A CASE STUDY OF SAFETY BEHAVIOR IN THE CONSTRUCTION SITE

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ABSTRACT

The construction industry has been recognised as one of the hazardous industries. Although there is an improvement of the safety performance and increase in safety awareness in this industry, the accident rate is still one of the highest across all sectors. Besides causing human tragedy and economic losses, construction accidents also affect the productivity and reputation of the construction industry. The statistic of accidents at construction sites give us a picture that Malaysian construction industry is one of the critical sectors that need a huge and fast overhaul from the current site safety practices. Accident don't just happen, they caused by unsafe acts, unsafe condition or both. Previous studied shows that most of the accidents happen due to unsafe acts rather than unsafe conditions. In order to improve the overall safety performance we need to investigate the root causes of the construction accidents. The specific objectives of this study are to find out the factors of safety climate, safety training and safety motivation influences the safety behaviour. Through literature reviews, the behavior safety conceptual framework, supported by theory Planned Behavior was develop. The measurements tools were adopted from previous researchers. The target respondents were the workers at construction site and quantitative method was applied. The data were gathered from the survey were analysed using Standard Package for Social Science (SPSS 19). The response of the survey were rated according to the Likert scale type with '1' indicated strongly disagree and '5' indicated strongly agree. This study shows safety motivation, safety training and safety climate were positively and significantly related with the safety behaviour. With this finding, it was recommended that importance of taking human factors into account in safety management.

ABSTRAK

Sektor pembinaan adalah merupakan sektor pekerjaan yang sangat berisiko. Walaupun ada peningkatan prestasi keselamatan dan kesedaran, kadar kemalangan industri masih tinggi jika dibandingkan dengan lain-lain industri. Selain dari faktor kemanusian, harta benda, kemalangan di industri pembinaan akan menjejaskan kadar pengeluaran dan menjejaskan imej sektor pembinaan itu sendiri. Statistik kemalangan di tapak pembinaan di Malaysia mengambarkan satu keadaan yang kritikal dan memerlukan perubahan dan penilaian semula tentang sistem pengurusan keselamatan yang sediada. Kemalangan berlaku adalah disebabkan faktor perlakuan yang tidak selamat dan keadaan yang tidak selamat atau gambungan kedua-dua faktor tersebut. Banyak kajian- kajian yang terdahulu membuktikan kebanyakan kemalangan adalah disebabkan oleh faktor perlakuan yang tidak selamat berbanding dengan keadaan yang tidak selamat. Untuk meningkatkan prestasi keselamatan di sektor pembinaan, kajian mestilah di lakukan untuk mencari punca berlakunya kemalangan di sektor tersebut. Objektif utama kajian ini adalah untuk menentukan pengaruh pemboleh ubah ‘safety climate,’ ‘safety training’ and ‘safety motivation’ terhadap ‘safety behaviour.’ Kajian ini adalah berasaskan kepada kajian terdahulu dengan menggunakan konsep ‘Planned Behavior’. Kajian ini di jalankan keatas pekerja-pekerja di tapak pembinaan dengan menggunakan kaedah kuantitatif. Data yang dikumpulkan dan dianalisa menggunakan SPSS 19. Hasil kajian ini menunjukan ‘safety climate’, ‘safety training’ dan ‘safety motivation’ mempengaruhi safety behaviour secara terus dan positif. Hasil dari kajian ini adalah disarankan agar faktor kemanusian diambilkira dalam perlaksanaan pengurusan keselamatan.

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INTRODUCTION

1.0. Background of study

1.1. Overview of construction industry

The construction industry has been classified as one of the most hazardous industries in the United States in terms of both fatal and nonfatal injuries. Construction workers are also at risk for exposure lead and other inhalation hazards. In addition, when compared to other workers, construction workers may also experience a higher proportion of early retirement due to illness and musculoskeletal disorders, losing over 24000 potential years of working life.

Controlling hazards that reduce injury rates is difficult in an industry such as construction where work is conducted under extreme condition an ever-changing physical environment and with variable workforce. Achieving change in this environment involves a widespread shift in safety culture because of the way in which work is conducted and the need to meet potentially competing imperatives such client demands and trade specific date line. This situation was made worst by workers negative attitude and behaviours toward safety (Choudry, R.M. & Fang, D., 2007) Occupational Safety & Health (OSH) issues in the construction industry are partly attributable to the fragmented nature in which the industry operates (Ringen et al. 1995). The “one-of-a-kind” nature of projects, with their temporary multi-organisations (Lingard and Rowlinson 2005, 5), results in constantly changing work assignments, worksites and employers (Ringen et al. 1995). Several trades often work simultaneously on one site. It is also common for each trade to be employed by a different contractor (Ringen et al. 1995). This “cyclical demand for contracted services” (Hislop 1999, 5), coupled with the shortage of skilled labour, creates staffing difficulties for construction companies. This state of affairs also results in workers being contracted for multiple specialist tasks, being forced to work in a pressured environment, and becoming responsible for their own health and safety

(Ringen et al. 1995). Long work hours culminate in worker exhaustion, fatigue and burnout, which results in safety becoming neglected (Hislop 1999). A hazardous work environment is often the result.

The poor OSH performance of the construction industry is further heightened by salient industry trends including downsizing, outsourcing of work, increasingly complex operating systems, equipment specialisation, and the use of potent chemical products (Hislop 1999). Industry downsizing has culminated in the practice of contracting out less desirable and more hazardous tasks (Hislop 1999). At the same time, pressures for greater work efficiency have resulted in contracted employees being subjected to greater health and safety risks than those directly employed. Compared to other industries, the uptake of technology and innovation in the construction industry has been slow, while litigation focusing on injury claims has increased (Hislop 1999). In order to offset the increased costs of settlements, Hislop (1999) claims that construction companies are transferring risk rather than promoting hazard identification and resolution processes.

According to Hislop (1999), construction safety is not the responsibility of the contractor alone. His view is based on the premise that unsafe work practices have both direct and indirect costs for organisations. Direct costs include those that result from accidental equipment damage or personal injuries such as lost production time, insurance costs, penalties for breach of OSH legislation and litigation costs. He also describes indirect costs as those that incur indirect financial impacts resulting from schedule disruptions, increases in insurance and workers compensation premiums. In view of the redistributive impact of poor safety performance, both Hislop (1999) and Durham et al. (2002) agree that all parties associated with a construction project should be accountable for safety. Benefits of effective hazard identification and control and consequent safety promotion are argued to ensue from this multi-stakeholder approach (Hislop 1999). In a similar vein, the European C*onstruction Site Directive* also emphasised the importance of developing communication networks throughout the construction process and establishing “responsibilities of the parties involved in the construction phase” (Bluff 2003, 10).

1.2 CONSTRUCTION INDUSTRY IN MALAYSIA

Since gaining independence in 1957, Malaysia has made tremendous progress economically. From being mainly agriculture-based (two-thirds of export earnings were initially derived from agriculture), the country's economic planners began focusing on the manufacturing sector for growth, largely with the help of foreign investors (Mohamed, 1996; Jomo, 1990). By 1987, manufacturing overtook agriculture in terms of value added to gross domestic product (Thillainathan, 1990). The advent of the 1990s saw the government gearing up for a knowledge-based era as epitomized by the creation of the multi-media super corridor (MSC). It is the aspiration of the government that the country will attain industrialized status by the year 2020.

During this time, the construction industry has been able to largely meet the challenges associated with rapid physical development. Yet while other economic sectors have undergone tremendous transformation, the construction industry still lags in many respects, one of which is occupational safety and health. Indeed as concluded by one study to identify research priorities in occupational health in Malaysia (Sandhra, Beach, Aw and Sheikh-Ahmed, 2001), construction is one of two economic activities (the other being plantation) that deserve the highest priority. It is not for lack of effort that the safety performance of the construction industry has remained obstinately poor. Various safety legislation and regulative institutions have been put in place by the government in its drive to emulate industrial safety performance of industrialized nations.

Table 1.1
Value of Malaysia Growth Domestic Product (GDP) (RM million)

Sector	2005	2006	2007	2008	2009	2009			
						Q1	Q2	Q3	Q4
Agriculture	35,835	37,701	38,177	39,828	39,992	8,957	9,837	10,734	10,465
Mining and Quarrying	42,472	42,030	42,881	41,831	40,246	10,300	9,825	9,979	10,142
Manufacturing	137,940	147,154	151,257	153,171	138,809	31,770	33,682	36,502	36,855
Construction	14,685	14,639	15,707	16,366	17,321	3,851	4,306	4,680	4,484
Services	230,043	247,099	272,406	292,555	300,153	70,496	73,489	76,730	79,438
GDP	449,250	475,526	506,341	530,181	521,095	121,660	127,256	134,717	137,463

* GDP at constant price 2000. Source: BNM Monthly Statistical Bulletin August 2010
** Numbers may not necessarily add up due to rounding.

For the fiscal year 2009, the construction sector expanded by 5.8% as against other economic sectors. Strong growth was reflected in the second quarter of 2009 (2Q09: 4.5%) and remained so throughout the year (Q309: 7.9%; Q409: 9.3%). The strong growth for the most part of 2009 was mainly driven by the effects of the two stimulus packages that were announced in November 2008 and March 2009. Meanwhile, the housing price index fell to its lowest at 1.5% since 2001 when it recorded 1.1% (2000 = 100) after registering 4.7% in 2008.5 The residential subsector experienced mixed performance in 2009 as the weak economy resulted in slow property sales early in the year. However towards the end of 2009, private projects started to rebound owing to growing consumer confidence that persuaded developers to resume projects postponed earlier due to the uncertainty in the economy.

1.2.1 Value of Contracts

In 2009, the aggregate value of construction projects declined by 19.4% to RM68.6 billion (2008: RM85.25 billion). However, the number of projects grew by 1.4% to 6,531 projects (2008: 6,443 projects). This indicated that the increase was contributed by smaller-value projects.

The non-residential segment led the category in 2009 with RM21.64 billion worth of projects followed by infrastructure (RM18.52 billion) and the social amenities segments (RM14.76 billion). The residential segment meanwhile registered a total project value of RM13.53 billion in 2009. The projects with values between RM 1 million to RM 5 million made up the largest number of projects in 2009 constituting 48.2% or 3,146 projects. However, the category of projects with values between RM10 million to RM50 million topped the list in terms of aggregate value of RM20.4 billion or 29.8% of the share in 2009.

The gap between the value of Government and private projects also grew closer with a ratio of 48:52 due to the projects allocated under the two stimulus packages coupled with the fewer private projects launched in 2009. Approximately 40% of the allocation in the two stimulus packages was allocated to the construction sector as the construction sector has been proven to be capable of complementing the other economic sectors. To secure pump-priming effect on the economy most of the construction projects under the two stimulus packages were designed to be implemented on short-term basis whilst the completions of existing construction projects were expedited. This in turn, saw the proliferation of projects in the form of upgrading, maintenance and repair works of infrastructure and social amenities. In addition, the increase in value of Government projects was supplemented by the completion of several construction projects which were distributed during the earlier phases of 9MP in 2006, and 2007. A total of 2,900 projects valued at RM33.11 billion made up of social amenities (RM13.53 billion), infrastructure (RM11.38 billion) and non-residential segment (RM6.07 billion) remained the core of public sector projects. Private sector projects nosedived in 2009 after achieving robust performance in the preceding year with 3,631 projects valued at RM35.49 billion. Non-residential (RM15.57 billion), residential (RM11.43 billion) and infrastructure segment (RM7.14 billion) were the top three categories of private projects. Among the biggest projects awarded in 2009 were the Gumusut-Kakap pipeline project in Sabah (RM2.93 billion), the construction of super-structure (package 2) for the Penang Second Bridge (RM1.55 billion), and the Pahang-Selangor raw water transfer project (RM1.31 billion).

Table 1.2
Construction Contracts

Type of Projects	2006		2007		2008		2009	
	Number of Projects	Projects Value (RM b)	Number of Projects	Projects Value (RM b)	Number of Projects	Projects Value (RM b)	Number of Projects	Projects Value (RM b)
Private Projects								
Residential	1,610	14.53	1,619	14.89	1,243	14.72	1,364	11.43
Non-Residential	1,648	14.28	1,776	19.48	1,580	18.17	1,409	15.57
Social Amenities	397	0.78	196	1.11	178	2.68	189	1.23
Infrastructure	774	7.92	797	9.35	721	10.04	643	7.14
Others	16	0.96	18	0.21	25	0.99	26	0.12
Total Private Projects	4,445	38.47	4,406	45.04	3,747	46.60	3,631	35.49
Residential	168	2.02	134	1.99	223	2.12	173	2.1
Non-Residential	331	3.43	525	6.94	550	5.42	484	6.07
Social Amenities	160	3.21	1,184	10.98	1,078	16.43	1,259	13.53
Infrastructure	750	13.7	990	28.26	832	14.65	971	11.38
Others	3	0	19	0	13	0	13	0.03
Total Private Projects	1,412	22.46	2,852	48.25	2,696	38.65	2,900	33.11
Grand Total	**5,857**	**60.93**	**7,258**	**93.29**	**6,443**	**85.25**	**6,531**	**68.60**

*As at 30 June 2010 Source: Economic Planning Unit (EPU)

1.2.2 Construction Companies

Registered Contractors by Grade As of 31st December 2010, CIDB Malaysia's record showed a total of 64,924 registered contractors in 2009. More than 80% or 52,709 of the contractors were registered under G1, G2 and G3 grades while the rest consisted of contractors registered under G4-G7 grades and foreign contractors.

Table 1.3
Number of Contractors by Grade

Grade	Bidding Limit	2006	2207	2008	2009
G1	Not exceeding RM200,000	36,141	34,581	34,060	33,633
G2	Not exceeding RM500,000	6,937	7,300	7,516	8,095
G3	Not exceeding RM1,000,000	10,043	10,572	10,963	10,981
G4	Not exceeding RM3,000,000	2,140	2,340	2,420	2,613
G5	Not exceeding RM5,000,000	2,816	3,078	3,363	3,673
G6	Not exceeding RM10,000,000	1,003	1,065	1,206	1,437
G7	Unlimited	3,736	4,191	4,285	4,326
Foreign	Unlimited	163	163	164	166
Total		**62,979**	**63,290**	**63,977**	**64,924**

Source: CIDB Malaysia

1.2.3 Number of Construction Companies by Employment Size

The largest group of 206,080 or 34.6% came under the employment size group of 100-499. This was followed by the larger companies that employed more than 1,000 employees providing 26.8% of total employment (159,443 employees). A majority of these construction companies (4,355 or 76.8%) employed less than 100 persons but contributed only 22.9% (RM13.9 billion) of overall gross output and generated 22.4% employment as compared to the remaining 1,188 or 21.4% of construction companies in the group size of more than 100 persons that contributed 77.1 % (RM46.8 billion) of gross output and 77.6% (461,980 employees) of total employment.

Table 1.4
Number of Construction Companies and Employment by Group Size, 2007

Employment Group Size	Construction Companies	Total Employment
< 100	4,355	133,159
100 - 499	976	206,080
500 - 999	140	96,457
≥ 1,000	72	159,443
Total	**5,543**	**595,139**

Source: Department of Statistics Malaysia: Report on Survey of Construction Industries 2008

1.2.4 Registered Construction Workers

CIDB recorded a total of 345,198 valid registered construction personnel as of 2009. This figure represented an increase by 1.3% over the previous year. From this figure, 164,919 personnel or more than 47% of the total represented general workers reflecting the general dependence of the construction industry in Malaysia on manual labour qualifying it as a labour-intensive industry.

