

Occupational Health Problems in Small Industries in Korea

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1. The Importance of Small Industries from the Viewpoint of Occupational Health

Small industries have great significance in the economic development and the trend of labor population in each country. Their various aspects, such as economy, administration, technology, etc. have been studied extensively in the past; but their most important side—safety and health—has been neglected so far.

Inasmuch as the industrial hazards and occupational diseases in an industrial establishment have a close connection with the type of industry, the degree of superannuation of facilities, and the existence or absence of preventive measures, it can hardly be said that small industrial establishments have usually a larger rate of industrial hazards and occupational diseases. However, it is true that smaller enterprises have more problems to be tackled compared with larger ones. A small enterprise may be defined based upon the number of laborers, the amount of capital invested, production capacity, the size of land and buildings, the quantity of raw materials consumed, etc., but the criteria for definition may vary from country to country.

At present, in Japan, a plant which has an invested capital of less than \$150,000 or less than 300 laborers is categorized as a small

enterprise. On the other hand, in the Republic of China, a regulation goes that a plant which uses a power of less than 5 h.p. or employs less than 30 laborers or one which owns a capital of less than US\$5,000 is a small enterprise.

In any case, there is a close relation between the scale of a plant and various labor conditions, such as production, wage, laborers' living, working condition, and safety.

The ILO defines that a small enterprise has two distinctive characteristics, that is, (1) the employer and employees are inseparably bound up together and (2) the management is not specialized, with the operation being done with a limited, private capital, a small number of workers and a small quantity of production.

It is quite often that plants of a small scale serve as sub-contractors for large enterprises, and handle dangerous and noxious work processes. Although there is no regulation with regard to the definition of a small enterprise in our country, according to the current law, it may be delineated that a small enterprise is one for which there is no regulation for safety and health management officials and which has less than 100 workers or uses a motive power of less than 100 h.p. According to statistics announced in 1971 by the Office of Labor Affairs, the number of

Table 1. The number of worker and establishment by size of establishment in Korea (1971)

Size(No. of workers)	Total	10-15	16-29	30-49	50-99	100-199	200-499	500-999	1000--over	
No. of workers	Total	1,251,503	150,155	103,883	110,762	171,762	147,653	238,887	144,764	183,637
	Per cent	(100)	(12.0)	(8.3)	(8.9)	(13.7)	(11.8)	(19.1)	(11.6)	(14.7)
	Male	839,985	115,810	72,814	80,564	129,111	99,728	147,099	99,022	95,837
	Per cent	(100)	(13.8)	(8.7)	(9.6)	(15.4)	(11.9)	(17.5)	(11.8)	(11.4)
	Female	411,518	34,345	31,069	30,198	42,651	47,925	91,788	45,742	87,800
Per cent	(100)	(8.3)	(7.5)	(7.3)	(10.4)	(11.6)	(22.3)	(11.1)	(21.3)	
No. of Establishment	25,367	12,943	4,884	2,895	2,510	1,047	787	206	95	
Per cent	(100)	(51.0)	(19.3)	(11.4)	(9.9)	(4.1)	(3.1)	(0.8)	(0.4)	

plants by scale of industry and number of workers is as shown in Table 1.

The number of plants which have less than 100 workers accounts for 87 per cent of the nationwide total and the number of workers employed by these small plants reaches 35 per cent of the entire labor populace of the nation.

2. The Current State of Occupational Health in Small Industries

As indirect factors for evaluating the state of laborers' health, the rates of laborers' average turnover and absenteeism may serve as indicators.

Table 2 shows the average turnover rates by type of individual workplaces, and scale of industry as revealed in 1967 as the result of a survey with regard to the safety and health of workers.

The average turnover rate ranges from 84 to 310 in a certain type of industry, and even in the same type of industry, the rate in one workplace is 10 times as large as that in another workplace, depending upon the scale of industry. Laborers' wages have a close connection with the scale of a workplace. Table 3 shows the rate of absenteeism by wage brackets.

From both the overall rate of absenteeism and the rate of absenteeism due to sickness,

it is seen that the low wage bracket has the rate of absenteeism five times as large as that of the high wage bracket.

