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A STUDY OF PERCEPTION OF ERGONOMIC ENVIRONMENT IN MATCH INDUSTRY IN VIRUDHUNAGAR DISTRICT

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Abstract

In and around, Virudhunagar district, there are 500 Safety Match factories which have been employing 80273 workers. The major processes are frame filling, wax dipping, head filling, drying, box framing and filling, side painting, band rolling, dozen packing and chemical grinding. The labourers are exposed to physical, chemical and ergonomic hazards. They are exposed to various chemical hazards mainly potassium chlorate, commercial sulphur, glue, black and red manganese, red phosphorus, antimony glass powder etc. In this article the researcher take the perception of working condition and welfare facilities in Safety Match Industry in Virudhunagar district. The researcher himself prepared an interview Schedule, through that the researcher would come to know the problems faced by the labourers those who are working in the Safety Match Industry in Virudhunagar district, and what are their family backgrounds.

Introduction

The origin of the safety match industry in India goes back to the beginning of this century. Around 1910 immigrant Japanese families who settled in Calcutta began making matches with simple hand–made and power-operated machines. Local people soon learned the necessary skills and a number of small match factories sprang up in and around Calcutta. The factories in Calcutta were unable to compete with imports, and handmade match production shifted to Southern India, especially in the Ramanathapuram and Tirunelveli districts of Tamil Nadu State. This shift was due to the pioneering efforts of P.Iyya Nadar and A.Shanmuga Nadar who went to Calcutta to learn the process from Purna Chandra Ray, a local businessman, who had learned the trade in Germany. The Nadars set up a number of manual match production units in extremely poor regions of Tamil Nadu, where a combination of the dry climate, cheap labour and availability of raw materials from nearby Kerala created ideal conditions for match production.

Mechanization came to the Indian match industry in 1924 when M/s Wimco, Ltd. Started operations in 1924 as a unit of the multinational Swedish Match Company. Wimco is still the only representative of the large scale sector in wooden match manufacturing and is the only fully mechanized match factory in the country.

During the past three decades, the Indian match industry grew especially rapidly. Government policies protected Indian matches by placing protective tariffs on imported products and specifically favoured the expansion of the handmade, small-scale sector

through the use of differential excise taxes. Indian government policies have played an important role in the development of the match industry as a whole and in the encouragement and protection of the small-scale sector for the last fifty years. Protective tariffs, differential excise duties and sales tax exemption are some of the mechanisms used by central and state governments to develop the industry.

Statement of the problem

In and around, Virudhunagar District, there are approximately. 500 match works and employing more than thirty thousand workers. Major processes are frame filling, wax dipping, head filling, drying, box framing and filling, side painting, band rolling, dozen packing and chemical grinding section. The labourers are exposed to physical, chemical and ergonomic hazards. Physical hazards include excessive heat superadded by poor ventilation and noice pollution. Due to synergistic effect of chemicals in the presence of excessive heat and lack of ventilation, and improper ergonomic condition, the people working in the match factories are exposed to major occupational health problems. Working conditions such as safety equipment, ventilation, cleanliness, seating arrangement, and pollution control and seaking employment are very important in match industry. Long working hours, exposure to excessive heat, low illumination, improper posture, overcrowded working space, continuous sitting in one posture cause health problems like pain in joints, body ache, fatigue and other muscle skeletal problems, resulting in stunted physical growth and development etc.so in this paper are attempt has been made to analyze the existing working condition and the preference of workers for coming to match work industries in virudhunagar dist.

Objectives of the Study

The proposed study has the following objectives:

1. To study socio-economic profile of the labours working in safety match industry.
2. To study the ergonomic environment in safety match Industry.

Scope of the Study

This study was conducted in Virudhunagar district, because Virudhunagar district have large number of safety match industries and more number of workers are employed in the safety Match industries. The socio-economic profile of the labourers working in safety match industries and the working conditions such as safety equipment, ventilation, cleanliness, seating arrangement, and pollution control were considered for this study. Because of it will fetch efficient production in the match industry. The efficient production leads to achieve the business objective.

Methodology of the Study

Primary data were collected from the workers working in the safety match factories.

Secondary data were collected from published reports, journals and magazines. The researcher used random sampling method to select 400 sample respondents who are working in the match factories in Virudhunagar District for this study. For the collection of primary data the researcher used the structured interview schedule prepared for this purpose.

Data Analysis

The collected data were scrutinized to check the consistency. After this, the collected data were classified and grouped to form suitable tables. Percentage analysis, and KStest were used in this study.