Table 1.5
Registered Construction Workers

Category	2005	2006	2007	2008	2009
General Worker	114,615	125,992	141,463	152,235	164,919
Semi-skilled Worker	16,213	15,478	16,284	14,416	15,442
Skilled Worker	42,166	42,244	46,267	41,336	38,506
Administration Personnel	35,646	51,552	68,344	74,510	64,477
Site Supervisor	29,197	31,578	34,706	34,856	36,491
Construction Manager	20,241	21,757	23,251	23,472	25,363
Total	**258,078**	**288,601**	**330,315**	**340,825**	**345,198**

*As at 20 August 2010 Source: CIDB Malaysia

1.2.5 Value-added per Employee

In 2009, the value-added per employee grew by 5.6% to RM22,728 (2008: RM21,514). Both the value-added and employees for the construction sector expanded moderately to RM17,321 million and 762,100 employees in 2009. This translated into RM22,728 value added per employee for the construction sector, an increase of 5.6% from the previous year (2008: RM21,514 value-added per employee). The value-added per employee for the construction sector has been growing since 2006 reflecting improved productivity.

Table 1.6

Value -Added Per Employee

	2005	2006	2007	2008	2009
Construction Sector Value Added (million)	RM14,685	RM14,639	RM15,707	RM16,366	RM17,321
Construction Sector Employees (`000 person)	762.5	781.1	775.1	760	762.1
Value-Added Per Employee	RM19,259	RM18,742	RM20,264	RM21,514	RM22,728

Source: Economic Planning Unit (EPU)

1.2.6 Wages of General Construction Worker in Peninsular Malaysia

In 2009, overall local construction worker earns an average daily wage of between RM52.00 to RM103.00, while the foreign construction workers earn an average daily wage of between RM37.00 to RM85.00. The rate also differed for skilled workers and semi-skilled workers. Skilled local workers earn an average daily wage of between RM56.00 to RM114.00 as compared to RM47.00 to RM88.00 for semi-skilled local workers. Foreign skilled workers earn less than local skilled workers but more than their foreign semi-skilled workers at an average daily wage of between RM40.00 to RM91.00 as against RM34.00 to RM77.00 for the latter.

Table 1.7

Construction General Worker Wage Rates in Peninsular Malaysia (RM daily)

Category of workers		Skilled Workers				Semi-skilled Workers			
		Local		Foreign		Local		Foreign	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1	General Construction Worker-Building	40.00	80.00	30.00	70.00	n.a	n.a	n.a	n.a
2	Concretor	60.00	100.00	32.00	80.00	45.00	80.00	30.00	72.00
3	Barbender	55.00	120.00	38.00	100.00	45.00	80.00	34.00	72.00
4	Carpenter-Formwork	55.00	120.00	42.00	100.00	45.00	88.00	35.00	83.00
5	Bricklayer	60.00	105.00	40.00	90.00	46.00	90.00	34.00	72.00
6	Roofer	56.00	120.00	38.00	100.00	45.00	80.00	35.00	72.00
7	Carpenter-Joinery	60.00	120.00	42.00	100.00	50.00	93.00	32.00	83.00
8	Steel Structure Fabricator	60.00	120.00	45.00	87.00	50.00	90.00	35.00	82.00
9	General Welder	55.00	180.00	40.00	120.00	40.00	90.00	35.00	82.00
10	Plumber-Building & Sanitary	60.00	120.00	45.00	82.00	48.00	80.00	30.00	72.00
11	Plumber-Reticulation	60.00	120.00	45.00	97.00	50.00	97.00	30.00	87.00
12	Building Wiring Installer	50.00	110.00	35.00	87.00	n.a	n.a	n.a	n.a
13	Scaffolder-Prefabricated	56.00	100.00	45.00	82.00	46.00	80.00	35.00	67.00
14	Scaffolder - Tubular	56.00	120.00	45.00	82.00	50.00	90.00	35.00	72.00
15	Plasterer	60.00	110.00	41.00	90.00	43.00	95.00	35.00	78.00
16	Tiler	60.00	120.00	41.00	100.00	50.00	100.00	34.00	82.00
17	Painter-Building	60.00	120.00	38.00	100.00	50.00	85.00	34.00	75.00
18	General construction Worker-Civil	40.00	72.00	32.00	67.00	n.a	n.a	n.a	n.a
19	Electrical Wiremen PW2 (RM monthly)	1,300.00	2,600.00	1,040.00	2,100.00	n.a	n.a	n.a	n.a
20	Electrical Wiremen PW4 (RM monthly)	1,560.00	3,120.00	1,170.00	2,500.00	n.a	n.a	n.a	n.a
		56.00	114.00	40.00	91.00	47.00	88.00	34.00	77.00

n.a. = Not Available

Source: CIDB Malaysia

Note: Data as July 2009

1.3 Legislative Intervention and Regulative Institutions

1.3.1 Occupational Safety and Health Act 1994

Model on the Australian Occupational Health and Safety Act of 1983, the Occupational Safety and Health Act (OSHA) 1994 was introduced in an effort to lower industrial accident rates in Malaysia. OSHA 1994 is premised on the notion that occupational safety should be self-regulating, that is to say employers should comply with the regulations because of self-interest rather than official sanction. Those who create the risks and those who work with them (i.e. the management and workers) should play the pivotal role in the consultative, co-operative and participative process in ensuring that workplaces do not marginalise health and safety. Under OSHA 1994, the penalty for employers not adhering to the set safety guidelines was increased to RM50,000 (approximately US$13,160, using the exchange rate of US$1.00 is equivalent to RM$3.80), or two years imprisonment, or both. Errant employers could be fined RM1,000 or three months imprisonment, or both. Further, OSHA 1994 marks a milestone in safety legislative intervention as it dispenses with the precept that all occupational hazards can be controlled by means of detailed regulations, and that safety and health at work places can be achieved by a system based exclusively on the use of these regulations enforced by the safety inspectorates (Laxman, 1995).

OSHA 1994 complements rather than replaces all existing safety legislation and regulations such as the Workers Act 1966, the Factories and Machinery Act 1967, the Workers Social Security Act 1967 and the Factories and Machinery (Building Operations and Works of Engineering Construction) (Safety) Regulations of 1986. The safety laws and regulations in Malaysia interpret the construction site as a “factory" and the main contractor the “owner." The treatment of the main contractor rather than the client as the “owner" is explicitly stated in all the standard forms of building contracts in Malaysia, for example JKR 203/203A, PAM 1998 and CDIB 2000. Thus, the main contractor is responsible for the safety and health of every worker within his control. In accordance with OSHA 1994, main contractors must take the initiative to familiarise themselves with whatever is permissible. They are required to formulate occupational safety and health policies, and inform the

Department of Occupational Safety and Health (DOSH) of the specific measures that will be taken for each new project. Internal safety committees, responsible for ensuring that safety measures are implemented, have to be established on sites where the number of workers exceeds 40.

1.3.2 The Department of Occupational Safety and Health (DOSH)

The DOSH, under the Ministry of Human Resources, is responsible for ensuring that all economic sectors abide by the safety legislation. It is empowered to inspect workplaces, enforce safety laws and prosecute offenders. Since 1991, two dedicated Task Force teams attached to the Kuala Lumpur branch, each comprising of 3 to 4 DOSH inspectors, were specifically assigned to oversee the construction industry that was then experiencing double-digit growth rates (see Fig. 1). It was made known during the IRPA study that other major cities and big towns also had similar set-ups. Members of the Kuala Lumpur Task Force Teams admitted that it was not easy to cover the entire capital and surrounding state of Selangor due to the sheer number of construction sites. In fact, as Table 2 shows, what they experienced merely reflected DOSH's predicament nationally. To economize on scarce human resources, priority was accorded to tall buildings. The greatest means DOSH has to combat unsafe construction sites is the Stop-Work Order, imposable under Section 48 of OSHA 1994 that prohibits work from taking place on site whilst the workplace is deemed unsafe. However there must be a basis for issuing the order, otherwise DOSH would exceed the parameters of legislation. DOSH also has the power to prosecute errant main contractors in court. Even though it has lost cases on technical grounds or interpretation of the statute, DOSH officials opined that simply taking these violators to court is itself a victory as the importance of safety would have been impressed on the other party. DOSH does not keep a record of repeat violators as it is hoped that they would eventually change of their own accord.

In addition to DOSH, there is the National Institute of Occupational Safety and Health (NIOSH). Established in 1992 following consultation between DOSH and the international Labour Organization (ILO), its functions among others are to conduct training programmes, disseminate information, provides consultation and other related services. Insofar as the construction industry is concerned, NIOSH targets major client organizations and main contractors as they can wield influence on main contractors and subcontractors respectively to follow safety procedures.

1.3.3 The Construction Industry Development Board (THE CIDB)

In operation since 1995, the CIDB was formed to ensure that the construction industry in Malaysia develops in a proper manner in line with national aspirations. The CIDB has undertaken various initiatives, inter alia, the \green card" programme launched in May 2000 with an allocation of RM 16 million. In terms of this program all CIDB-registered site personnel are required to undergo a one-day safety course conducted either by CIDB personnel or CDIB-accredited independent trainers, following which they are issued with a green registration card (as opposed to white for those who have not done so). Green card holders are automatically covered by a CIDB-arranged insurance scheme against industrial accidents. Ultimately, the CIDB hopes to make the “green card" a passport to enter construction sites.

What began as an exercise for site operatives was soon enlarged to include field construction professionals and executives, which was not well received by the intended parties.

1.3.4 Social Security organization

Contractors are required to obtain a Workmen's Compensation Insurance (WCI) policy prior to commencement of work for every construction project that they undertake. The insurance covers every worker on site, including those of subcontractors. In addition, the Social Security Act 1969 stipulates that every employee earning less than RM2,000 a month must contribute to SOCSO. All enterprises employing five or more persons are covered by the Act. The employer is obligated to make deductions from employees' wages to cover their contribution to SOCSO. The employer's contribution is 1.25% of the employee's monthly wage for the Employment Injury Insurance Scheme while the employee's contribution is 0.5% of the monthly wage for the Invalidity Pension Scheme. The Employment Injury Insurance Scheme covers industrial accidents, occupational diseases and commuting accidents whereas the Invalidity Pension Scheme covers invalidity or death from whatever causes.

Despite a possible fine of RM2,000 or six months imprisonment, the IRPA study supports the observation of others (Ramachandran and Arjunan 1994; Lee and Sivananthiran, 1996) that SOCSO non-compliance is rampant among site operatives, largely because of casualization of labour. Besides, construction employers and workers alike do not see the benefit of making SOCSO contributions as the Social Security Act, 1969 does not permit claimants seeking parallel compensation from the Workmen's Compensation Insurance. Equally pertinently, the premium for the latter is actually included in the contract sum and therefore underwritten by the client, as opposed to SOSCO contributions that are absorbed by the employers and workers.

The IRPA study found that getting the rightful compensation either from Workmen's Compensation Insurance or SOCSO is a laborious and time-consuming process. The amount being claimed may not even justify the effort | the Workmen Compensation Act, 1952 stipulates that the maximum medical bills claimable is RM470.00 and maximum loss of earnings is RM165.00 per month, figures that are exceedingly low by today's standards. Given the weakness of the two systems it is little wonder that some construction employers feel compelled to absorb the medical expenses for, and even compensate, their injured workers. In such instances, the injured foreign workers, regardless of whether they are regularized or illegal, are either sent to government hospitals (for life-threatening injuries) or private clinics (for minor treatment). Government hospitals (for humanitarian reasons) and private clinics (for monetary gain) rarely check on the work status of foreign nationals.

Prior to April 1993, foreign workers had been given the same protection and benefits as local workers under the SOCSO arrangement. Arising from logistical difficulty in locating returnees or their next-of-kin for compensation in their home countries, the facility was rescinded. A separate mandatory insurance scheme for foreign workers came into operation at the beginning of November 1996. The benefits include 24-hour coverage, ex-gratia payment of RM2,000 for injuries leading to death and a maximum of RM4,800 for repatriation cost in the event of death.

1.4. Safety Performance of the Construction Industry

The construction industry has been plagued by a poor safety record due to a confluence of factors. These include itinerant labour force, discontinuity of construction projects and pressure to complete work on time.

Table 1.8

Statistics for accidents and deaths on construction sites

Year	Construction-related accidents	Construction-related deaths	Accidents for Industries	Deaths for all industries
1990	3,123 (2.6%)	26 (6.7%)	121,104	390
1991	3,377 (2.7%)	35 (9.6%)	124,898	363
1992	3,615 (2.8%)	39 (7.2%)	130,019	541
1993	4,207 (3.2%)	51 (7.8%)	133,293	653
1994	4,311 (3.5%)	44 (6.8%)	122,688	644
1995	4,636 (4.1%)	64 (6.7%)	114,134	952
1996	5,302 (4.9%)	116 (9.6%)	107,635	1,205
1997	3,510 (4.1%)	81 (6.2%)	86,289	1,307
1998	979 (1.1%)	104 (9.9%)	85,338	1,046

Source: SOCSO

Note: Figures in bracket denote proportion of total industrial rates

The poor safety record can also be attributed to the many small-size and medium-size independent production entities acting as subcontractors that operate in the informal realm of the national economy and as such are unconstrained by the legal institutions of society (Edgren, 1990). During the 1988/1997 construction growth period, deaths and serious injuries of site operatives made staple reading in local newspapers. Interviews for the IRPA study with DOSH officers in Kuala Lumpur found that the construction industry was slow in improving safety standards, two years after the Occupational Safety and Health Act came into force in 1994. Various parties have since then echoed IRPA's observation. A recent study conducted by Abdul Hamid, Singh and Hussin (2001) among 620 individuals on 169 construction sites found awareness of safety procedures and laws to be low among site operatives; both site operatives and main contractors exhibit apathy for safety; and safety enforcement is weak. In its submission to the Construction Industry Dialogue 2000, DOSH indicated that the industry was still afflicted with poor compliance with safety legislation. Back in 1996, DOSH officials had already conceded that a shift in attitude as significant as this was bound to take time. Progress is being made, but not to the extent that some had hoped for.

Official statistics (see Table 1.8) do not convey the actual safety record of the construction industry. It was found from the IRPA study, and supported by Jones (2000), that main contractors preferred to avoid official scrutiny for fear of the Stop-Work Order. Despite the inadequacy of official figures, it is significant that construction consistently records the highest rate of fatalities among all economic sectors.

1.5. Causes of Accident, Injuries, Illnesses and Fatalities

Accident don't just happen, they are caused. According to Ridley 99 per cent of the accident are caused by either unsafe acts or unsafe conditions or both (Ridley, 1986). As such, accidents could be prevented. The unsafe act is a violation of an accepted safe procedure which could permit the occurrence of an accident. The unsafe condition is a hazardous physical condition or circumstances which could directly permit the occurrence of an accident. Most accident results from a combination of contributing causes and one or more unsafe acts and unsafe condition. Accident theories and models discussed have evolved from merely blaming workers, conditions, machineries into management roles and responsibilities. Nowadays, accident models are being used to better explain the causes of accident so that appropriate actions could be taken to make improvement. However, in order to effect permanent improvement, we must deal with the root causes of accident. A review of the literature indicates that finding the factors and causes that influence construction accidents has been the passion of many researchers. Kartam and Bouz (1998) did a study in Kuwaiti construction and noted that the causes of accidents were due to worker turnover and false acts; inadequate safety performance; improper cleaning and unusable materials; destiny; low tool maintenance; supervisory fault; and misplacing objects. Abdelhamid and Everett (2000) conducted a more comprehensive study in the USA and classified the causes into human and physical factors. Human factors were due failed to secure and warn; Failed to wear personal protective equipment (PPE); horseplay; operating equipment without authority; operating at unsafe speed; personal factor; remove safety device; serviced moving and energized equipment; took unsafe position or posture; used defective tool or equipment; and other unsafe action. While, physical factors were due to; unsafe act of another person(s); disregard known prescribed procedures; defects of accident source; dress or apparel hazard; environmental hazard; fire hazard; hazardous arrangement; hazardous method; housekeeping hazard; improper assignment of personnel; inadequately guarded; public hazard; and other unsafe conditions.