The noxious environmental conditions in a workplace exercise a decisive influence on the safety and health of the workers. However, harmful factors of work environments vary with the type of industry, and even when workplaces are of the same type of industry, the factors differ depending upon facilities and technical processes. Furthermore, even in one workplace, the harmful factors differ from time to time depending upon the condition of operation and the time of work. So, it is very difficult to represent the evaluation of work environments with a single value.

Table 4 shows the average density of harmful factors of work environments by scale of industry in the field of chemical industry. From the table, it is noticed that the harmful environmental factors differ depending upon the work process of individual plants.

Although, in general, the density tends to be higher in small plants no distinct difference is seen. It is presumed that, although large plants have a larger number of harmful factors to a greater extent, they are offset by their better facilities, there being no difference due to the scale of industry in this

Table 2. Number of newly hired and separated employees and labor turnover rates by industry
(July 1966-June 1967)

Industry	Estab.	Average No. of workers	No. of workers		Ratio to No. of worker		Turnover rate
			Hired	Separated	Hired	Separated	
Coal mining	A	1,097	152	138	14.1	12.8	26.9
	B	1,040	1,252	774	120.3	74.4	194.7
	C	232	546	330	235.4	142.4	377.8
	D	163	276	436	169.3	267.5	436.8
	total	2,512	2,226	1,678	88.6	66.7	155.3
Shipbuilding	A	2,076	1,198	294	57.7	14.2	71.9
	B	575	1,200	804	208.7	139.9	348.6
	total	2,651	2,398	1,098	90.4	41.4	131.8
Automobile	A	451	54	320	12.0	71.0	83.0
	B	766	108	728	14.1	95.0	109.1
	total	1,217	162	1,048	13.3	86.1	99.4
Iron and steel	A	372	106	126	28.5	33.9	62.4
	B	366	8	94	2.2	25.7	27.9
	C	167	116	104	69.5	62.3	131.8
	D	120	170	136	141.7	113.3	255.0
	total	1,025	400	460	39.0	44.9	83.9
Electric machinery	A	665	380	244	57.1	36.7	93.8
	B	466	442	394	94.8	88.3	183.1
	C	194	268	174	138.1	89.7	227.8
	total	1,325	1,090	812	82.3	61.3	143.6
Printing	A	133	38	42	28.6	31.6	60.2
	B	282	154	162	54.6	57.4	112.0
	total	415	192	204	46.3	50.0	96.3
China-ware	A	1,016	124	726	12.2	71.5	83.7
	B	419	284	152	67.8	36.3	104.1
	total	1,435	408	878	28.5	61.2	89.7
Asbestos-cement slate	A	550	760	566	138.2	102.9	241.1
	B	229	632	460	276.0	200.9	476.9
	total	779	1,392	1,026	178.7	131.7	310.4
Rubber	A	2,074	1,180	1,340	56.9	64.6	121.5
	B	1,124	492	464	43.8	41.3	85.1
	total	3,202	1,672	1,804	52.2	56.3	108.5

Table 3. Ratio of total absent days to total workers by wage groups

Wage groups (Unit:Won)	-5,000	6,000-10,000	11,000-15,000	16,000-30,000
Ratio				
Sickness absent days (S. A)	567	244	154	50
Total absent days (T. A)	1,494	817	401	121
Total workers (T.)	884	1,253	574	377
S. A. /T	0.64	0.19	0.27	0.13
T. A. /T	1.69	0.65	0.70	0.32

Table 4-1. The working environments in large chemical industry

Work process	Noise NRN	Illuminat. lux	Dust mg/m ³	Temp. °C	Humidity %	Radiation °C	Cl ₂ ppm	CO ppm	H ₂ S ppm	Acetone %	Xylene ppm	Toluene ppm
Electric power	99											
Sulfur melting	82			32								
Work shop	76											
Electrolyzing							trace					
Hydrochloric acid							trace					
Sodium hydroxide	81			31								
Boiler	83					45		30				
Pesticide mixing		150-180										40
Powdered pesticide			3.6									
Emulsified pesticide	75											30
Dye									0.05			
Fluorescence dye	85									0.5		
Diazo processing							trace					
Packing	87											
Filling		70	2.2									
Tablet	85	100-140										
Cleaning	82											
Paint manufact.	70									1.4	5000	600
Dye mixing		200-600								(-)	70	70
Dye processing	88		3.3									
Dye drying	89			35	44	47						