Socio-economic Profile of the Respondents

Age wise classification of Respondents

Workers of different age groups have been working in safety match industry. The Table 1 furnishes the age wise classification of the respondents of safety match industryinVirudhunagar district.

Table 1: Age wise classification of Respondents

Age (In years)	Number of respondents			Total
	Rural	Semi-urban	Urban	
Less than 20	20(9.52)	20(19.05)	15(17.65)	55(13.75)
20-30	75(35.71)	35(33.33)	25(29.41)	135(33.75)
30-40	85(40.48)	40(38.09)	30(35.2930)	155(38.75)
Above 40	30(14.29)	10(9.53)	15(17.65)	55(13.75)
Total	210(100)	105(100)	85(100)	400(100)

Source: Primary data

(Figures in the parentheses indicates percentage)

It could be inferred from the above table that out of 400 respondents, 38.75 per cent are in the age group of 30 to 40 years followed by 33.75 per cent are in the age group of 20 to 30 years, while 13.75 per cent are in the age group of above 40 years and the remaining 13.75 per cent are in the age group of below 20 years.

From Table 1, it is understood that among the respondents of rural safety match industries about 40.48 percent are in the age group of 30-40 years, while 35.71 percent of the respondents are in the age group of 20 to 30 years. In the case of semi-urban safety match industries about 38.09 percent of the respondents are in the age group of 30-40 years while in the case of urban safety match industries 29.41percent of the respondents are in the age group of 20-30 years. On the whole majority of the respondents belong to the age group of 30-40 years

Classification of respondents according to gender

Workers of two different gender groups namely male and female have been working in the safety match industries in Virudhunagar district. The following table 2 shows the gender wise classification of respondents of safety match industry in Virudhunagar district.

Table 2: Gender wise classification of Respondents

Gender	Number of respondents			Total
	Rural	Semi-urban	Urban	
Male	55(26.19)	25(23.81)	18(21.18)	98(24.5)
Female	155(73.81)	80(76.19)	67(78.82)	302(75.5)
Total	210(100)	105(100)	85(100)	400(100)

Source: Primary data

(Figures in parentheses indicates percentage)

From Table 2 it could be inferred that out of the 400 respondents, 155 respondents (73.81 percent) are female and the remaining 55 respondents (26.19 per cent) are male. It is evident from table that more number of female workers are working in safety match units in the study area.

Educational Qualification wise classification

Education is of paramount importance for the proper growth and development of the individual. It plays an important role in one's life in the sense that it helps in shaping the right kind of life style in the human beings. Workers with different literacy have been working in the safety match industries. The following table 3 shows the educational qualification of wise classification of workers of safety match industry in Virudhunagar district.

Table 3: Educational Qualification wise classification of Respondents

Literacy	Number of respondents			Total
	Rural	Semi-urban	Urban	
Illiterate	65(30.95)	55(52.38)	60(70.59)	180(45)
5th	14(6.67)	8(7.62)	15(17.65)	37(9.25)
8th	63(30)	25(23.81)	4(4.70)	92(23)
10th	50(23.81)	10(9.52)	3(3.53)	63(15.75)
Diploma/Graduate	18(8.57)	7(6.67)	3(3.53)	28(7)
Total	210(100)	105(100)	85(100)	400(100)

Source: Primary data

(Figures in parentheses indicates percentage)

Table 3 shows that out of 400 sample respondents, 45per cent are illiterates, 7percent of the respondents are diploma holders. The respondents constituted 23percent are having education up to 8th standard. It is evident from the study that among the respondents of

rural safety match units, 8.57 per cent of the respondents are having diploma/Graduate, 30.95per cent of the respondents are illiterate and 23.81per cent of the respondents have studied up to 10thstandard.In the case of semi- urban safety match units, 52.38 per cent of the sample respondents are illiterates. In the urban safety match units, 70.59 per cent of the respondents are illiterate followed by 17.65 per cent of the respondents have studied up to 5thstandard.It is inferred from table 3 that majority of the respondents are illiterates irrespective of the location of the safety match units.

Marital status wise classification

Workers of different marital status have been working in the safety match industries. They are married, unmarried and widow. The marital status wise classification of the sample of respondents of safety match industries in Virudhunagar district is presented in the following table 4.