Lubega et al. (2000) did a study in Uganda and concluded the causes of accidents were mainly due to lack of awareness of safety regulations; lack of enforcement of safety regulations; poor regard for safety by people involved in construction projects; engaging incompetent personnel; non-vibrant professionalism; mechanical failure of construction machinery/equipment; physical and emotional stress; and chemical impairment.

Pipitsupaphol and Watanabe (2000) did a study in Thailand construction sites and classified the causes into the most influential factors i.e. unique nature of the industry; job site conditions; unsafe equipment; unsafe methods; human elements; and management factors. They further concluded that major immediate causes were due to failure to use personal protective equipment; improper loading or placement of equipment or supplies; failure to warn co-workers or to secure equipment; and improper use of equipment.

Toole (2002) also did a study in the USA and suggested that the causes of accidents were due to lack of proper training; deficient enforcement of safety; safety equipment not provided; unsafe methods or sequencing; unsafe site conditions; not using provided safety equipment; poor attitude toward safety; and isolated and sudden deviation from prescribed behaviour. Tam et al. (2004) did a study in China and noticed that the causes of accidents were due poor safety awareness from top leaders; lack of training; poor safety awareness of project managers; reluctance to input resources for safety; reckless operation; lack of certified skill labour; poor equipment; lack of first aid measures; lack of rigorous enforcement of safety regulation; lack of organizational commitment; low education level of workers; poor safety conscientiousness of workers; lack of personal protective equipment (PPE); ineffective operation of safety regulation; lack of technical guidance; lack of strict operational procedures; lack of experienced project managers; shortfall of safety regulations; lack of protection in material transportation; lack of protection in material storage; lack of teamwork spirits; excessive overtime work for labour; shortage of safety management manual; lack of innovative technology; and poor information flow.

Holt (2001, 4) concurs with this view and suggests that unsafe acts and conditions are “symptoms” of “basic underlying indirect or secondary causes.” Although Holt (2001) claims that the primary cause of construction accidents is the inability of safety legislation to specify the safety requirements of materials and contracting parties, he also identifies the following unsafe acts and conditions as causes of construction accidents Refer table 1.9)

Table 1.9

Causes of Construction Accidents: Unsafe Acts and Conditions

Unsafe Acts	Unsafe Conditions
▪ Working without authority; ▪ Failure to warn others of danger; ▪ Leaving equipment in a dangerous condition; ▪ Using equipment at the wrong speed; ▪ Disconnecting safety devices such as guards; ▪ Using defective equipment; ▪ Using equipment in the wrong way or for the wrong tasks; ▪ Failure to use or wear personal protective equipment; ▪ Unsafe loading of vehicles; ▪ Failure to lift loads correctly; ▪ Being in an unauthorised place; ▪ Unauthorised servicing and maintaining of moving equipment; ▪ Horseplay; ▪ Smoking in prohibited areas; and ▪ Alcohol or drug consumption.	▪ Inadequate or missing guards to moving machine parts; ▪ Missing platform guardrails; ▪ Defective tools and equipment; ▪ Inadequate fire-warning systems; ▪ Fire hazards; ▪ Ineffective housekeeping; ▪ Hazardous atmospheric conditions; ▪ Excessive noise; and ▪ Inadequate lighting.

(Source: Adapted from Holt 2001, 4)

1.6. Problem Statement

The past accident records in our country, construction industry showing that one of the critical sector that needs safety improvement (Abdul Rahim, A.H. & Muhd Zaini, A.M., 2005). A UK Research Report (HSE, 2002) concluded that that human behaviour is a contributing factor in approximately 80% of the accidents. Many studies revealed that the majority of accidents and resulting injuries are due to unsafe work practices of the workers rather than the unsafe working conditions (Choudry, R.M & Fang, D., 2007).

Human error and unsafe behaviour are both the cause of failures which led to accidents. Reason, parker and Lawton (1998) define human error as “the failure of planned actions to achieve their desired ends”. They argued that although human error was major cause of unsafe behaviours and accidents, previous studies had not provide much insight into the behavioural mechanism that leads to unsafe behaviours.

The discussion on safety behaviour issues is nothing new and had been around for long time ago. However the solutions remain scattered and scarce. In analysing the cause of industrial accidents reports in early 1930s, Heinrich discovered that 88 percent of workplace accidents were caused by unsafe behaviour (Goetsch, 2008). Since that organizations established various measures to reduce injuries and to prevent accidents at workplace. However due to variability nature of human behaviour, these objective had been very challenging (Reason, Parker, & Lawton, 1998; Zohar, 2002) It not abnormal to find employees take shortcuts and violate safety rules and procedures during routine activities. To resolve safety behaviour issue in hazardous working environment is event more challenging than any other industries due to the nature of the construction industry which involves multiples hazards. Dekker (2002) sees human error and unsafe behaviours as symptoms to accidents and direct causes. He viewed human error as a symptom of something deeper involving individual personality and safety system practised in the organizations. He believes that employees have to create because work systems are not always in concert with the multiple goals they pursue simultaneously. Dekker (2002) also thinks that human error can be systematically connected to features of people, tools, tasks and operating environment. Therefore there is a need to understand more of this notion and its effect on the safety behaviour.

1.7. Research Question

This case study intent to address the following research question:

1. What is the relationship between safety climate and safety behaviour?
2. What is the relationship between safety training and safety behaviour?
3. What is the relationship between safety motivation and safety behaviour?

1.8. Research Objective

General objective is to determine the factors that influence of behaviour and this case is focus on unsafe trends by construction workers.

This Research aims to:

- To determine the relationships between safety climate and safety behaviour.
- To determine the relationship between safety training and safety behaviour
- To determine the relationship between safety motivation and safety behaviour.

1.9 Limitation of the study

Several limitation this study were noted. The nature of this study as a case study may not reflect exactly the occurrence in all other places throughout the country. The data collected is uniquely for the site surveyed. Nevertheless the scenario as almost similar with other typical sites having similar characteristics such as site with a very past pace project, site with a limited budget and site with insufficient numbers of safety personal.

This study used self-administered questionnaires as a primary tool to collect the data from respondents. These measurement tools can be viewed as limitation because self-administered questionnaires may raise the tendency of single-source bias. It is understood that majority of the respondents like to show their good safety behaviour in the surveys. This might lead to a wrong conclusion assuming the responses represent the true picture of their safety behaviour at the construction site.

The scope of this study is limited to the selected human factors and its relationship with safety behaviour. In this study only a few limited set factors were assessed in the survey questionnaires. Others factors such as work pressured, commitment, conscientiousness and some others were not covered due to focus on selected variable only.

1.10 Significance of the Study

Since OSHA 1994 was enacted, the numbers of accident seem does not decrease. Enforcement alone does not affective measure to reduce an accident. Others approach can be taken to enhance the quality of our construction site safety. This should be an agreement with the suggestions that we also need to shift our focus to the factors of behaviour (Mullen, J., 2004; Cohen, J.M., 2002; Cooper, M.D., 1999).

Majority of accidents are caused by unsafe behaviour or human errors have been supported by many researches (surry, 1971, Freeman, 1972, Shuckburgh, 1975, Hale and Glendon, 1987, Peterson, 1988, Williamson and Feyer, 1990, Krausse, 1995, Salminen and Tallberg, 1996: as cited in Seo, D.C., 2005).

In Malaysia construction industry, there are limited studies which directly emphasize on the behavioural aspects of the workers. Apart from the focus on physical safety, researchers also need to focus on the antecedent of behaviours. Probably the lack of this kind of study was due to our construction industries itself which applied closed door policy for variety reasons. It is not easy to access and assess a construction site.

Organizations are struggling to find ways to reduce occupational accidents for economic and human reasons. A few of them might have implemented good safety programs but failed to reduce the accident while some might have implemented successful safety programs but they like to improve further. This study provides a conceptual model for safety behaviour together with assessment tools which should be useful for organizations to access the status of the safety behaviour among their employees.

This study will help the organisation to learn more about human factors and how it can helps to reduce the accident at the workplace. This is very important because improving safety behaviour is the way to achieve organisations safety goals. This study also provided the approach to enhance safety behaviour by focusing on training, motivation and safety climate to reduce the unsafe safety behaviour at work place.

1.11 Definition of the terms

1. **Safety behaviour**

   Safety behaviour is defined in terms of safety compliance and safety participation (Neal & Griffin, 2006). Safety compliance is refers to the core activities that individuals need to carry out to maintain workplace safety and safety participation describes behaviours that do not directly contribute to an individual's personal safety but that do help to develop an environment that supports safety.

2. **Safety motivation**

   Safety motivation is refers to an individual's willingness to exert effort to an act safety behaviours and the valance associated with those behaviours. Individuals are motivated to comply with safe working practices and to participate in safety activities if they perceive that there is positive safety climate in the work place (Neal & Griffin, 2007).

3. **Training**

   In general, training refers to instruction and practice for acquiring skills and knowledge of rules, concepts, or attitudes necessary to function effectively in specified task situations (Cohen & Colligan, 1998).

   Training can also be described as systematic process of acquisition of knowledge, skills and attitudes required to perform more effectively on one's current job (Blanchard & Thacker, 1999). Effective training must address the personal needs of employees, helping them to learn, to grow, and to cope with the issues that are important to them. Meanwhile, effective training strategies and practices are those that meet the needs of the organisation while simultaneously responding to the needs of individual employees.

4. **Safety climate**

   Safety climate (Zohar, 1980) is term used to describe shared employee perceptions how safety management is being operationalized in the workplace, at a particular moment in time (Byron & Corbridge, 1997). These descriptive perceptions provide an indication of the "(true) priority of safety" (Zohar, 2000) in an organization with regard to other priorities such as production or quality. Safety Climate is considered to be a sub component of the "safety culture" construct (International Atomic Energy Agency [IAEA],1988) by some (Copper, 2000; Glendon & Stanton, 2000; Neal, Griffin, & Hart, 2000; Silva, Lima, & Baptista, 2004; Zohar, 2000) or reflection of actual safety culture by others (Arboleda, Morrow, Crum, & Shelly, 2003; Cabrera & Isla, 1998; Cox & Flin, 1998; Fuller & Vassie, 2001; Guldenmund, 2000; Lee & Harrison, 2000; O'Toole, 2002; Vredenburgh, 2002; Williamson, Feyer, Cairns, & Biancotti, 1997).

1.12 Organization of the Dissertation

This dissertation is divided into five chapters. Chapter one contains the statement of the problem to be studied, the research questions, the objectives of the study, significance of the study, historical view of the Occupational Safety and Health in Malaysia, and definition of the terms. Chapter two provides a review of the literature, which includes the empirical past studies and theories which are primary interest to this study. It also presents a theoretical model which depicts the relationship between independent and dependant variables. Chapter three presents the methodology utilized in this study, include research type and design, a description of the populations and sample, research instrumentation, the procedures data collection and analysis. Chapter four provides the data, results of the hypothesis testing, analysis and discussion. Finally chapter five concludes the study with summary of findings, conclusion and recommendation for futures research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter to review the literature, identify previous conceptual and empirical work that that could provide a solid basis for the successful execution of the study effort. This chapter also support a theoretical framework for development of the research model. The literature review will support to the methodology that would empirically investigate the relationships between various variables used in this study. In this chapter also provided a research model and theory that underpinned the theoretical framework.

2.2 Safety Behaviour

Safety behaviour defines in terms of safety compliance and safety participation (Neal and Griffin, 2006). Safety compliance is refers to the core activities that individuals need to carry out to maintain workplace safety. Safety participation describe as behaviour that do not directly contribute to an individual personal safety but that do help to develop an environment which supports safety.

The safety behaviour and behaviour base safety are sometimes used interchangeably to refer to the behavioural approach to improve safety performance at the work-place. The concept of Behaviour base safety is to apply the science of behaviour change to real world problems and it focuses on what people do, analyses why they do it and the applies a research supported intervention strategy to improve what people do. The missing piece of behavioural base safety approach is to go deeper into the inner core of the individual and understand their personality characteristics, competency level and what motivate them to behave safely. Safety behaviour identifies this gap and its concept is to improve the behaviour by improving the inner-self of the individuals. It is a long term process which involves rigorous effort and commitment from both party employer and employees.

Evolution of the safety behaviour at workplace was first established in the 1930 after the finding of the accident reports revealed that as many as 95 percent of workplace accident were caused by employee unsafe acts (Geller, 2001; Wikipedia, 2008; Cooper, 2009). Cooper 2009 described at length the reason why people behave unsafely because they had never been hurt while doing their jobs in unsafe ways. Over the certain period of time, the lack of any injuries of those who have been consistently committing unsafe acts will reinforce the unsafe behaviours. These behaviours may eventually lead them to serious accidents.

In this study, safety behaviour is expressed in term of employee compliance to the organisation safety rules and regulation as well as voluntarily participation in safety programs and initiative (Neal & Griffin, 2002). Safety compliance is directly contributed to personnel safety and represents the core activities that need to be performed to maintain workplace safety. The basic compliance is requirement for the use of personnel protective equipment which is enforced by many organizations and also mandated by authority under the Occupational Safety and Health Act, 1994. Safety participation described the behaviours that do not directly contribute to employee personal safety but help to create an environment that support safety at workplace.

2.3 Safety Climate

Safety climate (Zohar, 1980) is term used to describe shared employee perceptions how safety management is being operationalized in the workplace, at a particular moment in time (Byron & Corbridge, 1997). These descriptive perceptions provide an indication of the "(true) priority of safety" (Zohar, 2000) in an organization with regard to other priorities such as production or quality.

2.3.1 Past Studies

Neal and Griffin (2000) conducted 2 studies to determine the relationship between safety climate and safety behaviours using archival survey data and administered questionnaires distributed to employees working in manufacturing and mining organisation. They found positive relationship between safety climate with employee compliance and safety participation.

This was supported by this statement, there are also correlation between workers safe behaviour and safety climate within the construction site environments (Seo, D.C., 2005; Choudry R.M. & Fang .D, 2007).Behaviour are much related with the working climate. Behaviours are influenced by attitude; these attitudes towards safety are influenced by their perceptions toward external factor (Tauha Hussain Ali, 2006).

Safety Climate influences how employees perceive organizational safety commitment at the work place (Neal & Griffin, 2000; Lu & Shang, 2005). This includes the perception of management values on safety, safety communications, safety training and safety system (Probst, Brubaker & Barrsotti, 2008). Neal and Griffin (2002): safety climate reflects the perceptions of organizational safety related policies, procedures, practices but more important how these practices were valued in the organizations influenced the safety behaviour of the employees. Active involvement in safety activities and compliance with organizational safety rules and procedures were indicative of employee positive perception on organizational safety climate. The employee positive perceptions on organizational safety commitment help to influence their safety behaviours.

Harvey, Bolam Gregory and Erdos (2001) argue that developing the perception was timely and significant behavioural changes could only be produced when safety is paramount importance in the organization. Across organization and industries practicing partnership agreement where people from different groups work closely such as in offshore platform, Fuller and Vassie (2001)found positive safety climate brought harmony in their working relationship and consequently minimised unsafe behaviour.

Neal and Griffin (2000) conducted 2 studies to determine the relationship between safety climate and safety behaviour using archival survey data and administered questionnaires distributed to employees working in manufacturing and mining organizations. They found positive relationship between safety climate with employees' safety compliance and safety participation. This was supported by a study by Zohar (2002) who collected data from 411 production workers in a metal processing plant found higher safety climates created by greater concern for employees' welfare and safety arising from closer individualized relationships promotes safe behaviours among the employees.

