cotton textiles, the tanning and leather industry became the second important industry of Punjab as the province possessed sufficient raw material to establish it successfully. In 1880, Punjab had 10.5 million cows and bullocks, 3.7 million buffaloes, 4.5 million sheep and 4 million goats. Out of these, around 40% stock yielded hides and skins (Census of India, Punjab, 1901, 1911). Realizing the economic importance of the tanning and leather industry, the colonial government tried to develop tanning from a purely household craft to a highly specialized industry towards the end of the nineteenth century. The major innovation in leather tanning process by the British was the introduction of chrome tanning (Martin, 1903), to make boot-uppers and light items like kid gloves. Leather produced by chrome was called chrome tanned leather (Ramalingam, 2017).[5] Chrome tanning was a technical process based on theory and practical application of chemicals. It involved a procedure in which pickled hides and skins were first acidified with sulphuric acid and common salt to allow the tanning agent to penetrate and bring them into a uniform condition to adjust to the basicity of the chrome liquor. The pickled pelts were then allowed to drain, and were passed through 5 to 10% solution of sodium chloride in a drum to remove acid. Then chrome liquor[6] was periodically added to the drum. The total volume of liquor in the drum was 100–150% out of which the chromium used was 1.5 to 2.5% of the pickled pelt weight. Tanning time differed for different pelts. For example, the time of tanning was 6 to 8 h for calf skins, 5 to 6 h for sheep and goat skins and 10 to 12 h for ox hides. The temperature of the drum was carefully controlled during the process (Marry, 1936). The chemical treatment of pelts with solutions of basic chromium salts converted the pelts into finished leather. This kind of leather was soft and supple and much better than that prepared by the vegetable tanning process (Ramalingam, 2017). Another technological modification was the substitution of the tanning pit with the rotating drum during the tanning process. The modern tanning industry was fully operationalized in Kanpur in the 1880s using the chrome tanning process and modern machinery (Annual Administrative Report of United Provinces, 1903–1904).[7]

In colonial Punjab, efforts to establish modern tanneries, like those in Kanpur, were made by the British by establishing large tanneries and training local *chamars* about elementary principles of modern tanning. The Department of Industries tried to improve the quality of skins by inculcating care in flaying and also by investigating supplies of tanning materials (Badenoch, 1917). In 1908, Kanpur influenced technology of a modified tanning process with chrome tanning, was introduced in the tanneries at Rawalpindi, Sialkot and Wazirabad. The Rawalpindi tannery also set up modern machinery for both bark and chrome tanning as well as boot making and leather work. It employed manpower consisting of factory trained workers from Madras and Kanpur. The government tannery at Shahdara, established in 1908, had complete machinery and facilities for training manpower. Other modern tanneries using chrome technology were established by *Khojas* in Jullundur and Ferozepur (Badenoch, 1917). The Wazirabad and Shahdara tanners turned out 70 and 50 skins per day of which approximately one third in each case were tanned and finished by the modified process. In 1929, the number of mechanized tanneries in Punjab was 53, which increased to 155 in 1939 (Labour Investigation Committee, 1946). The Post-War Development Plan prepared in 1940 for developing the tanning and leather goods industry made provisions for setting up dyeing and finishing plants with modern equipment at Sialkot, Multan, Hisar and Rawalpindi.

4 Impact of technological modifications in the tanning and leather industry

Despite the efforts of the colonial government, the tanning industry started declining due to a number of factors. The new tanneries established by the British with modified technologies required superior quality hides. However, in the indigenous industry, the local requirements were chiefly for inferior leather, such as was needed for the country made shoes (*desi jutis*), worn usually in the villages of the Punjab between 1901 and 1920 (Anand, 1933). Evidently, it was not economical to manufacture cheap leather from costly hides (Civil and Military Gazette Press, 1933). Hides were spoiled by the artisans themselves as their methods of fleecing cattle and tanning were primitive, which caused an enormous waste of raw materials leading to the decline of the industry (Latifi, 1911).

[5] Chrome tanning, which evolved only during the British period was undertaken using minerals and chemicals like chrome salts, formaldehyde, alum and salt. The discovery of the tanning power of chrome salts, first introduced in the USA and Europe as early as 1890, had already led to drastic technological improvement in the production of leather. The improved technology was, therefore, applied in practice in industrial production by the British. In India, chrome tanning started on an experimental basis in a factory set-up by the Government of Madras in 1904 at the initiative of A. Chatterton, a Government servant.

[6] The chrome liquors are usually prepared from chrome alum, sodium or potassium dichromates or technical by-products from oxidation processes in which chromic acid has been used as an oxidizing agent.

[7] United Provinces, a Central Province in British India.