Table 4-2. The working environments in small chemical industry

Process	Noise NRN	Illumination lux	Dust mg/m ³	Toluene ppm	Xylene ppm	Lead mg/m ³	CO ppm	Radiation °C
Mixing	78	800	3.5	70	70	0.03		
Ink Processing	87	200						
Resin	70	80-100						
Roving and spinning	83	25-45					50	
Weaving	78	60-80						48
Twisting	94	100						
Winding		2-10						
Transforming		80						
Colouring			3.3					

Table 5. Lead concentrations in air in storage battery plants

Process	Size	Lead concentration in air (mg/m ³)		
		Small (-49)	Medium (50-99)	Large (100 person and over)
Melting and moulding		0.50	0.26	0.24
Crushing		0.25	0.39	0.33
Electrode processing		0.68		

Table 6. Frequency rate of accident by type and size of industry

Size, No. of workers	-49	50-99	100-199	200-	Total
Type of indust.					
Foods		13.7		11.1	11.3
Textiles	94.1	40.1	62.7	22.0	22.7
Paper	54.4	44.2	342.0	29.9	94.7
Chemicals	393.9	251.2	26.9	32.4	135.2
Glass, clay & stone	163.1	165.2	61.6	147.4	143.7
Basic metals		223.5	88.3	58.5	115.3
Metal products	236.9	168.1	773.3	103.2	183.2
Machinery	335.6	302.0		66.8	126.0
Electric machinery	559.0	118.3	84.4	70.1	126.0
Transport equipment	60.1	54.2	64.8	117.2	97.1
Others			195.4	18.3	30.1
Total	270.2	158.5	185.4	35.6	57.2

Table 7. Severity rate of accident by type and size of industry

Size, No. of workers	-49	50-99	100-199	200-	Total
Type of indust.					
Foods		0.15			0.11
Textiles	0.44	0.41	0.39	0.11	0.12
Paper	0.39	0.38	15.12	0.68	2.70
Chemicals	0.79		1.06		3.72
Glass, clay & stone	1.18	1.23	1.85	1.30	1.27
Basic metals		1.93	0.80		1.13
Metal products	1.08	1.63	1.48	1.08	2.07
Machinery	2.59	2.95		5.68	2.01
Electric machinery		0.67	1.68	0.54	1.37
Transport equipment	1.51	1.14	1.12	2.17	1.48
Others			5.58	0.14	0.34
Total	1.96	1.48	3.28	0.34	0.60

Table 8.