Zohar (2005) collected data from 3,952 production employees in 401 work group nested in 36 small to medium size plants in metal, food, plastics and chemical industries to examine the mediating effect of group level safety climate in cross level relationship between organizational safety climate and safety behaviour. The finding indicates that safety behaviour of the employees was mediated by the group level safety climate. That means the organizational level safety climate will be effective to influence safety behaviour when it aligned with group level safety climate. The middle ranks such as supervisors have significant role to play in influencing group members on safety behaviour by enforcing and educating group members on organizational safety policies, rules and procedures.

Probst, Brubaker and Barsotti (2008) used safety climate measure to predict the extent of organizational injury rate underreporting in the construction companies. The safety climate was assessed using data gathered from 1,390 employees of 38 companies contracted to work in a large construction site while injuries rate were obtained from recorded injury logs kept by the companies. They found organizations with positive safety climate experience fewer workplace injuries and the underreporting of injury rate was about 50 percent lower compared to the underreporting of injury rate from the organizations with poor safety climate. Dejoy, Shaffer, Wilson, Vanderberg and Butts (2004) tested the relationship of safety climate measure with perceived safety at work using data from 2,208 employees in 21 retailers. The respondents were given a range of options from very safe to very unsafe for them to rate their personal exposure to safety and health hazard at the work place. They found the influence of safety climate was a direct relationship rather than a mediated relationship to perceived safety at work. It can be implied that fewer workplace injuries and good perception of safety at work were attributable to positive perception of the organizational safety climate which led employees to demonstrate safe working behaviour at the workplace.

Mark et al. (2007) conducted a longitudinal study to examine the moderating effects of safety climate on the relationship between staffing adequacy and work condition on nurse injuries. Three different sets of questionnaires were distributed in 6 consecutive months involving 281 medical-surgical units in 143 general acute care hospitals. They found work engagement and work conditions were positively related to safety climate. Safety climate was found to moderate the effect of work conditions and work engagement on nurse injuries. The authors suggested that positive work engagement and work conditions enhance safety climate and influence safety behaviour of the nurses which can reduce injuries.

2.4 Safety Training

In general, training refers to instruction and practice for acquiring skills and knowledge of rules, concepts, or attitudes necessary to function effectively in specified task situations (Cohen & Colligan, 1998).

Training can also be described as systematic process of acquisition of knowledge, skills and attitudes required to perform more effectively on one’s current job (Blanchard & Thacker, 1999). Effective training must address the personal needs of employees, helping them to learn, to grow, and to cope with the issues that are important to them. Meanwhile, effective training strategies and practices are those that meet the needs of the organisation while simultaneously responding to the needs of individual employees.

The importance of safety training to improve the safety performance in the construction industry has been addressed by many researchers (Huang and Hinze, 2003; Aksorn and Hadikusumo, 2008). An effective training of construction workers can be one of the best ways in improving site safety performance (Hislop, 1991; Tam et al., 2004).

2.4.1 Past studies

In the study of Zeng et al. (2008), it has been pointed out that some accidents such as falling from height and hit by falling materials in construction could easily be prevented from implementing training programs to employees. In the same study, it has also been found that many workers in the Chinese construction industry had received limited education about safety issues (Zeng et al., 2008). Similarly in the study of Dingsdag et al. (2008) construction workers identified training as necessary element of safety performance.

Many studies have shown that there is a close relationship between individual safety behaviour and safety performance (Tarrants, 1980; Sawacha et al., 1999). An effective training of workers can also significantly reduce unsafe behaviour. As Fang et al., (2006) stated workers with good safety knowledge have more positive safety climate than those with poor safety knowledge.

Langford et al. (2000) identified the critical factors that influence the attitudes of construction workers towards safe behaviour on construction site. As the result of the study, training of operatives and safety supervisors is important to safety awareness and improve performance. Moreover, it has also been found that knowledge and competence influence personal safety performance. They also stated that companies must maintain and update their workers skill and knowledge by training, skill updates and effective on site communication (Langford et al., 2000).

2.5 Safety Motivation

Motivational refer to as a source of energy, desired to achieve, desire to perform better than others, responsive to rewards, perceived behavioural control and an intentions (Klehe and Aderson. 2007). This is the key drivers influencing the behaviour to achieve the intended goals. In many respects, high level of motivation leads to positive outcomes.

Neal and Griffin (2006) define safety motivation as an individual willingness to exert, effort to enact safety behaviours and the valance associated with those behaviours.

2.5.1 Past Studies

Neal and Griffin (2000) revealed that motivation factor is an important component to influence safety behaviour among employees in Australian manufacturing organisation.

Hinsz, Nickell and Park (2007) found motivation for safety behaviours among162 employees working in turkey processing plant was substantially influenced by attitudes and subjective norms. Built on the theory of intentional behaviour, their study suggested "There is significant research on intentions and behaviour that serves as fertile conceptual ground for considering factors that contribute to employee behaviour in work setting". The results indicate that there was a strong positive relationship between the intentions and self-report of behaviour to keep the food safe and uncontaminated.

Probst and Brubaker (2001) collected data from 237 food processing employees and state that employees who reported high perception of job insecurity exhibit decreased in safety motivation and compliance, which in turn were related to higher levels of workplace accidents and injuries.

In a study among 53 participants, VOSH et al. (2007) found there were stable individual differences in the motivation. The study suggested that when a person anticipated a decision would be taken advantage by others, then that person would be motivated to take an adverse emotional response to prevent that from happening.

In data collected from 700 employees working in an Australian hospital, Neal and Griffin (2006) found that individual safety motivation was associated with increased in self-reported safety behaviour and reduction in accidents.

A study by Zacharatos (2001) in manufacturing industries suggests that motivation plays a crucial role to change employee behaviour towards working safely.

Neal (2006) also found safety motivation has a strong link with employees' safety behaviour during performing the job. Neal (2006) stated that safety motivation also influenced safety climate and safety performance at workplace. As per Wallace and Vodanovich (2003) conscientious people perform better in safety because they have higher level of motivation.

2.5.2 Motivation Theories

Campbell and Richard (1980) came up with the following assumption about human behaviour. (1) All human behaviour has a course, which can be traced to the effect of the environment. (2) The root of human behaviour is also traceable to needs wants and motives. (3) Human behaviour is goal seeping people would release their effort in the direction they believe will help to satisfy their personal needs.

There are a number of known theories that can be considered as motivation theories. Such as Mc Clelland's Achievement Motivation Theory: Maslow's Hierarchy Needs Theory: McGregor Theory X and Y: Victor Vroom's Expectancy Theory and others. Among these theories there is Frederick Herzberg's Hygiene Theory. This theory indicate hygiene factor (i.e. security, status, relationship with subordinates, personal life, work conditions, relationship with supervisor, company policy and administration) as elements that can cause a motivational impact. These hygiene factors are closely associated with the climate of an organization. Climate is described as the atmosphere of an organization.

1. Abraham Maslow Theory

Abraham Maslow (1954) attempted to synthesize a large body of research related to human motivation, prior to Maslow, researchers generally focused separately on such factors as biology, achievement, or power to explain what energizes, directs, and sustains human behaviour. Maslow posited a hierarchy of human needs based on two groupings: deficiency needs and growth needs. Within the deficiency needs, each lower need must be met before moving to the next higher level. Once each of these needs has been satisfied, if at some future time a deficiency is detected, the individual will act to remove the deficiency.

Maslow’s needs hierarchy theory is one of the most popular theories of work motivation in our time but it was not always so. Though the theories were introduced in the mid 1940s and until 1950s, it remained primarily in the realm of clinical psychology where Maslow did most of his development work. However, as more attention began to be focused on the role of motivation at work, Maslow’s need matching theory emerged in the early 1960s as an appealing model of human behaviour in organizations. And as a result of its popularization by Douglas McGregor (1960, 1967), the model became widely discussed and used not only by organizational psychologists but also by managers.

As early as 1954, Maslow had discussed two additional needs in his work, namely, cognitive and aesthetic. Cognitive needs are the needs to know and understand and these examples include the need to satisfy one’s curiosity, and the desire to learn. Aesthetic needs include the desire to move toward beauty and away from ugliness.

These two needs were not however included in Maslow’s hierarchical arrangement and have therefore been generally omitted from discussions of his concepts as they relate to organization settings. Maslow developed the theory that human beings are motivated, i.e., stirred to action by their needs. He contrasted 2 broad categories of human motives – 'growth motives' and 'deprivation motives'.

The first kind is characterized by a push toward actualisations of inherent potentialities, while the other is oriented only toward the maintenance of life, not its enhancement. Deprivation motives he says are arranged in a developmental hierarchy. They are five in number and structured as in Figure 2.1 explanation as follows: -

(i) **Physiological needs.** These include homeostasis (the body's automatic efforts to retain normal functioning) such as satisfaction of hunger and thirst, the need for oxygen and to maintain temperature regulation. Also sleep, sensory pleasures, activity, maternal behaviour, and arguably sexual desire.

(ii) **Safety needs.** These include safety and security, freedom from pain or threat of physical attack, protection from danger or deprivation, the need for predictability and orderliness.

(iii) **Love needs** (often referred to as social). These include affection, sense of belonging, social activities, friendships, and both the giving and receiving of love.

(iv) **Esteem needs** (sometimes referred to as ego needs). These include both self-respect and the esteem of others. Self-respect involves the desire for confidence, strength, independence and freedom, and achievement. Esteem of others involves reputation or prestige, status, recognition, attention and appreciation.

(v) Self-actualization needs. This is the development and realization of one's full potential. Maslow sees this as: 'what humans can be, they must be', or 'becoming everything that one is capable of becoming. Self-actualisation needs are not necessarily a creative urge, and may take many forms, which vary, widely from one individual to another.

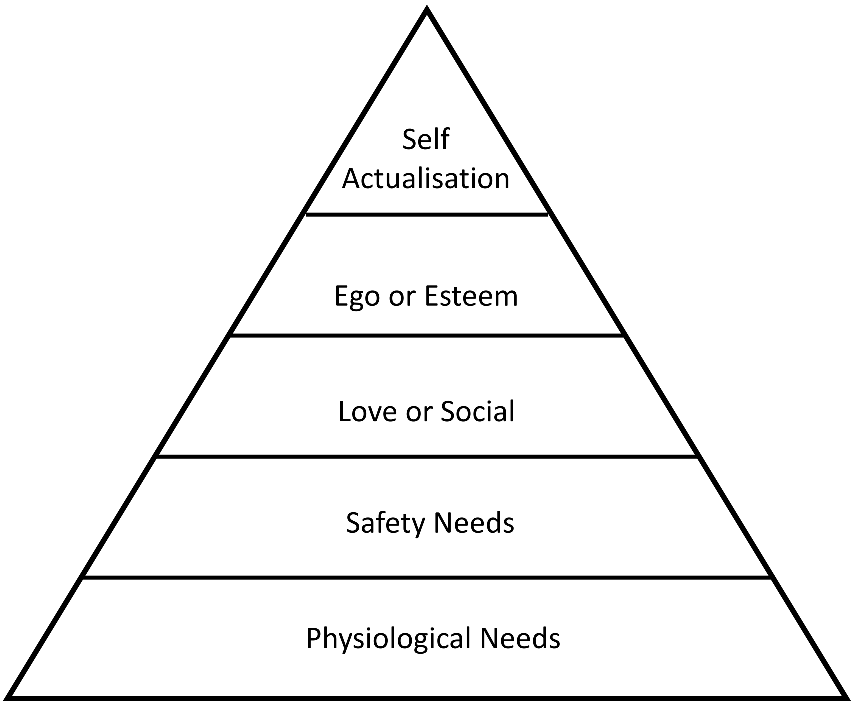

Figure 2.1
Maslow's hierarchy of Needs model

The normal person is characterized by spontaneity, creativeness and appreciation of others. People who fail to achieve self-actualisation, he says, tend to be hostile and disastrous. Maslow conceived a human being developing the five groups of needs, in sequence, from one to five.

The survival needs are present at birth. During childhood, one becomes aware of each of the higher groups of needs. A man takes all five needs to work. The manager who wishes to motivate his management subordinates is faced with the fact that his subordinates are attempting to satisfy all five levels of needs.

If a man experiences nagging insecurity, because redundancies are being anticipated or because He feels there is an absence of order and equity in the organization (which would be caused by an irrational wage or salary structure), he will not be interested in the organization's policies and plans designed to assist him in fulfilling higher needs.

If he cannot see an easy, straightforward way to satisfy these needs, he is liable to behave irrationally, obstructing or sabotaging the work of the firm or organization, breaking work agreements and going on strike.

Maslow's hierarchy of needs is widely accepted as a convenient simple analysis of human motivation and which can assist us, therefore, to understand why men behave the way they do in given situation and to anticipate how they will behave in future situations.

2.6 THEORETICAL DEVELOPMENT

The theoretical development to support the conceptual framework of this study was based on the concept behaviourism and the behaviour change theories. Behaviourism states that all things that organism do including acting, thinking and feeling should be regarded as behaviour (Wikipedia, 2010). Behaviour change theories describe the reason behind the alteration in the behaviour pattern of the individual. These theories state that environmental, personal and behaviour characteristics are major factor in behaviour determination. This study analysed a few behaviour change theories namely as Accident causation model, Domino Theory, Multiple causation model, human error theory, self-efficacy theory, learning theory, social learning theory, theory of reason action and theory of planned behaviour. Only one theory which was the most applicable to support the conceptual framework was chosen.

2.6.1 Accident Causation Models

Accident causation model is not a new model to identify the root problem of safety in construction and other industry. The objective of this model is to provide tools for better industrial accident prevention program (Abdelhamid and Everett, 2000). As described by Heinrich (1980) accident prevention is an integral program, a series of coordinate activities, directed to the control of unsafe personal performance and unsafe mechanical conditions, and based on certain knowledge, attitudes, and abilities. The famous models that were developed that relate to accident causation are namely domino theory that was invented by Heinrich in 1930 and multiple causation theory that was developed by Petersen in 1971.

2.6.2 Domino Theory

Accident causation model was pioneered by Heinrich in 1930, which discussed accident causation theory, the interaction between man and machine, the acts, the management role in accident prevention, the costs of accident, and the effect of safety on efficiency.

Heinrich developed the domino theory (model) of causation that consist of five dominoes namely ancestry and social environment, fault of a person, unsafe acts and condition, accident, and injury. This five dominoes model suggested that through inherited or acquired undesirable traits, people may commit unsafe acts or cause the existence of mechanical or physical hazards that result in injury (Abdelhamid and Everett, 2000). This theory has pointed two main things; first, people are the fundamental reason of caused accident. Most of the accident occurs are caused by wrong doer of the worker. Secondly, the management should be responsible for the accident prevention. The management should provide workers with safety facilities to prevent the workers from hazardous environment.

Heinrich’s domino sequence was a classic in safety and health thinking and teaching for over 30 years in many countries around the world. However, in the late 1960s the domino sequence was updated by Bird to reflect the direct management relationship involved with the causes and effects of all incidents and accidents, which could downgrade a business operation (Heinrich et al., 1980). Theory put forward by Bird has the same concept of illustrated dominoes as Heinrich’s but the five elements were different. Bird’s updated domino elements are lack of control – management, basic causes – origins, immediate causes – symptoms, incidents – contact, and people – property –

loss. Bird's approach has emphasized more on the management role to prevent losses.

In addition to that, Adams (1976) and Weaver (1971) had also put forward the updated version of the domino theory. Adam had the same view as of Bird's but emphasized more on the organisational structure of the management. The objective of an organisation, how certain works were being planned and executed would certainly have an impact on accident prevention (Heinrich et al., 1980).Weaver had put forward the same concepts of elements or factors as of Henrich's. However, he stressed on the important to recognize the root of unsafe acts or conditions which eventually emphasized on bigger management roles in preventing accidents (Heinrich et al., 1980).