Table 4: Classification of Respondents according to marital status

Marital status	Number of respondents			Total
	Rural	Semi-urban	Urban	
Married	190(90.48)	75(71.43)	70(82.35)	335(83.75)
Unmarried	15(7.62)	28(26.67)	13(15.30)	57(14.25)
Widow	4(1.90)	2(1.90)	2(2.35)	8(2)
Total	210(100)	105(100)	85(100)	400(100)

Source: Primary data

(Figures in parentheses indicates percentage)

The above Table 4 shows that out of 400 respondent's majority of the respondents (83.75 percent) are married and 14.25 per cent of the respondents are unmarried and the remaining (2 percent) are widows. It is found that most of the respondents are married.

The above table 4 also indicates that out of 210 respondents of rural safety match industry 90.48 per cent are married and the remaining 7.62 per cent are unmarried and widow 1.90 percent. Among 105 semi-urban respondents 71.43 percent are married and the remaining 26.67 percent are unmarried and widow 1.90 percent. As regards 85 urban respondents, 82.35 percent are married, 15.30 percent are unmarried and 2.35 per cent are widows. It is evident from table 4 that majority of the married respondents are working in rural area safety match units in the study area.

Respondents Monthly Income

Income is the yard stick to measure the economic condition of the workers of safety match industry. The following table explains the monthly income of the workers of safety match industry in Virudhunagar district.

Table 5: Respondents Monthly Income

Monthly income	Number of respondents			Total
	Rural	Semi-urban	Urban	
Up to 3000	90(42.86)	70(66.67)	50(58.82)	210(52.5)
3000-9000	70(33.33)	23(21.90)	17(20)	110(27.5)
9000-12000	40(19.05)	10(9.52)	12(14.12)	62(15.5)
12000-15000	10(4.76)	2(1.91)	6(7.06)	18(4.5)
Total	210(100)	105(100)	85(100)	400(100)

Source: Primary Data

(Figures in parentheses indicates percentage)

The study has brought to surface that out of 400 respondents, a majority (52.5 per cent) of the respondents are earning up to Rs.3,000 per month followed by27.5 percent of the respondents are earning a monthly income of Rs.3,000 to 9,000. 15.5 per cent of the respondents are earning a monthly income of Rs. 9,000 to Rs. 12,000 and 4.5 per cent of the respondents are earning above Rs. 15,000 per month. It is clear from table that majority of the respondents are earning monthly income of up to Rs.3,000. Table 5 also shows that 42.86 percent respondents of rural safety match units, are earning monthly income of up to Rs.3000 followed by 33.33 per cent of the respondents are earning the monthly income of Rs.3000 to 9000. Among the workers of semi-urban safety match units, 66.67 percent of the respondents are earning up to Rs.3000.

Periodicity of payment

The periodicity of the payment of wages in the safety match industry varies from units to units in the study area. The periodicity of payment of wages is classified in to daily, weekly and monthly. The following table 6 shows the periodicity of payment wages for the workers of safety match industries in Virudhunagar district.

Table 6: Periodicity of payment

Periodicity of payment	Number of respondents			Total
	Rural	Semi-urban	Urban	
Daily	70(33.33)	20(19.05)	10(11.76)	100(25)
Weekly	130(61.91)	75(71.43)	60(70.59)	265(66.25)
Monthly	10(4.76)	10(9.52)	15(17.65)	35(8.75)
Total	210(100)	105(100)	85(100)	400(100)

Source: Primary Data

(Figures in parentheses indicates percentage)

Table 6 shows that out of 400 respondents of safety match industry in the study area, about 25per cent of the respondents are getting the payment on daily basis, 66.25 per cent respondents are getting the payment on weekly basis and remaining 8.75per cent of the respondents are getting the payment on monthly basis. In the rural safety match

units33.33 per cent of the respondents are getting the payment on daily basis, while 61.91 per cent are getting the payment on weekly basis. In the semi-urban safety match units 19.05 per cent of the respondents are getting the payment on daily basis and 71.43 per cent are getting the payment on weekly basis. Among the urban safety match units 70.59 per cent of the respondents are getting the payment on weekly basis and 17.65 per cent of the respondents are getting the payment on monthly basis. Table 6 reveals that the workers are paid daily in the rural and semi-urban areas whereas in the case of the urban areas majority of them are we

Perception about the ergonomic environment in match industry

Perception of workers about the working environment has relationship with location of safety Match industries. Workers of rural, semi-urban and urban safety match industries have different perception about the working environment. The working environment differs in the rural, semi-urban and urban areas of safety match industries. The difference in the working environment of safety match units located in varied location influences the perception of workers. Hence perception of workers is considered for the analysis in this study. In order to find out the difference in perception about the working environment among workers of different location of safety match industries analysis of variance tools has been administered.