Table 1 Number of workers engaged in tanning and shoe-making work in colonial Punjab

Occupation	1881	1891	1901	1911	1921	1931
Tanners	7530	11,610	41,631	18,043	10,573	6500
Shoemakers	71,618	229,986	59,687	75,676	22,724	16,917

Data adopted from: Census of Punjab, 1881, pt. II, Table XII; Census of Punjab, 1891, pt. II, 416; Census of Punjab, 1901 pt. II, Table XV; Census of Punjab 1911, pt. II, 304–308; Census of Punjab, 1921, pt. II, 291–311, 502; Census of Punjab, 1931, pt. II, 156–84, 241

The lack of practical expert knowledge about the new technologies and of dissensions between partners was the second factor due to which the Rawalpindi, Jullundur and Ferozepur tanneries failed (Punjab District Gazetteers, Rawalpindi, 1901). Only the Wazirabad and Shahdara tanneries were able to survive. An effort was made in 1912 by the Government to help the tannery and leather industry by making available a disused government building in Amritsar, and also by sending a state scholar to England and America to learn the English tanning process as part of the training in the new process of tanning. However, this scheme did not succeed as the scholar had neither sufficient practical knowledge of the processes, nor had ordinary business aptitude to conduct the operations of a factory (Latifi, 1911).

The indigenous tanning industry declined rapidly as it was severely affected by the foreign imports and from other industrially advanced provinces. The makers of Kalanaur leather products like bridles and saddles were driven out of work by the products of Kanpur, which had better techniques of production (Punjab District Gazetteers, Rohtak, 1910). Similarly, the products of Rohtak, Dinangar and Gurdaspur also declined gradually. The imposition of prohibitive duties on tanned leather was also a cause for decline of the tanning industry (Latifi, 1911). Another reason was the thinning down of the castes, whose belonged to these occupations by tradition, in terms of numbers. Due to a rapidly changing socio-economic environment in the British Punjab, a large number of artisans moved out of the village and in many cases changed their occupations. These circumstances had a bearing on their demographic distribution as well. The 'chamars', who were traditionally involved in tanning, alone showed a decrease of 79,730 in a 10-year period. The tanning industry, which supported 756,291 persons in 1901, was supporting 629,868 in 1911, showing a decrease of 17%. By 1911, 67% of the total working *chamars* were not engaged in their traditional occupation (Sharma, 1996). This percentage increased to 76% by 1931 (Census of India, Punjab, 1931).

The tanning industry was connected to the shoe industry and the local tanned leather was used for making *jutis*. The extensive use of boots and shoes of European make after the first decade of the twentieth century left no room for the development of local shoe-making. The numbers of persons engaged in shoe-making were 22,724 in 1921, which declined to 16,917 in 1931 (Census of India, Punjab, 1931).

The above given facts can be further made clear with Table 1.

As per the Report of the Punjab Provincial Banking Enquiry, 1929–1930, by the 1930s, with the change of taste and fashion, the demand for country made shoes began to diminish. Boots of European style and make were replacing local shoes, mostly among younger generations as they were more durable and fashionable. The local shoe makers had no facilities to learn the art of boot-making and they found it difficult to adjust to the new demands. This caused a decline in the manufacture of Punjabi *jutis* (Report of Census of India, Punjab 1911). Moreover, after 1930s, local leather was being replaced by a cheap variety called 'Leatherette' from Japan and Czechoslovakia, which further gave tough competition to the indigenous leather industry through the selling of cheap leather and rubber shoes (Report of the Department of Industries in the Punjab, 1940).

The change in the means of transportation in 1930s also affected the indigenous tanning industry adversely, as the motor lorries largely displaced *tongas* and *ekkas* for long distance travels. This resulted in the fall of demand for harness leather. The military department also curtailed its requirements of horns and saddlery by employing to a greater extent the mechanical modes of transport. Ginning factories too gradually took to canvas beltings and cheap washers made from coir and card-boards (Anand, 1933).

It is significant to point out that due to the increasing use of English shoes or boots, small shoe making factories sprang up all over the province of Punjab, and shoes made in Kanpur became available everywhere. Lahore responded by establishing over 40 shops, while Delhi and Ludhiana had 15 and 7 shops respectively. A number of educated persons established shoe-making factories. One factory was located in Delhi, which was attached to a tannery, while other modern shoe factories were established at Ferozepur, Amritsar, Gujrat, Sialkot, Rawalpindi and Jullundur (Latifi, 1911).