2.6.3 Multiple Causation Model

This model was presented by Petersen in 1971 that has totally different concept with the domino theory that influenced many researchers during Heinrich time. This model was inspired by his believed that many contributing factors, causes, and sub-causes are the main culprits in an accident scenario. Under this concept, the factors combine together in random fashion, causing accidents. By using multiple causation models, the surrounding factors to the accident would be revealed (Abdelhamid and Everett, 2000). The set questions will be used to identify the root causes of the accident. For example for stepladder accident, the question would be "why the defective ladder was not found in normal inspection, why the supervisor allowed its use, whether the injured person knew that he should not use the ladder, and so on". The questions asked is not pointed only to the injured person, but also to the management, supervisor, and other person or department that relate to the accident. The answer of these questions could be used to identify the root cause of the accident, and also can be use as an improvement tools for inspections, supervisions, training, better definition of responsibilities, and pre-job planning by supervisors. Multiple causation models also pointed out that the root causes of accident normally relate to the management system such as management policy, procedure, supervision, effectiveness, training, etc (Abdelhamid and Everett, 2000).

2.6.4 Human Error Theories

The approach of this theory is pointed to the worker as the main factor of the accident. This approach as mentioned by Abdelhamid (2000) studies the tendency of humans to make error under various conditions and situations, with the blame mostly fall on human (unsafe) characteristics only. But this theory does not blame the workers as the main problem for accident, other factors such as design of workplace and tasks that do not consider worker (human) limitation also take part as the reason why accident happened (Abdelhamid and Everett, 2000). In general, the overall objective of human error theory is to create a better design workplace, tasks, and tools that suitable with human limitation.

There is some theory that related to the human error theory such as behaviour model, human factor model, and Ferrel theory. Most of these theories address the human (worker) as the main problem that makes an accident happen such as permanent characteristic of human, the combination of extreme environment and overload of human capability and conditions that make human tends to make mistake (Abdelhamid and Everett, 2000).

2.6.5 The Self-efficacy Theory

The self-efficacy theory describe that behaviour change is determined by the individuals impression of his ability to perform a task base upon prior success in performing the related tasks, the physiological state and the persuasion from external sources (Bandura, 1977). This impression upgrades self-confident and predicts the amount of effort necessary to initiate and maintain the behaviour change. In applying to safe behaviour concept, self-efficacy provides a strong platform that self-confident is necessary for change but it lack in many ways to address the mechanism of how behaviours can be influenced.

2.6.6 The Learning Theory

The learning theory describe that a complex behaviour is learned gradually by modification of a simple behaviour which individual learn through duplicating the behaviour they observed and that rewards are essential to ensure repetitious of desirable behaviour (Skinner, 1953). Although the learning theory provides the basis to support the change mechanism in safety behaviour that good safety behaviour can imitated and reinforced by reward system but it does not provide the mechanism how the inner can be influenced. According to behaviourism concept, inner behaviour is equally important as the outer behaviour.

2.6.7 Social Learning Theory

Social learning theory explains that behavioural change is determined by environmental, personal and behaviour elements. The change is one factor affects the others two factors. The theory suggests that an individual environment affects the development of his personal characteristics as well as the person behaviour and individual behaviour may change the person environment as well as the way the persons thinks or feels (Bandura, 1989). In application to safety behaviour concept, a person's environment is the physical interaction between person and his workstation, the employees and the system in which the organization operates. As an example a well maintained and clean workstation affects the thinking that cleanliness is a must not an option. Therefore compare to learning theory, this theory is more applicable to support the safety behaviour conceptual framework because it explains the interaction between the factors that affect internal and external behaviour. However this theory lack of explanation on how does the environment affects the thinking which led a person to demonstrate a certain behaviour pattern in agreement with the person thoughts and belief.

2.6.8 The Theory of Reason Action and the Theory of Planned Behaviour

The theory of reason action and the theory of planned behaviour describes the individual's intention is crucial in determining the behaviour and behaviour

change (Ajzen & Fishbein, 1980). These theories provide the mechanism of how to influence the intention and behaviour.
For the theory reason action, individual's attitude to the consequence of the behaviour and the social pressure from his environments affects his intention and his behaviour. The theory of planned behaviour complemented this theory by incorporating perceived behaviour control in the model which is equally important to determine the intention and behaviour. Therefore this study took the theory of planned behaviour because it is the most applicable to support the safety behaviour conceptual framework.

The conceptual framework of this study was supported by theory of planned behaviour which was developed by Ajzen and Fishbein and as extension of the theory of reason action (Ajzen & Fishbein, 1980). They suggested that person's intention would determine the likelihood of a person to finally perform behaviour. This theory was tested by Ajzen and Madden in 1986 in two experiments involving 169 undergraduate college students enrolled in an introductory social psychology class (experiment 1) and 90 students enrolled in Business Administration (experiment 2). The first experiment, examine the intention of the college students to attend the class while the second experiment determined the student's behaviour goal setting "A" in the course. The results were evaluated by means of hierarchical regression analysis and the finding indicated that theory of planned behaviour predicted the intention and goal attainment more accurately than the earlier theory of reasoned action (Ajzen & Madden, 1986).

The basic concept of the theory of planned behaviour is based on the fundamental construct of intention to perform a behaviour which is influenced by the attitude toward the behaviour and subjective norm. The attitude is the evaluation step of behaviour and it could be favourable or unfavourable depending on the salient information or beliefs linking the behaviour to the outcomes such as cost and injuries incurred as a result of performing the behaviour. The intention is also influenced by subjective norm which is a belief of perceive social pressure coming from the colleagues, bosses, parent, etc expecting the behaviour to be performed by the person. In spite of the success of attitude and subjective norm as antecedents to predict behaviour, fundamental issues related to boundary conditions were identified (Ajzen & Madden, 1986). It was argued that during transition between the intention and performing actual behaviour, three conditions must be fulfilled. First, the intention must be specific only to the behaviour in question; second this intention must not have changed during the transition and finally the duration of time interval between the intention and the behaviour. It was found the accuracy of the prediction varies inversely with the time interval between measurement of the intention and observation of the behaviour (Ajzen & Madden, 1986).

Ajzen and Madden (1986) discussed the prediction of a behaviour relying solely on attitude and subjective norm is sufficient when a person has a complete control of his behaviour. However, this is not always the case because many factors can interfere with control over intended behaviour. An internal factor such as knowledge and the availability of resources may impede a person's control his or her behaviour. It is necessary to access the extent of this control to ensure accurate prediction of behaviour. For this reason, the theory of planned behaviour was constructed to include perceived behavioural control and together with attitude and subjective norm ensure accurate prediction of behaviour (Ajzen & Madden, 1986). This theory as shown in Figure 2.2 suggest the attitude toward the behaviour, subjective norm and perceived behaviour control exert an independent effect on behaviour intention as well as mediates the relationship between these three antecedents with the behaviour. In addition, this theory also suggest that person's perceived behaviour control, influenced by the availability of resources (e.g., skill, knowledge) and opportunities, can predict the behaviour directly independent of the intention.

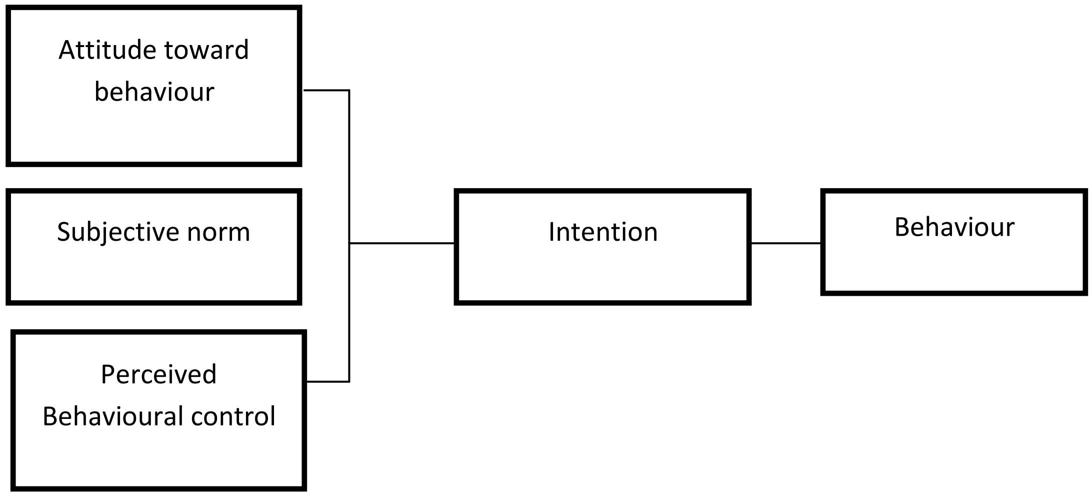

Figure 2.2
The Theory of Planned Behaviour Model (Ajzen & Fishbein, 1985)

Wright (1986) suggested that employees typically associate normal working practices with the work practices that every other employee does. In high risk industries, the subjective norm can be explained by self- regulation, enforced by regulatory bodies as well as the organization to generate safe working environment. Reason (1997) only highly skill and motivated employees are recruited to perform the job in hazardous working environment and management expects these employees to exhibit save working at all time and aware of the hazards around them. Safety rules and procedures are established to ensure behaviour is guided and to ensure employees are more independent and self regulated (Reason, Parker, & Lawton 1998) Rewards for compliance and punishment for violation to safety rules and procedures indicate seriousness by the management. In other words, an employee is expected to behave according to organizational norm to ensure compliance with safety rules and regulations. Only motivated employees shall be able to meet expectation. Geller (2001) stated that employee motivation is a driving force to influence safety behaviour among the employees at the workplace. Additionally, Geller suggested that the consequence of not getting injured as a result of behaving safety is a true motivator for save behaviour. Cooper (1998) stated that "proven strategies that harness group process can be brought to bear to motivate people to behave safely and help each work group to positively redefine their safety related norm".

Beside attitude and subjective norm, the behaviour of the people is strongly influenced by their confidence in their ability to perform (Bandura, Adams, & Beyer, 1977). This is attributed to how people perceived the control over the intended behaviour which relies on the availability of resources, competency, support from other people and past experience with the behaviour in question. The confidence may arise once the perceived control over the behaviour is in place. In this study, perceived behaviour control is explained by employees having knowledge, skill and ability to execute the behaviour will have better control on the behaviour. All these gained from training and education process which is an independent variable in this study. It is believe that employees who have adequate training/knowledge (competent) are more motivated and willing to demonstrate strong commitment to handle the tasks and in a position to behave according to organizational safety norms (Spencer & Spencer, 1993). A competent employee reflects the right attitude and high values on job efficiency, productivity and more importantly on safety.

2.7 Summary

Behaviour is the significant element in the overall safety performance at construction site. Accident as the ultimate performance of behaviours can be connected with safety climate. Unsafe behaviour does not happen purely on human factors alone. It also related to external factors like training/knowledge, motivational and nature of behaviours are also shaping the character of the construction workers.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This study examined the relationship between safety climate, safety training, safety motivation and safety behaviour in the construction industry in our country, Malaysia. This chapter describes concept applied for this study including methodology, research design, a description of the population and sample, the survey instruments, the operationalization of the research variables, validity and reliability tests and the data collections and analysis

3.2 Theoretical/conceptual/research framework

The construction of the theoretical framework for this study based on concept The Theory of Planned behaviour Model (Ajzen & Fishbein, 1985). The variable of primary interest to this research is the dependent variable of safety behaviour. Three independent variables are used in an attempt to explain the variance in safety behaviour. These three variables are safety climate, motivation and safety training.

This dependent variable lies on the premises that, people decide to perform a particular behaviour before they actually execute any given behaviour. Decision to behave in which manner are influence by various factors. These factors could be internal or external. The argument on this dependent variable is based on behaviour intention. Training included in this framework instead of knowledge. Training is one of the source of knowledge is considered more appropriate for this study. The perception of the effectiveness and quality of the training in the site is more purposeful to assess. The reason here, if a researcher assesses the respondent's knowledge, it is not known whether the knowledge was acquired through the training in the site itself or was acquired from other sources.

INDEPENDANT VARIABLE (IV) **DEPENDANT VARIABLE (DV)**

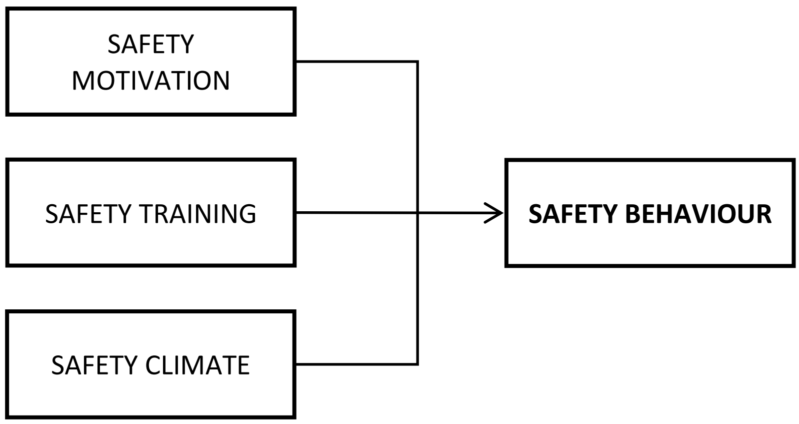

Figure 3.1

Theoretical Framework

3.3 Research Hypothesis

Hypothesis for this research are expressed as below:

- H_0^1 - Safety climate will not affect the behaviour of the workers in this site.
- H^1 - Safety climate will affect the behaviour of the workers in this site.
- H_0^2 - Safety Training will not affect the behaviour of the workers in this site.
- H^2 - Safety Training will affect the behaviour of the workers in this site.
- H_0^3 - Motivation will not influence the behaviour of the workers in this site.
- H^3 - Motivation will influence the behaviour of the workers in this site.

3.4 Research Design

This study to identify the extent to the selected human related factors (climate, motivation and training) can influence safety behaviour of the workers to the hazards in construction site. The research design involve quantitative, cross-sectional and survey type questionnaires. The quantitative research is use to answer question about relationships among measure variables with the purpose of explaining, predicting and controlling phenomena.

This study occurred in real life setting and it was conducted in the field with individuals responding to questionnaires from their own personal experiences.

3.5. Sampling and Population

The population in this study includes all workers and contractors directly and indirectly involved in the construction site at Lot G, Kuala Lumpur Sentral. Those who are attached in the operation of the construction site would be exposed to the material and occupational hazards, so they are the most suitable candidates for this study. The numbers of workforce registered in this site is estimated about 500 workers.

The sample size should be adequate to the study with referred to Veal (2005), a minimum sample for a population size 500; at confidence level of ± 5% is equal to 217. This study used the guideline suggested by Veal (2005).

In order to reach valid conclusions about population from samples, random sampling is the best way to reduce bias and gain the ability to generalize (Sekaran, 2000). Therefore this study used the random sampling method to collect data.

3.6 DEVELOPMENT OF INSTRUMENTS

3.6.1 Instruments

This study applied quantitative approach in data collection process. A survey method was used to collect the data from the respondent because that is the most appropriate method. The survey questionnaire used in this study was adopted from previous studies and represents a compilation of survey items already tested for reliability and used in the earlier empirical studies by others researchers in the field.

The survey questionnaire utilized the closed ended question format gives a uniform frame of reference for respondents to decide their answers (Weisberg & Bowen, 1977). The hallmarks of the survey questionnaire are clarity, simplicity and attractiveness, according to Folz (1995). Clear and logical questions with suitable response choices foster accurate and consistent responses. The flow of the questions should be logical, so that the respondents would be able to see easily the relationship between the questions asked and stated objectives of the research (Casley & Kumar, 1988).