Distribution of occupational diseases classified by scales of plants

Serial No. of diseases		1		2		3		5		6		7			
		Diseases caused by industrial accidents.		Diseases of locomotorium & Evisceration caused by heavy labor		Diseases of eye caused by heat, gas, foreign bodies & harmful lights		Heliosis & heat stroke		Burn caused by heated material		Pneumoconiosis by dust			
		Without functional impairments		With functional impairments											
		No. of case	%	No. of case	%	No. of case	%	No. of case	%	No. of case	%	No. of case	%		
size, No. of workers	Sex														
		~ 99	Male	876	20.3	1,088	25.2	789	18.3	664	15.4	311	7.2	853	19.7
	Female	190	10.3	347	18.8	56	3.0	106	5.7	39	2.1	119	6.5		
	Total	1,066	17.3	1,435	23.3	845	13.7	770	12.5	350	5.7	972	15.8	12	0.2
100~499	Male	665	17.2	864	24.9	1,067	30.8	515	14.9	257	7.4	414	11.9	12	0.3
	Female	177	10.5	217	12.8	38	2.2	107	6.3	36	2.1	107	6.3		
	Total	842	16.4	1,081	21.0	1,105	21.5	622	12.0	293	5.7	521	10.1	12	0.2
500~	Male	273	20.8	382	29.2	276	21.1	134	10.2	71	5.4	82	6.3	6	0.5
	Female	95	4.3	372	16.7	13	0.6	40	1.8	27	1.2	100	4.5		
	Total	368	10.4	654	18.5	289	8.2	174	4.9	98	2.8	182	5.1	6	0.2
Total plants	Male	1,778	19.5	2,334	25.7	2,132	23.4	1,313	14.4	639	7.0	1,349	14.8	30	0.3
	Female	462	8.0	936	16.2	107	1.9	253	4.4	102	1.8	326	5.7		
	Total	2,240	15.1	3,270	22.0	2,239	15.1	1,566	10.5	741	5.0	1,675	11.3	30	0.7
Serial No. of diseases		10		11		12		13		26		28		30	
		Phlegmone and dermatitis of textile workers' finger		Neuritis & other diseases caused by vibration		Ear diseases caused by noise		Cramp & tremor or telegraphic worker and others		Corrosion, ulceration & inflammation caused by acid, alkali, halogen, phenol		Poisoning caused by organic solvents and other chemical agents		Skin diseases caused by oil, tar, cement, lacquer, etc.	
		No. of case		No. of case		No. of case		No. of case		No. of case		No. of case		No. of case	
		%	%	%	%	%	%	%	%	%	%	%	%	%	%
Size, No. of workers	Sex														
		~ 99	Male	27	0.6	273	6.3	1,012	23.4	85	2.0	484	11.2	146	3.4
	Female	342	18.5	60	3.2	335	18.2	32	1.7	104	5.6	80	4.3	37	4.3
	Total	369	6.0	333	5.4	1,347	21.9	117	1.9	588	9.6	226	3.7	293	4.8
100~499	Male	18	0.5	242	7.0	578	16.7	45	1.3	297	8.6	122	3.5	188	5.4
	Female	282	16.7	68	4.0	160	9.5	20	1.2	104	6.1	101	6.0	12	0.7
	Total	300	5.8	310	6.0	738	14.3	65	1.3	401	7.8	223	4.3	200	3.9
500~	Male	27	2.1	180	13.7	198	15.1	18	1.4	64	4.9	3	0.2	128	9.8
	Female	498	22.3	71	3.2	266	7.9	8	0.4	100	4.5	41	1.8	26	1.2
	Total	525	14.8	251	7.1	465	13.1	26	0.7	164	4.6	44	1.2	154	4.3
Total plants	Male	72	0.8	695	7.6	1,788	19.6	148	1.6	845	9.3	271	3.0	572	6.3
	Female	1,122	19.5	199	3.5	761	13.2	60	1.0	308	5.3	222	3.8	75	1.3
	Total	1,194	8.0	894	6.0	2,549	17.2	208	1.4	1,153	7.8	493	3.3	647	4.4

regard.

However, according to the data regarding a survey of lead concentration in the atmosphere conducted in seven battery plants, marked differences by scale are noticed in casting work, as shown in Table 5.

Table 6 shows the frequency rates of industrial accidents by type and scale of industry as investigated in 93 plants located in the Yongdungpo industrial area.

The frequency rate shows a marked difference depending upon the type of industry, ranging from 11 to 183. It also varies greatly with the scale of industry, ranging 270 in workplaces with less than 50 workers and 35 in those having more than 200 workers.

On the other hand, the severity rates of industrial accidents, as shown in Table 7, do not show any difference by scale of industry, but reveal a significant difference depending upon the type of industry. It may be presumed that the density of hazardous factors grows larger with the increase in the size of a plant.

The distribution of occupational diseases by industrial scale among employees working in plants of harmful environments across the

nation, which was investigated in 1963, is shown in Table 8.

Occupational diseases occur in all workplaces, regardless of scale, but the rate of occurrence differs depending upon the type of industry. In general, however, the occurrence tends to be higher in small plants.

Meanwhile, Tables 9 and 10 show the result of a close investigation by type of industry conducted in 1968 on patients of occupational hearing loss and eye diseases in the Yongdungpo industrial area. Here, too, the same tendency can be observed with regard to the occurrence of occupational diseases.

It is presumed that laborers, who are placed not only in harmful work environments, but also, compared with the non-worker public, in more unsanitary living conditions, will have a higher prevalence of diseases not connected with work. Table 11 shows the rate of prevalence of general diseases by scale of industry as the result of a periodic physical examination conducted in 1963. The prevalence rate differs, showing a higher tendency in small plants.

Table 9. Prevalence of occupational hearing loss by size of industry

Size of industry (No. of employee)	—49	50—99	100—499	500 persons and over
Workers examined	129	243	331	167
No. of cases	44	53	95	48
Prevalence rate (%)	34.1	21.8	28.7	28.7

Table 10. Prevalence of occupational eye diseases by industry

Size of industry (No. of employee)	—49	50—99	100—499	500 persons and over
Workers examined	29	38	99	120
No. of cases	10	11	17	18
Prevalence rate (%)	34.5	28.9	17.2	15.0

Table 11.