5 Conclusion

In conclusion, it can be said that due to technological changes, the village industry, and indigenous techniques of tanning and shoe-making as well as the artisans connected with the hereditary profession, were affected adversely. Although the village-based tanning and leather industries persisted due to the poverty of the rural population, the overall tendency was towards decline (Vermani, 1983). However, at the same time, the quality,

quantity and working conditions of persons connected with tanning and shoe-making improved due to the new or modified technologies and mechanization of operations, which was a positive change towards industrialization of the province. The modified technologies encouraged productivity, mainly as a market-induced development, and there were overall signs of improvement as a result. Adoption of European lifestyles, mainly by educated people, increased the production of English styled shoes, boots and sandals.

Glossary

Amaltas Tree-*Cassia fistula*
Amla Indian gooseberry-*Phyllanthus emblica*
Bahera Bastard myrobalan-*Terminalia belerica*
Bangaru Low caste artisans preparing leather from tanned skins
Ber-Jujube tree *Zizyphus jujube*
Chamar Principal Hindu Leather worker Caste
Chamrang Important Muslim tanning caste in the area of Sialkot
Chanal Professional skinners of the Simla Hills
Charsas Leather article like a whip
Chir Pine tree-*Pinus longifolia*
Dabgar Artisan class preparing articles from raw hide
Desi *Jutis* Country made Indian shoe
Ekka Two wheeled vehicles drawn by a horse or bullock
Harrar Black myrobalan-*Terminalia chebula*
Hukka Indian smoking pipe
Khatik Mohammedan caste of tanners
Khoja Principal Muslim trading caste
Kikar Tree-*Acacia arabica*
Mochi Tanning and shoe making caste
Pasi Caste engaged in skin tanning and pig keeping
Raigar Traditional saltpetre making caste in Punjab who also engage in tanning in Hisar area
Tonga Light two wheeled carriage drawn by a horse

References

Annual Administrative Report of U.P., Calcutta, 1903–1904 (p. 30).
Badenoch, A. C. (1917). *Punjab industries—1911–1917* (pp. 20–21, 108). Government Printing Press, Lahore.
Baden-Powell, B. H. (1872). *Handbook of the manufactures and arts of the Punjab* (Vol. II, pp. 102–103, 106, 122–123). Government Printing Press, Lahore.
Census of India, 1901 (Vol. XVII, pp. 221, 381).
Census of India, 1911 (Vol. XIV, pp. 100–101, 498, 502).
Census of India, Punjab, 1891 (pp. 292, 308).
Census of Punjab, 1931, pt. II, p. 220, 222; *Census of India, 1931*, *Punjab* (Vol. XVII, p. 241).
Government of India. (1946). *Labour Investigation Committee, tanneries and leather goods factories* (pp. 2, 113).
Government of Punjab. (1940). *Post-war development plan* (pp. 78–79). Government of Punjab (Lahore).
Hunter, W. W. (1887). *The Imperial Gazetteer of India* (Vol. XII, p. 448).
Lahore: Civil and Military Gazette Press. (1933). (p. 181).
Latifi, A. (1911). *The industrial Punjab: A survey of facts, conditions and possibilities* (pp. 100, 103, 106, 112, 117–118). Punjab Government Publication, Longmans, Green & Co.
Marry, E. W. (1936). *The chrome tanning process: Its theory*, *practical application and chemical control* (1st ed., pp. 5, 19–20). A. Harver Publisher.
Martin, J. R. (1903). *Monograph on the tanning and working in leather in the Bombay Presidency*, Bombay (p. 4).
Punjab District Gazetteers, Gurdaspur District, 1914 (Vol. XXI-A, p. 146).
Punjab District Gazetteer, Lahore District, 1883–84 (p. 101).
Punjab District Gazetteers, Rawalpindi District, 1901 (Vol. XXVIII A, p. 171).
Punjab District Gazetteers, Rohtak District, 1910 (Vol. III-A, p. 128).
Ramalingam, D. (2017). Growth of leather industries in Tamil Naidu under the British: A study. *International Journal of Humanities and Social Sciences, 7*(1), 62.
RamlalAnand. (1938). *Tanning industry in the Punjab* (pp. 7–8, 20–21, 76, 81). Director of Industries, Punjab.
Report of the Department of Industries in the Punjab for the year ending 31st March, 1940 (p. 8).
Report of the Punjab Provincial Banking Enquiry, 1929–30 (p. 82).
Roshan Lal Anand. (1933). *The milk supply of Lahore in 1930.* Civil and Military Gazette Press, *Op .Cit*. (p. 181).
Sharma, H. C. (1996). *Artisans of Punjab: A study of social change in historical perspective (1849–1947) (*pp. 28, 88, 100). Manohar Publications.
Vermani, R. C. (1983). *British colonialism in India* (p. 88). Authors Guild Publication.