The survey questionnaire was developed with specific questions to answer the research questions and to test the hypotheses. The questionnaire was divided into five sections. Section measured safety behaviour, section B measured safety climate, section C measured training, and section D measured motivation. Demographic questions were included to provide a profile of the respondents in section E. To measure the intensity of the respondent views, a five point Likert scale was employed.

3.6.2 Safety behaviour

Safety behaviour was measured by safety initiative and safety compliance. The items adopted from Neal et al. (2006), were used to measure safety compliance. Safety initiative was measured using items adopted from Zacharatos (2001). Safety initiative describe the behaviour that support safety such as participating in the safety programs and safety compliance describe the core activities that need to be carried by employees to ensure that is protected from injuries such as complying with safety rules and procedures. All these items were measured using a 5 point likert scale, were coded on a scale of 1 (strongly disagree) to 5 (strongly agree). The items are listed below:

1. I use all the necessary equipment to do my job
2. I use the correct safety procedures for carrying out my job
3. I ensure the highest levels of safety when I carry out my job
4. I voluntary carry out tasks or activities that help to improve workplace safety

3.6.3 Safety motivation

Safety motivation was measured by four items derived from Neal et al. (2000) and Zacharatos (2001). Responses were measured on a 5 point likert scale, range from strongly disagree to strongly agree. Higher score reflect higher employee motivation. The scale item as per listed below.

1. I feel that it is worthwhile to put effort to maintain or improve my personal safety
2. I feel it is important to maintain safety at all time
3. I believe that it is important to reduce risk of occupational accidents and incidents
4. I believe that workplace health and safety is an important issues

3.6.4 Safety training

Safety training was measured by four items derived from Lam, C.S. 1999. Responses were measured on a 5 point likert scale, range from strongly disagree to strongly agree. Higher score reflect higher employee motivation. The scale item as per listed below.

1. The training covered all the health and safety risks associated with my job
2. Training give me clear understanding on the critical aspects regarding safety at site
3. Workers are consulted to establish their training needs
4. Training gives me more confidence in executing my work

3.6.5 Safety climate

Safety training was measured by four items derived from Zohar (2000). Responses were measured on a 5 point likert scale, range from strongly disagree to strongly agree. Higher score reflect higher employee motivation. The scale item as per listed below.

1. Management places a strong emphasis on work place health and safety
2. Safety is given a high priority by the site by the site management
3. My employer considers safety to be important
4. Safety committee members used to advise workers pertaining safety

3.7 Validity and Reliability

All the variables used were tested by previous researchers for validity and reliability. Validity is defined as the degree to which a measurement scale measures what it is intended to measure (Nunally, 1978). Reliability describes the degree to which the measurement instrument accurately and repeatedly measures the intended construct (Churchill, 1979). Reliability of the results of this study were tested using Cronbach alpha, a coefficient of reliability which measures how well each item in a scale correlates with some of the remaining items. It measures consistency among items in a scale. This technique is the widely used internal consistency coefficient.

3.8 Pilot Study and reliability measurement

Prior to mass distribution of the survey questionnaire, a pilot study was conducted to ensure the questionnaires were understood, reliable and usable to collect data from large scale population. A total 30 questionnaires were distributed to the respondents through partially interview with the random selected workers.

The internal consistency of the measurement tools were analysed using SPSS 16 by determining the Cronbach's alpha coefficient. Sekaran (2000) recommended a value above 0.6 for good internal consistencies. Table 3.1 shows the results of the reliability analysis which shows all cronbach's alpha coefficient value were above 0.6. All values were above 0.7, an ideal for good internal consistencies (De Vellis, 2003). It was concluded that the measurement tools were consistent, reliable and usable to be used for data collection survey.

Table 3.1
The results of the internal consistencies analysis for pilot test

Dimension	Number of item	Cronbach alpha coefficient
Safety behaviour	4	.746
Safety climate	4	.767
Safety training	4	.726
Motivation	4	.726

3.9 Data Collection Procedure

The survey questionnaires were prepared in Malay and English version to give flexibility for the respondents to respond in either medium they were comfortable with. Prior to distributing the surveys, the selected safety committee's and safety personal's was explained about the details of the survey procedures. The time limit for collection was given as ten days; however the late responses were still acceptable. The key contact persons were asked to contact the researcher once they had collected some of the questionnaires.

The questionnaires were administered on the premises on Monday morning during the tool box meeting. Distributed and filled up the questionnaire with helps from safety officer from all sub-contractor. The questionnaires distributed to four safety officer from four subcontractor which is from Civil and Structural (C&S), Architectural, Mechanical and Electrical (M&E) subcontractor. We were assured the workers that their responses would be anonymous and confidential, and the respondents completed the questionnaires within 10 minutes. The process was continued until completed of 217 samples within 10 days.

Prior to the actual data collection, a discussion with the officer in-charge was held. It was decide all data collection will be conducted only during break and lunch hours. With helped of safety supervisors from subcontractor, data was collected during induction and tool box meeting.

The data collection was fully interviewer-completion with most of it were respondent completion. The interviewer-completion was made possible because the assistants were very helpful and understand the questionnaires well. They also minimized the possibilities of patchy or frivolous responses.

3.10 Data Analysis

The data collected was analysed used SPSS programme. The data was first code and entered into the data file of the programme. The frequencies, minimum and maximum scales of all the items measured in the questionnaires then computed to ascertain level of respondents reaction on the items. This serve as a counter inspection on the accuracy of the data entered before statistical analysis. *Figure 4.1* shows the process flow diagram of the data analysis.

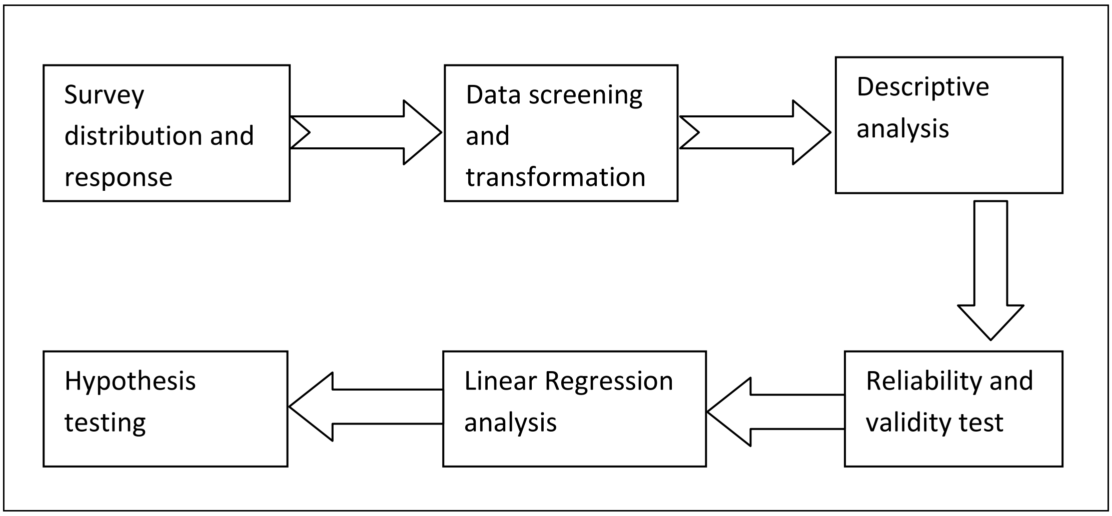

Figure 3.2
Process flow diagram for data analysis

3.10.1 Descriptive Analysis

Mean analysis is one of the descriptive statistical methods that can be conducted by using SPSS. This method generated the value of mean, mod, median, standard deviation, variance, maximum and minimum. Basically the mean is the average score located at the mathematical centre of distribution. Generally applied in order to indicate the value of scale variables that is been used in the questionnaires to tap the relevant information regarding behaviour.

3.10.2 Regressing and Hypothesis Testing

Correlation is one of the most common of data analysis method because it underlies many others analysis. Correlation measures the linear relationship between two variables. The correlation analysis computes a coefficient value in order to evaluate the relationships between variables.

According to SPSS version 16.0, the Bivariate Correlation procedure computes Pearson's correlation coefficient, Spearman's rho and Kendall's tau-b with their significance levels. Correlations measure how variables or rank order are related. Before calculating a correlation coefficient, the data is been screened for outliers (which cause misleading results) and evidence of a linear relationship. Pearson's correlation coefficient is a measure of linear association. Two variables can be perfectly related, but if relationship is not linear, Pearson's correlation coefficient is not an appropriate statistic for measuring their association.

Pearson's Correlation is a number measure the strength and direction of the linear relationship between the two variables. The correlation coefficient can range from -1 to +1, with -1 indicating perfect negative correlation, +1 indicating a perfect negative correlation, 0 indicating no correlation at all. A variable correlated with it will always have correlation coefficient of 1. You can think of the correlation coefficient telling you the extent to which you can give the value of one variable given a value of the other variable. The P-value associated with the correlation is known as Sig. (2-tailed). The footnote under the correlation table explains on the single and double asterisks signify.

Before any further interpretation is carried out in the correlation analysis, the Pearson coefficient or known as p-value need to be indicates at the first place. The p-values are important to indicate whether there is significant correlation between variables or not.

According to Aripin (2007), the interpretation of the p-value is as below:

1. No correlation if the p-value is close to zero
2. Low or weak correlation is if the p-value is greater than 0.5 or less than -0.5
3. Moderate correlation if the p-value between ±0.5 and ±0.7

4. High or strong correlation if the p-value is higher than 0.7 and less than -0.7

Generally a correlation coefficient has a value ranging from -1 to 1. Values that are closer the absolute value of 1 indicate that there is a strong relationship between the variables being correlated, whereas values closer to 0 indicate that there is little or no linear relationship.

The sign of a correlation coefficient describes the type of relationship between the variables being correlated. A positive correlation coefficient indicates that there is a positive linear relationship between the variables; as one variable increase in value, so does the other. A negative value indicates a negative linear relationship between variables; as one variable increase in value, the other variable decrease in value. The number of days students miss class and their test scores are likely to be negatively correlated because as the number of days of missed classed increases, test scores typically decrease.

3.11 Summary

The concept applied for this study is based on previous ideas by Ajzen & Fishbein. Some of the instruments were slightly modified or created new for the purposed of this study. The main variable interest in this study is the dependent variable of safety behaviour. The three important independent variables are safety climate, safety training and motivation. Data collection gets through the distribution of questionnaires randomly in selected construction site. All data will process using SPSS programme.

CHAPTER 4

RESULT AND FINDING

4.1 Introduction

Generally this chapter concentrates on data analysis process and presents the surveys finding or describes the result of the statistical analysis of the quantitative data using method have been describes in chapter 3. The collected data were analysed according to the objective of this study that have been stated in Chapter 1. Basically the objective of the questionnaires is to get feedback from the workers regarding the factors influence their safety behaviour at construction site. It also tried to get the information with current safety practices contributes to the safety behaviour of the workers.

4.2 Data Screening and Transformation

Table 4.1 shows the summary of data during screening stage. The raw data collected from the survey questionnaires were entered into the Statistical Package for Social Science (SPSS) version 19 worksheet for analysis. This step involved screening and cleaning of the data from errors in data entry and missing data. The analysis revealed that no data were missing.

Table 4.1
Data screening and transformation (N=217)

Variables	No. of Missing Data point	No. of items In the Variable	Negative Items recoded	Total data Points (Nx no. of Items)	Percent Missing Data points
Safety Behaviour	0	4	none	868	0
Safety Climate	0	4	none	868	0
Safety Training	0	4	none	868	0
Safety Motivation	0	4	none	868	0
Background information	0	4	none	88	0

4.3 Survey Results

The questionnaires survey results comprise the outcomes from a Reliability and Validity, normality test, descriptive analysis and regression analysis.

4.3.1 Reliability and Validity Test

Comparison of internal reliability between pilot test and actual survey are shown in the table 4.2

Table 4.2
Cronbach's Alpha

	Variables	Item no	Cronbach's Alpha	Cronbach's Alpha
			Pilot Test (n=30)	Actual Survey (n=217)
1	Safety Behaviour (DV)	4	.746	.748
2	Safety Climate (IV)	4	.767	.761
3	Safety Training (IV)	4	.726	.720
4	Safety Motivation (IV)	4	.726	.731

4.3.2 Demographic profile of the respondents

Section A of the questionnaire provides the background information of the respondents. The profile includes age, nationality, trade and duration in construction.

Table 4.3

The demographic profile of the respondents

Parameter		**Frequency**	**Percentage**
Age	18-25	37	17.1
	26-35	106	48.8
	36-45	14	6.5
	46-55	59	27.2
	55 above	1	.5
Nationality	Bangladesh	105	48.4
	Indonesia	78	35.9
	Myanmar	10	4.6
	Pakistan	24	11.1
Trade	Barbender	41	18.8
	Carpenter	46	21.2
	General workers	32	14.7
	M&E	60	27.6
	Mason	38	17.5
Exposure	1 to 5 year	71	32.7
	6 to 10 year	98	45.2
	11 to 15 year	48	22.1
	16 to 20 year	0	0
	21 above	0	0

4.3.3 Correlation

Table 4.4
Correlations

		TSAFETY BEHAVIOUR	TSAFETY CLIMATE	TSAFETY TRAINING	TSAFETY MOTIVATION
TSAFETY BEHAVIOUR	Pearson Correlation	1	.202**	.463**	.533**
	Sig. (2-tailed)		.003	.000	.000
	N	217	217	217	217
TSAFETY CLIMATE	Pearson Correlation	.202**	1	.643**	.252**
	Sig. (2-tailed)	.003		.000	.000
	N	217	217	217	217
TSAFETY TRAINING	Pearson Correlation	.463**	.643**	1	.417**
	Sig. (2-tailed)	.000	.000		.000
	N	217	217	217	217
TSAFETY MOTIVATION	Pearson Correlation	.533**	.252**	.417**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	217	217	217	217

**. Correlation is significant at the 0.01 level (2-tailed).

Interpretation:

Correlation between Dependant Variable (DV) and Independent Variable (IV) which is Safety Behaviour as a Dependant Variable (DV);

- There is a positive correlation between safety climate and safety behaviour (.202)
- There is a positive correlation between safety training and safety behaviour (.463)
- There is a positive correlation between safety motivation and safety behaviour (.533)

Correlation between Independent Variable (IV) with Independent Variable (IV);

- There is a positive correlation between safety climate and safety training (.643)
- There is a positive correlation between safety climate and safety motivation (.252)
- There is a positive correlation between safety training and safety motivation (.417)

4.3.4 Hypothesis Test

Regressing analysis was tested individually for each predictor in the relationship. Table 4.34 depicts the correlation analysis of the variables using the Pearson correlation. The table shows the independent variables correlated substantially with safety behaviour (all above 0.2). The variables with significant relationships with safety behaviour included safety climate (.202), safety training (.463) and safety motivation (.533). All independent variables had positive correlations with safety behaviour. The correlation among independent variables shows all values were less than .7. These included the correlation between safety climate and safety training (.643) and safety motivation (.255), similarly correlation between safety training and safety motivation was .417.

Hypothesis One

- H_0^1 - Safety climate will not affect the behaviour of the workers in this site.
- H^1 - Safety climate will affect the behaviour of the workers in this site.