Prevalence of non-occupational diseases classified by scale of plant

Disease	Sex	No. of subjects	Disturbances of vision		Disturbances of hearing		Diseases of respiratory system							
			Less than 0.5	Blindness	Hearing loss	Deafness	General	Tuberculosis						
			No. of case	%	No. of case	%	No. of case	%	No. of case	%				
~ 99	Male	43,200	2,263	5.2	167	0.4	2,852	6.6	114	0.3	248	0.6	2,376	5.5
	Female	18,447	874	4.7	21	0.1	667	3.7	56	0.1	54	0.3	486	2.6
	Total	61,647	3,137	5.1	188	0.3	3,529	5.7	170	0.3	302	0.5	2,862	4.6
100~499	Male	34,657	1,761	5.1	251	0.7	2,193	6.3	102	0.3	237	0.7	2,289	6.6
	Female	16,889	751	4.4	21	0.1	521	3.1	12	0.1	51	0.3	431	2.6
	Total	51,546	2,512	4.9	272	0.5	2,714	5.3	114	0.2	288	0.6	2,720	5.3
500~	Male	13,096	631	4.8	74	0.3	517	5.4	17	0.2	98	0.7	730	5.6
	Female	22,339	578	2.6	4	0.1	170	2.1	1	0.04	71	0.3	448	2.0
	Total	35,435	1,209	3.4	78	0.3	687	3.3	18	0.1	169	0.5	1,178	3.3
Total plants	Male	90,953	4,655	5.1	492	0.5	5,749	6.3	263	0.3	583	0.6	5,395	5.9
	Female	57,675	2,203	3.8	46	0.1	1,659	2.9	39	0.1	176	0.3	1,365	2.4
	Total	148,628	6,858	4.8	538	0.4	7,408	5.0	302	0.2	759	0.5	6,760	4.5

Disease	Sex	Diseases of digestive system				Skin diseases	Diseases of nervous system & sensory organs			Diseases of circulatory system									
		Teeth	G-I tract	Liver	Eyes		E. N. T.	Nervous system	General	Hypertension									
		No. of case	%	No. of case	%		No. of case	%	No. of case	%	No. of case	%							
~ 99	Male	13,781	31.9	2,057	4.8	42	0.1	1,353	3.1	3,491	8.1	13,467	8.0	62	0.1	274	0.6	4,344	10.1
	Female	5,569	30.2	1,370	7.4	2		380	2.1	1,090	5.9	1,019	5.5	22	0.1	70	0.4		
	Total	19,350	31.4	3,427	5.6	44	0.1	1,733	2.8	4,581	7.4	4,486	7.3	84	0.1	344	0.6		
100~499	Male	12,211	35.2	1,593	4.6	43	0.1	831	2.4	2,820	8.1	2,876	8.3	30	0.1	253	0.7	2,986	8.6
	Female	5,343	31.6	1,258	7.4	2		253	1.5	946	5.6	801	4.7	13	0.1	67	0.4		
	Total	17,554	34.1	2,851	5.5	45	0.1	1,084	2.1	3,766	7.3	3,677	7.1	43	0.1	320	0.6		
500~	Male	4,546	34.7	522	4.0	11	0.8	187	1.4	689	5.3	851	6.5	53	0.4	106	0.8	1,316	10.0
	Female	9,228	41.3	1,177	5.3			348	1.6	1,010	4.5	675	3.0	52	0.2	121	0.5		
	Total	13,772	38.9	1,699	4.8	11	0.03	535	1.5	1,699	4.8	1,526	4.3	105	0.3	227	0.6		
Total plants	Male	30,538	33.6	4,172	4.6	96	0.1	2,371	2.6	7,000	7.7	7,194	7.9	145	0.2	633	0.7	8,646	9.5
	Female	20,140	34.9	3,806	6.6	4		981	1.7	3,046	5.3	2,495	4.3	87	0.2	258	0.4		
	Total	50,678	34.1	7,978	5.4	100	0.1	3,352	2.3	10,046	6.8	9,689	6.5	232	0.2	891	0.6		