Opinion Regarding job satisfaction and working conditions

The efficiency of any worker depends upon the working conditions. Every factory should provide good atmosphere, so that the workers work effectively and efficiently. The good working condition in sample units ensures the greatest ease of work and removes all the causes of annoyance, worry anxiety and the like. The working conditions in these industries consist of temperature, ventilation, lighting, dust, smoke and fumes, noise, humidity, hazards and safety devices, overcrowding and plastic sheet for sitting.

Every factory should be clean and free from dirt. The floors should be cleaned inside the walls, partition, ceiling, door and windows should be repainted at least once in five years. The work materials produced by these industries should be disposed off properly. There must be provision for ventilation by the circulation of fresh air. The temperature should be kept comfortable. There must not be overcrowding. Factories should be well-lighted. Match work industry consider all these factors.

In match work Industries, there are a number of personal factors such as age, educational qualification, marital status, length of service and so on influencing the job satisfaction. Out of these factors age is one of the important factors which highly influence the level of job satisfaction.

For manufacturing match sticks, these industries are using a number of chemicals. The workers should be alert in all occasion; otherwise they have to meet fatal accidents.

Hence, the researcher has chosen age as a factor which influences the job satisfaction over the working conditions.

In order to test whether there is any relationship between age and perception scores towards working conditions, the Kruskal Wallis test has been used. It is a non-parametric test. Non parametric test is distribution free. It is applicable to all types of data. It can be used with original data as well as with interval or ratio data.

The following formula has been used to test the level of significance.

$$W^4 = \frac{12}{nt(nt+1)} E^k{}_{i=1} \frac{Rj^2}{ni} - 3(nt+1)$$

Where K – Number of population groups

n_1 = Number of items in sample I

nT = Total number of items in all samples

Ri = Sum of the ranks for sample I

The Kruskal – Wallis test is used when $k \geq 3$

The hypothesis is that there is no significant difference between the age and the perception scores of working condition.

Table: 7 Relationships between Age and Perception Scores of Working Conditions

Sl. No.	Statement	Chi-square	D.F	Significant	T.V
1.	Temperature	17.623	3	0.001	7.815
2.	Ventilation	26.771	3	0.000	7.815
3.	Lighting (natural)	22.122	3	0.000	7.815
4.	Dust, smoke, fume	4.782	3	0.188	7.815
5.	Noise	13.219	3	0.004	7.815
6.	Humidity	9.008	3	0.029	7.815
7.	Hazards and safety devices	14.427	3	0.002	7.815
8.	Over crowding	13.222	3	0.004	7.815
9.	Use plastic sheet for sitting	20.237	3	0.000	7.815

Source: Primary Data

The hypothesis is rejected for all factors except dust, smoke and fumes because the calculated value is greater than the table value. That is, age is a factor which influences these conditions. It is also concluded that there is some relationship between the age and perception score of working condition.

Findings of the study

- Majority (38.75 per cent) of the respondents are in the age group of 30 – 40 years. The dominant age group among the rural and semi-urban workers is 30-40 years whereas it is 20- 30 years of age in the case of urban workers.
- Most (75.5per cent) of the workers working in the match factory are female and they are from the rural areas.
- Most of the semi-urban and urban illiterates are working in the match factories. It is interesting to note that most of the unemployed diploma holders from rural areas are working in the match factories.
- Majority (83.75 per cent) of the workers working in the match factory is married and they are from rural areas.
- Most (52.5 per cent) of the match factory workers are earning monthly up to3000 and among them 50 per cent are from rural areas. Only 15.5 per cent of the workers are earning monthly 12000-15000
- Majority (66.25 per cent) of the match workers are getting weekly wages. Among the weekly wage earners 61.91 per cent are working in the rural areas.
- Relationship between age and perception scores working conditions hypothesis is rejected for all factors except dust, smoke and fumes because the calculated value is greater than the table value.

Conclusion

At present, India has become self-sufficient in respect of matches and also exports matches to other countries. It is an unforgettable fact that the genesis of the match industry was largely responsible for lowering caste tensions in many parts of Tamil Nadu, especially in Virudhunagar district. Ensuring the safety measures and good working conditions will definitely lessen most of the problems faced by the safety match workers. The Government should also step up the inspection and ensure the adherence of the rules and regulations in force by the safety match units. The safety match industry is predominately representing the handmade safety match units and most of them are micro players. As the safety match units are moving towards cluster model, the emergence of this will pave a new road map ensuring safety, security and better working environment in the match industry in Virudhunagar District.

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