Table 4.5
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.202[a]	.041	.037	.46161

a. Predictors: (Constant), TSAFETY CLIMATE

b. Dependent Variable: TSAFETY BEHAVIOUR

Table 4.6

Anova

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.957	1	1.957	9.185	.000[a]
Residual	45.812	215	.213		
Total	47.770	216			

a. Predictors: (Constant), TSAFETY CLIMATE

b. Dependent Variable: TSAFETY BEHAVIOUR

Refer to the regressing analysis, the safety climate effect F (1,215) =9.185, p=.000 towards safety behaviour was significant with 4.1 % of variance in the dependant variable is accounted.

Therefore with $p<.01$, this study rejects the null hypothesis and accepts the alternative hypothesis, H^1

- H□^{1} - Safety climate will affect the behaviour of the workers in this site.

Table 4.7

Coefficients[a]

Model	Unstandard-ized Coefficients		Standard-ized Coefficie-nts	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tole-rance	VIF
(Constant)	3.752	.193		19.488	.000	3.372	4.131					
TSAFETY CLIMATE	.137	.045	.202	3.031	.000	.048	.227	.202	.202	.202	1.000	1.000

a. Dependent Variable: TSAFETY BEHAVIOUR

The summaries of the result: ß = .202, p= .000, t= 3.031, shows that significant direct positive relationship between safety climate and safety behaviour.

Hypothesis Two

- H□^{2} - Safety Training will not affect the behaviour of the workers in this site.
- H^2 - Safety Training will affect the behaviour of the workers in this site.

Table 4.8

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.463[a]	.214	.211	.41785

a. Predictors: (Constant), TSAFETY TRAINING

b. Dependent Variable: TSAFETY BEHAVIOUR

Table 4.9

Anova[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.231	1	10.231	58.595	.000[a]
Residual	37.539	215	.175		
Total	47.770	216			

a. Predictors: (Constant), TSAFETY TRAINING

b. Dependent Variable: TSAFETY BEHAVIOUR

With refer to the regressing analysis, the training effect F (1,215) = 58.595, p =0.000 towards safety behaviour was significant; with 21.4 % of the variance in the dependant variable is accounted.

Therefore with $p<0.01$, this study rejects the null hypothesis and accepts the alternative hypothesis H^2.

- H^2 - Safety Training will affect the behaviour of the workers in this site.

Table 4.10

Coefficients[a]

Model	Unstandar-dized Coefficients		Standar-dized Coeffici-ents	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Toler-ance	VIF
(Constant)	2.275	.270		8.438	.000	1.743	2.806					
TSAFETY TRAINING	.478	.062	.463	7.655	.000	.355	.602	.463	.463	.463	1.000	1.000

a. Dependent Variable: TSAFETY BEHAVIOUR

The summaries of the result: ß = .463, p= .000, t= 7.655, shows that significant direct positive relationship between safety training and safety behaviour.

Hypothesis Three

- H_0^3 - Motivation will not influence the behaviour of the workers in this site.
- H^3 - Motivation will influence the behaviour of the workers in this site.

Table 4.11

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.533[a]	.284	.281	.39878

a. Predictors: (Constant), TSAFETY MOTIVATION

b. Dependent Variable: TSAFETY BEHAVIOUR

Table 4.12

Anova[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	13.580	1	13.580	85.395	.000[a]

Residual	34.190	215	.159			
Total	47.770	216				

a. Predictors: (Constant), TSAFETY MOTIVATION

b. Dependent Variable: TSAFETY BEHAVIOUR

With refer to the regressing analysis, the safety motivation effect F (1,215) = 85.395, p = .000 towards safety behaviour was significant with 28.4 % of the variance in the dependant variable is accounted.

Therefore with $p<0.01$, this study rejects the null hypothesis and accepts the alternative hypothesis H^3.

- H^3 - Motivation will influence the behaviour of the workers in this site.

Table 4.13

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
(Constant)	1.915	.262		7.297	.000	1.398	2.432					
TSAFETY MOTIVATION	.565	.061	.533	9.241	.000	.445	.686	.533	.533	.533	1.000	1.000

a. Dependent Variable: TSAFETY BEHAVIOUR

The summaries of the result: ß = .533, p= .000, t= 9.241, shows that significant positive direct relationship between safety and safety behaviour.

Table 4.55 shows that all hypothesis were supported and thus accepted for this study

Table 4.55

Acceptance or rejection of stated hypothesis

No	Hypothesis	Accept or

		reject
1	Safety climate will affect the behaviour of the workers in this site.	Accept
2	Safety Training will affect the behaviour of the workers in this site.	Accept
3	Motivation will influence the behaviour of the workers in this site.	Accept

CHAPTER 5

DISCUSSION

5.1 INTRODUCTION

Generally this chapter discover about the findings of the study. It will be discuss the findings of the present study with some of the findings in the literature review. The aim of this study was to determine the extent to which human factors influence safety behaviour of the employees in the construction industry. The results of this study were essential because the nature of work activities in this industry is high risk. Record had shown the accidents rates with fatality were very high. As the industry expanded and more people were employed, minimize these risks was inevitable. To address this issue, the regulatory body introduced laws specifying the responsibilities of the employer and employees in relation to occupational safety at workplace. In addition organization introduced various safety measures such as safety awareness program in order to produce safe workers. However despite rigorous safety measures introduced by organization and regulatory body, the general trend indicated that the number of reported occupational safety accident in the industries was increasing. It can only mean one thing, that measures were ineffective. Meanwhile, literatures review revealed that a number of safety behaviour studies were focus on organizational factors and thus neglecting other important contributing factors such as persons, behaviour, and environment factors. In view of this issue, Reason et al. (1998) stated that despite the fragility of the industry, past literature had shown that safety behaviour studies in high risk working environment had received little attention. Therefore, it was compelling urge to examine the safety behaviour of the workers in construction site. The outcomes of this study could be assist the management to improve its safety performance while at same time this study a sound platform for future valuable work in this area.

5.2 Discussion on Major Components

There are certain few things which are important to understand regarding safety behaviour. If based on the Theory planned Behaviour people wait the situation before adapting to a given behaviour. In this case the external component of subjective norms plays its part in determining the route of behaviour. While in Vroom's Expectancy Theory explained, the strength of the tendency to act in specific way is depends on the strength of an expectation that the act will be followed, this to simply say, people behave in a certain manner towards the realization of personal goal in the form of some rewards.

When discuss about relationships between two variables. It is important to note that all relationship s may fall into one category as per below (Jones, J., 2008):

- There is a direct cause and effect relationship
- There is a reverse and effect relationship
- The relationship may be caused by a third variable
- The relationship may be caused by complex interactions of several variables
- The relationship may be coincidental

The regression analysis done in this case study accepted all three alternative hypothesis with considerations as suggested through the above relationship's guide. The result shows the safety climate (Pearson = .202; r^2 = .041), safety training (Pearson = .463; r^2 = .241) and safety motivation (Pearson = .533; r^2 = .284). Therefore the most positive correlated to safety behaviour is a safety motivation.

5.2.1 Safety Training and Behaviour

Most construction projects are subcontracted to subcontractors. The main contractors do not directly employed construction workers on sites. There are many different trades of workers that required working in the construction sites. The short duration of construction work activities posed a great mobility of the construction workers, because they are daily- based- wage. They required finding work in other construction sites and resulted in working multi-layers of sub-contracting system.

Finding from this study shows that all the respondents strongly agree and agree with the all statement about training. From the frequency analysis the statement 'The training covered all the health and safety risk associated with my job' which is 47% of respondent strongly agree and 53% agree. The statement of ‘Training give me clear understanding on the critical aspect regarding safety at site’ which is 48.8% of respondent strongly agree and 51.2% agree. For the statement ‘worker are consulted to establish their training needs’ which is 56.7% respondents strongly agree and 43.3% agree. Finally 59% of respondents strongly agree and 41% agree with the statement of ‘Training gives me more confidence in executing my work’.

Refer to the result above, the workers rally needs training because most the construction workers are not well educated. Their friends and relatives recruit them to work on sites. Subcontractors employed worker’s physical ability and skill to carry out work; they have not provided safety training to the workers in the construction sites. This means that the workers lack safety awareness and conscious on the job-related safety and health issues. In the questionnaire, the construction workers responded that the attendance of safety training green card course and safety induction course would enlighten their mind for safety and health knowledge and awareness, but the frequent change of site environment and poor equipment supplied making them difficulty for compliance of safety standards. So safety training is very important to cope the needs for the construction workers. Safety training can modify worker safe behaviour; the workers can understand the work potential hazard that they can prevent it. Safety training is very broad, but it can concentrate to the work-related safety and health. The training program shall cover

- The use of personal protective equipment and its maintenance
- Job safety analysis
- Work related hazard and ill-health
- Reporting of incident/ accident procedure and accident prevention
- Compliance with Malaysia Safety and Health laws
- Safe use of tools and equipment
- Emergency preparedness

Training to workers cannot be discontinuous. The effective and efficient way is the workers are receiving on-site safety training. They can practise which is correct and incorrect, which is a standard or non-standard, the worker safe behaviour can perform as a result. In parallel with legislation and compliance, provision of training is one of the mandatory requirements for the employees. This is stated in the clause Part IV section 15(2) (b) of OSHA 1994 as one of the employer responsibility.

5.2.2 Safety Climate and Behaviour

Positive safety climate is one of the factors that encourage people to work safely. It works as a platform that may indirectly caused certain behaviour. In this case study, the perception on safety climate shows that 56.7 % strongly agree, 40.1% agree and 3.2 % disagree with the statement 'Management places strong emphasis on work place safety and health'. The statement 'Safety is given priority by the site management' which is 55.3 % of respondent strongly agrees and 44.7 % agree. For the statement 'My employer consider safety to be important' which is 63.1% of respondent strongly agree, 30.4% agree and 6.5 % not sure. Finally 48.8% of respondents strongly agree and 51.2 % agree with the statement 'Safety committee members used to advise workers pertaining to safety'. Overall, shows that very good safety atmosphere. Most of the respondents either agree or strongly agree that the management strongly emphasizes safety. Other questionnaires response also implied a similar situation. The management of the organisation should take proactive measure to implement and develop safety climate in the workplace since all the worker have positive perception toward safety and health. The point to stress here, safety climate is not only affecting the workers but affecting the safety committee as well. When the top peoples of the site concern much about safety, it drags others to consider safety as important, the safety committee were committed to advice the workers because of the climate encouraging to do so. It is a complex interaction of several variables that giving the outcome. Management does care, safety committee do bother then the workers just follow the flow. This kind of chain events ended up with the workers work safely.

Another perspective, from the management's point of view, the management might claim they did enough in creating a favourable climate. The main contractor adhere to the rules and regulation albeit with less understanding of 'As far As practicable', this referring to Part IV section 15(2) of OSHA 1994. The compliance and legislation approach by the management with incorrect way. Organization thought physical compliance is good enough to impress the workers. This issue is some of these physical compliances are to show to the authority that they are adhered to the rules and regulation.

5.2.3 Safety Motivation and Behaviour

Safety motivation is strong drive that makes workers more imaginative and more concern about others. Motivated employees shall do better in complying and participating in safety programs, improving personal safety, maintain safety at all time, reducing occupational risk and follow the rules. All these actions are behaviour related and safety motivation, according to Neal and Griffin (2006), shall drive individual to exert effort to enact safety behaviours and the valence associated with that behaviour. All the finding show how safety motivation can improve safety behaviour.

The hypothesis test empirically confirmed that safety motivation influences to safety behaviour. The result raw data shows that 76% strongly agree and 24% agree with the statement 'I feel is worthwhile to in effort to maintain or improve my personal safety'. For the statement 'I feel important to maintain safety at all time', which is 69.1% strongly agree and 29.9% agree. The statement 'I believe it is important to reduce the risk of accidents in work place' shows that 66.4% respondent strongly agree and 33.6% agree. Finally 36.4% respondents strong agree and 63.6 agree with the statement 'I follow rules to avoid being reprimanded.

In the construction site, the motivational force for shaping the safety behaviour of the workers can derive from government regulatory requirement. Specifically Regulation 5(2) of Occupational Safety and Health (Control of

Industrial Major Accident Hazards) Regulation 1996 clearly defines the mandatory obligation of every employee to (a) co-operate with the employer in complying with these regulations; (b) act safely so as not to cause any danger to himself, other people and the property; and (c) notify employer and Safety Health Officer when he realized about any potential hazards (OSHA Act and Regulations, 2007). This obligation is not by choice but mandatory. The positive relationship found in this study shows how crucial safety motivation is to the construction site in order to influence safety behaviour of the workers.

5.3 Discussion of the Hypothesis

Hypothesis one propose that there would be a relationship between safety climate and safety behaviour. This hypothesis was supported by the result of the regression analysis which revealed a positive relationship between these two variables ($ß = .137$, $p=<.001$). (Pearson = .202; $r^2 = .041$)

Hypothesis two proposes that there would be a relationship between safety training and safety behaviour. This hypothesis was supported by the result of the regression analysis which revealed a positive relationship between these two variables ($ß = .478$, $p=<.001$). (Pearson = .463; $r^2 = .241$)

Hypothesis three proposes that there would be a relationship between safety motivation and safety behaviour. This hypothesis was supported by the result of the regression analysis which revealed a positive relationship between these two variables ($ß = .565$, $p=<.001$). (Pearson = .533; $r^2 = .284$).

5.4 Research Question

1. ***What is the relationship between safety climate and safety behaviour*** ?

   The result obtained, showed that there was a significant relationship between the safety climate factor and safety behaviour.

   The finding of this study, agree with those of studies conducted by Neal and Griffin (2000). They were conducted 2 studies to determine the relationship between safety climate and safety behaviour using archival survey data and administered questionnaires distributed to employees working in manufacturing and mining organizations. They found positive relationship between safety climate with employee safety compliance and safety participation. This was supported by a study by Zohar (2002) who collected data from 411 production workers in a metal processing plant found higher safety climates created by greater concern for employee welfare and safety arising from closer individualized relationships promotes safe behaviours among the employees.

2. ***What is the relationship between safety training and safety behaviour*?**

   The result obtained, showed that there was a significant relationship between the safety training factor and safety behaviour.

   The finding of this study, agree with those of studies conducted by Zeng et al. (2008), it has been pointed out that some accidents such as falling from height and hit by falling materials in construction could easily be prevented from implementing training programs to employees. In the same study, it has also been found that many workers in the Chinese construction industry had received limited education about safety issues (Zeng et al., 2008). Similarly in the study of Dingsdag et al. (2008) construction workers identified training as necessary element of safety performance.

   Langford et al. (2000) identified the critical factors that influence the attitudes of construction workers towards safe behaviour on construction site. As the result of the study, training of operatives and safety supervisors is important to safety awareness and improve performance. Moreover, it has also been found that knowledge and competence influence personal safety performance. They also stated that companies must maintain and update their workers skill and knowledge by training, skill updates and effective on site communication (Langford et al., 2000).

3. ***What is the relationship between safety motivation and safety behaviour*** ?

The result obtained, showed that there was a significant relationship between the safety motivation factor and safety behaviour.

The finding of this study, agree with those of studies conducted by VOSH et al. (2007) found there were stable individual differences in the motivation. The study suggested that when a person anticipated a decision would be taken advantage by others, then that person would be motivated to take an adverse emotional response to prevent that from happening. In data collected from 700 employees working in an Australian hospital, Neal and Griffin (2006) found that individual safety motivation was associated with increased in self-reported safety behaviour and reduction in accidents.

The result of the regression analysis supported all hypothesis and therefore fulfilled the objectives of this study. Safety climate, safety training and safety motivation were all have positive relationship with safety behaviour. Among the three antecedents used in this study, safety motivation appeared to have strongest influence on safety behaviour, followed by safety training and safety climate. This is a clear that the safety motivation factor plays a significant role in determining the safety behaviour in construction industry. However this aspect is almost neglected by many an organisation in providing solution to occupational accident. It would be have a great impact on safety behaviour if this factor implement seriously by organisation.