Table 12. Body-stature (cm) by scale of establishment and age of workers

Scale Age(yrs)	Small		Large-medium		Total	
	Mean	S. D.	Mean	S. D.	Mean	S. D.
15	147.7	5.9	149.3	1.5	148.2	5.7
16	150.5	5.2	151.2	4.2	150.8	4.8
17	153.3	4.8	155.1	4.3	154.3	4.6
18	154.6	5.7	155.1	5.0	154.9	5.3
19	155.0	5.3	155.3	3.9	155.2	4.5
20	156.7	4.7	156.4	3.7	156.5	4.0

Table 13. Body weight (kg) by scale of establishment and age of workers

Scale Age(yrs)	Small		Large-medium		Total	
	Mean	S. D.	Mean	S. D.	Mean	S. D.
15	39.3	4.7	41.9	5.9	39.6	4.9
16	42.9	4.4	46.3	4.9	44.3	4.9
17	47.0	4.1	51.1	4.4	49.2	4.7
18	47.9	4.0	51.0	4.6	49.9	4.6
19	49.1	5.0	51.3	4.5	50.4	4.8
20	51.3	7.8	53.7	5.2	53.0	6.2

A similar tendency is noticed by comparing the statures and weights of workers by scale of industry shown in Tables 12 and 13, obtained as the result of physical examination conducted in 1971 on under-age female laborers in industrial establishments in the Seoul area. As a consequence, it may be said that the health and sickness among laborers are more intimately connected with the socio-economic and living conditions under which they are placed, rather than with the scale of industry in which they work.

3. Solution to the Occupational Health Problems in Small Industries

The factors influencing adversely on laborers' health in small industries are varied and many. It is because laborers' health is closely connected not only with the harmful factors in the workplace but also with the

various economic and social conditions they are exposed to.

Furthermore, laborers working in small plants of home-style industry have received no vocational training and, accordingly, have no knowledge about occupational safety and health.

In addition, the owners of such plants, even when they are aware of the danger and harm posed by their work-environmental conditions, do not have economic ability to improve the conditions, and, in most cases, for operation, they are dependent upon daily production and income or seasonal work.

In small plants, there are no facilities such as dispensary, dining hall, bath room, locker room, etc.

Water supply and sewage systems are poor in such plants. Laborers working in these plants are incapable of paying medical fees, and accordingly, very frequently continue to

work even when they suffer from diseases. Since they, in most cases, work on a contract basis, they tend to sacrifice their health for the purpose of increasing their income. Although all people are equal before the constitution, the current Labor Standard Law is applied only to industrial establishments employing 16 or more workers, and the Workmen's Compensation Insurance Scheme covers only plants having 30 or more workers.

The improvement of safety and health of industrial establishments can be made through proper guidance rather than through supervision. However, it is impossible for the government to carry out efficient guidance activities for numerous enterprises with the present, meager number of labor inspectors. In particular the care does not reach small plants.

There are no safety and health officials in small plants. Therefore, there is no opportunity to conduct necessary health services for workers in such plants.

Because of the high turnover rate of laborers, small plants are quite negligent of pre-employment and periodic in-service physical examination.

Consequently, such plants are not in a position to grasp an accurate picture of occupational diseases occurring to the workers and have no means to control the diseases and health.

Small industries, both from the viewpoint of the number of establishments and the number of laborers, play a very important role in the national industry. This is a matter

of great significance in terms of public and occupational health. Nevertheless, the solution to the safety and health in small industries, as in the case of general public health, are not an easy task.

In tackling the problems of occupational health, all the factors involved in labor and industry must be considered. At the same time, public health factors must also be taken into consideration because they often exercise a great effect on the public health problems of workers serving in the field of small industries.

In matters of production, small plants are closely related with large enterprises. Therefore, with regard to the problems of occupational health, large enterprises should render extensive cooperation to small enterprises.

In setting up a labour administration policy, it is desirable that all the problems involved in small industries be taken into account. Activities for the occupational health in small industries must be carried out in line the situation of each country. One of the recommendable method is to establish an occupational health center in each industrial area which will give proper advice and guidance to small plants.

The center, of course, will be able to carry out activities effectively only when there is a positive cooperation and participation by the government, enterprise owners and laborers.

Furthermore, the center activities must be supported by the cooperation of large enterprises and a proper workmen's compensation insurance scheme.