In addition to fulfilling the research objectives, this study also contributed to enhance the knowledge and application of the Theory of Planned Behavior which was used extensively in marketing to predict consumer behaviour hardly used to predict safety behaviour among employee in the industry.

5.5. Overview of the study and Implication to Management

Based on the findings from this study, management of the construction site recommended to follows a few steps in managing behaviour of the workers in their organization. The hierarchy of the control measures in controlling the human factor started from motivation, training and finally with an enforcement in developing safety climate in the construction site.

Motivation

Motivation refers to processes or conditions that can energize and direct a person's behaviors in ways intended to gain rewards or satisfy needs. Setting goals for performance coincident with learning objectives and use of feed-back to note progress have motivational value. With regard to OS&H, motivation can mean one's readiness to adopt or exhibit safe behaviors, take precautions, or carry out self-protective actions as instructed. Bonuses, prizes, or special recognition can act as motivational incentives or rewards in eliciting as well as reinforcing these behaviors when they are displayed.

The study would tend to show however that the creation of a stimulating, productive and satisfying work environment could be beneficial for both the management and workers if honest concern is shown for all parties involved. It is belief that the managers have a greater role to play in this arrangement for improvement. One of the most important lessons from this study is perhaps the fact that managers must get personally involved and take active part in managing motivational processes at work, if they really wish to improve performance of safety.

The findings also point to the need for management to monitor the behaviour of their employees on a continuing basis as a deliberate policy and practice, and to use such information as a motivational barometer to identify potential trouble or problem spots. This should not be on abhorring basis rather it should be continuous.

Training

In general, training refers to instruction and practice for acquiring skills and knowledge of rules, concepts, or attitudes necessary to function effectively in specified task situations. With regard to OS&H, training can consist of instruction in hazard recognition and control measures, learning safe work practices and proper use of personal protective equipment, and acquiring knowledge of emergency procedures and preventive actions. Training could also provide workers with ways to obtain added information about potential hazards and their control; they could gain skills to assume a more active role in implementing hazard control programs or to effect organizational changes that would enhance worksite protection.

Knowledge or skills acquired in training may not always result in improved performance in actual work situations. This may indicate 1) lack of suitable motivation, 2) training content does not fit job demands (i.e., a problem in defining suitable training objectives, or 3) dissimilarity or conflicts between the instruction/practice in training conditions when compared to actual job conditions (i.e., a problem in transfer of training). More is said about this in the sections to follow.

- The adequacy of the current regulatory language on training requirements.
- Future training challenges owing to changing workplace technologies/job demands and related hazards, worker demographics, emergent occupational injury/illness problems.
- New training technologies and evaluation strategies for measuring training outcomes.
- Desirability of merging independent training domains (skills training, OSH Training and health promotion).

Safety Climate

Finally developing process of safety climate in the organization should be implemented in proper manner. A another important finding of this study is the fact that the workers wants a management or leadership by consultation, but whether the style of leadership is 'Tells', 'Sells', 'Joins' or ' Consults', a feature of such a leadership if it is to command effective follower ship should have a clear communication channels.

Every human being wants recognition and respect and the employee is no different in fact the worker seems to want and need it more. The findings of this study point to the need for the leaders of the organization to recognize this. A recognition or appreciation of an effort made or a good job done is likely to produce even better job apart from making a happier and more satisfied worker. But if when the work is well done, it attracts no comment but whereas the slightest mistake is condemned (negative stroking) then the likelihood is that more dissatisfied workers with less zeal or productivity for the job will be produced.

5.6 Overview of the study and Implication to policy maker and authorities

The government had established act and regulations and has taken many actions to guard employees against the entirely preventable tragedies of occupational death, disease and disability. The existing safety regulations have had little effect to guard workers/employees against occupational accident at the workplace. As discuss at chapter 1, the number of accident was increasing in proportion with the expansion of the industry due to growing of economy. This is the greatest challenge to Authorities Department in their quest to find a better approach to control the increasing of accident and incident rate in the construction industries and others industries as well. The effectiveness of traditional existing method of managing occupational safety and health by merely focusing on the hardware of organizational safety system and the working environment needs to reviewed and re-examined.

Finding of this study suggest a new approach to enhance safety policy and safety performance at workplace. This approach to promote more on safety behaviour that it shall be included during the entire process of the employment, from recruitment process until the employee retired from the company. The policy on safety behaviour should cover the hiring process, enhancement process and maturity process. The hiring process involves selecting the right candidates for the jobs while the induction process relates to explaining about the working condition and using the right tools and knowledge. Enhancement process is the step to further strengthen the knowledge the existing employees and maturity phase is establishing the refreshers courses to re-enlighten them with the knowledge they had learned.

In the construction industry the policy maker should establish a requirement for recruitment employees with minimum qualification. Refer to this study all the workers are foreign workers, so we do not know about their academic back ground, most of them are not educated. Through researcher experiences quite sometime in the construction industry, most of the occupational accident involved with the foreign workers, especially with the new workers. In order not to disrupt the shortage of workers in the construction industry, the authorities such as CIDB can play the role to implement the course or training related to the works before they can enter to construction site for commencement their work. Another problem with new foreign workers is a communication. All of them do not understand others language rather than their own language. To conduct the induction course such as CIDB green card to be conducted by trainer who know their language. This is will make the sense of the training, more effective and good output result.

5.7 Overview of the study and Implication to future researchers

The safety behaviour model should be applicable to various work settings and various industry. The variation may be in the form of risks, safety climate, safety culture, organizational commitment and employee background. Others influence factor can be used for future research such as work pressure, employee conscientiousness, management commitment and etc.

Finally for future study of safety behaviour should assess the safety commitment by employer and commitment to the organization because it's contribute strong impact in shaping the safety climate and organization behaviour in the workplace.

5.8 CONCLUSION

This case study provided significant contributions to the academy and practitioners of safety behaviour management. These finding may be used to enhance organization understanding of employees' safety behaviour and how it can be influenced. This case study also provides foundation for future researchers to extend the study on safety behaviour by covering wide range of human factors in different work setting.

Human capital is an important asset to the organization, therefore it is imperative that the management have clear understanding of the best way and strategy to encourage workers to engage and commit to safety. This is vital for safety behaviour improvement. The focus should be focus on safety training, developing safety climate and motivating to realise the important of safety.

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APPEDIX: A

BORANG KAJI SELIDIK

Kaji Selidik ini adalah untuk pengukuran dan persepsi pekerja di tapak bina berhubung amalan Keselamatan dan Kesihatan Pekerjaan. Maklumat yang anda berikan adalah sulit dan hanya digunakan untuk tujuan kajian ini sahaja.

1: Sila tandakan [√] pada petak yang sesuai atau mengisi ruang yang di sediakan/ Please tick (√) in the appropriate box or fill the space provided

A: *Maklumat Latarbelakang/Back ground*

1. Umur/Age

☐ 18-25 ☐ 26-35 ☐ 36-45

☐ 46-55 ☐ Lebih 55/more than 55

2. Warganegara/Nationality

☐ Malaysia ☐ Indonesia ☐ Bangladesh

☐ Myanmar ☐ Lain-Lain ……………………………………

3. Bidang Pekerjaan/ Trade

☐ Kayu/ Carpenter ☐ Besi/Barbender ☐ Simen/mason

☐ M&E ☐ Lain-lain/others……………………………

4. Tempoh masa di sektor Pembinaan/Duration in construction

☐ 1hingga 5 tahun/1 to 5 year ☐ 6 hingga 10 tahun/6 to 10 year

☐ 11 hingga 15 tahun/11 to 15 year ☐ 16 hingga 20 tahun/16 to 20 year

☐ Lebih dari 20 tahun/ More than 20 year

Sila tandakan (√) pada petak yang sesuai bagi menggambarkan tahap persetujuan anda pada setiap pernyataan di bawah:

Please tick (√) in the appropriate box to indicate your level of agreement for each statement below:

1-sangat tidak setuju/strongly disagree, 2- tidak setuju/not agree, 3-tidak pasti/not sure 4-setuju/agree, and 5-sangat setuju/strongly disagree

		1	2	3	4	5
B	***Safety Climate***					
1	Pihak Pengurusan memberi penekanan yang kuat terhadap keselamatan dan kesihatan di tempat kerja. Management places a strong emphasis on work Place safety and health					
2	Isu keselamatan adalah diberikan keutamaan oleh pihak pengurusan Safety is given priority by the site’s management					
3	Majikan saya mengutamakan keselamatan/ My employer consider safety to be important					
4	Ahli Jawatankuasa keselamatan selalu memberi nasihat berkaitan dengan keselamatan di tempat kerja/ Safety Committee members used to advise workers pertaining safety					
C	***Safety Training/Latihan Keselamatan***					
1	Latihan keselamatan merangkumi semua yang berkaitan dengan perkara bahaya kerja saya The training covered all the health and safety risks associated with my job					
2	Latihan Keselamatan memberikan saya pemahaman yang jelas tentang aspek kritikal pekerjaan saya yang melibatkan bahaya Training give me clear understanding on the critical aspect regarding safety at site					
3	Pekerja adalah dirujuk untuk merangka latihan keselamatan Workers are consulted to establish their training needs					
		1	2	3	4	5

4	Latihan keselamatan memberikan saya keyakinan untuk melakukan pekerjaan saya Training give me more confidence in executing my work					
D	***Safety Motivation/ Motivasi Keselamatan***					
1	Saya rasa adalah patut dan wajar untuk saya berusaha menjaga keselamatan diri saya. I feel is worthwhile to put in effort to maintain or improve my personal safety					
2	Saya rasa adalah penting untuk memastikan keselamatan pada setiap masa I feel it is important to maintain safety at all times					
3	Saya percaya adalah penting untuk kita mengurangkan tahap bahaya bagi mencegah kemalangan di tempat kerja I believe it is important to reduce the risk of accidents in the work place					
4	Saya menurut peraturan untuk mengelak dari di denda I follow rules to avoid being reprimanded					
E	**Safety Behavior**					
1	Saya menggunakan semua peralatan keselamatan yang perlu untuk melakukan kerja saya I use all the necessary safety equipment to do my job					
2	Saya mempastikan tahap tertinggi keselamatan semasa melakukan kerja saya I ensure the highest levels of safety when I carry out my job					
3	Saya selalu berusaha untuk meningkatkan tahap keselamatan di tempat kerja I put in extra effort to improve the safety of the work place					
4	Saya selalu membantu melakukan aktiviti keselamatan di tempat kerja dengan sukarela. I voluntary carry out tasks or activities that help to improve workplace safety					

APPEDIX: B

Appendix 8.2.1

Reliability

Variable: Safety Behavior

Case Processing Summary

		N	%
Cases	Valid	217	100.0
	Excluded[a]	0	.0
	Total	217	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.748	4

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.5392	2.009	1.41735	4

Variable: Safety Climate

Case Processing Summary

		N	%
Cases	Valid	217	100.0
	Excluded[a]	0	.0
	Total	217	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.761	4

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.1106	3.080	1.75508	4

Variable: Safety Training

Case Processing Summary

		N	%
Cases	Valid	217	100.0
	Excluded[a]	0	.0
	Total	217	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.720	4

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.1751	2.154	1.46778	4

Variable: Safety Motivation

Case Processing Summary

		N	%
Cases	Valid	217	100.0
	Excluded[a]	0	.0
	Total	217	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.731	4

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.4793	1.890	1.37463	4

Appendix 8.1.2

Frequencies

Statistics

Age

N	Valid	217
	Missing	0

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	37	17.1	17.1	17.1
	26-35	106	48.8	48.8	65.9
	26-36	14	6.5	6.5	72.4
	36-45	59	27.2	27.2	99.5
	46-55	1	.5	.5	100.0
	Total	217	100.0	100.0	

Statistics

Nationality

N	Valid	217
	Missing	0

Nationality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bangladesh	105	48.4	48.4	48.4
	Indonesia	78	35.9	35.9	84.3
	Myanmar	10	4.6	4.6	88.9
	Pakistan	24	11.1	11.1	100.0
	Total	217	100.0	100.0	

Statistics

Trade

N	Valid	217
	Missing	0

Trade

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	barbender	9	4.1	4.1	4.1
	Barbender	32	14.7	14.7	18.9
	Carpenter	46	21.2	21.2	40.1
	g.workers	32	14.7	14.7	54.8
	M&E	60	27.6	27.6	82.5
	Mason	38	17.5	17.5	100.0
	Total	217	100.0	100.0	

Statistics

Exposure

N	Valid	217
	Missing	0

Exposure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11to15year	48	22.1	22.1	22.1
	1to5year	71	32.7	32.7	54.8
	6to10year	98	45.2	45.2	100.0
	Total	217	100.0	100.0	

Frequencies of Safety Behavior

Statistics

		E1	E2	E3	E4
N	Valid	217	217	217	217
	Missing	0	0	0	0

Frequency Table

E1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	52	24.0	24.0	24.0
	strongly agree	165	76.0	76.0	100.0
	Total	217	100.0	100.0	

E2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	74	34.1	34.1	34.1
	strongly agree	143	65.9	65.9	100.0
	Total	217	100.0	100.0	

E3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	73	33.6	33.6	33.6
	strongly agree	144	66.4	66.4	100.0
	Total	217	100.0	100.0	

E4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	118	54.4	54.4	54.4
	strongly agree	99	45.6	45.6	100.0
	Total	217	100.0	100.0	

Frequencies of Safety Climate

Statistics

		B1	B2	B3	B4
N	Valid	217	217	217	217
	Missing	0	0	0	0

Frequency Table

B1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	disagree	7	3.2	3.2	3.2
	agree	87	40.1	40.1	43.3
	strongly agree	123	56.7	56.7	100.0
	Total	217	100.0	100.0	

B2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	97	44.7	44.7	44.7
	strongly agree	120	55.3	55.3	100.0
	Total	217	100.0	100.0	

B3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not sure	14	6.5	6.5	6.5
	agree	66	30.4	30.4	36.9
	strongly agree	137	63.1	63.1	100.0
	Total	217	100.0	100.0	

B4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	111	51.2	51.2	51.2
	strongly agree	106	48.8	48.8	100.0
	Total	217	100.0	100.0	

Frequencies of Safety Training

Statistics

		C1	C2	C3	C4
N	Valid	217	217	217	217
	Missing	0	0	0	0

Frequency Table

C1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	102	47.0	47.0	47.0
	strongly agree	115	53.0	53.0	100.0
	Total	217	100.0	100.0	

C2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	111	51.2	51.2	51.2
	strongly agree	106	48.8	48.8	100.0
	Total	217	100.0	100.0	

C3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	94	43.3	43.3	43.3
	strongly agree	123	56.7	56.7	100.0
	Total	217	100.0	100.0	

C4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	89	41.0	41.0	41.0
	strongly agree	128	59.0	59.0	100.0
	Total	217	100.0	100.0	

Frequencies of Safety Motivation

Statistics

		D1	D2	D3	D4
N	Valid	217	217	217	217
	Missing	0	0	0	0

Frequency Table

D1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	52	24.0	24.0	24.0
	strongly agree	165	76.0	76.0	100.0
	Total	217	100.0	100.0	

D2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	67	30.9	30.9	30.9
	strongly agree	150	69.1	69.1	100.0
	Total	217	100.0	100.0	

D3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	73	33.6	33.6	33.6
	strongly agree	144	66.4	66.4	100.0
	Total	217	100.0	100.0	

D4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	138	63.6	63.6	63.6
	strongly agree	79	36.4	36.4	100.0
	Total	217	100.0	100.0	

Appendix 8.1.3

Factor Analysis of Safety Behavior

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.713
Bartlett's Test of Sphericity	Approx. Chi-Square	226.397
	df	6
	Sig.	.000

Communalities

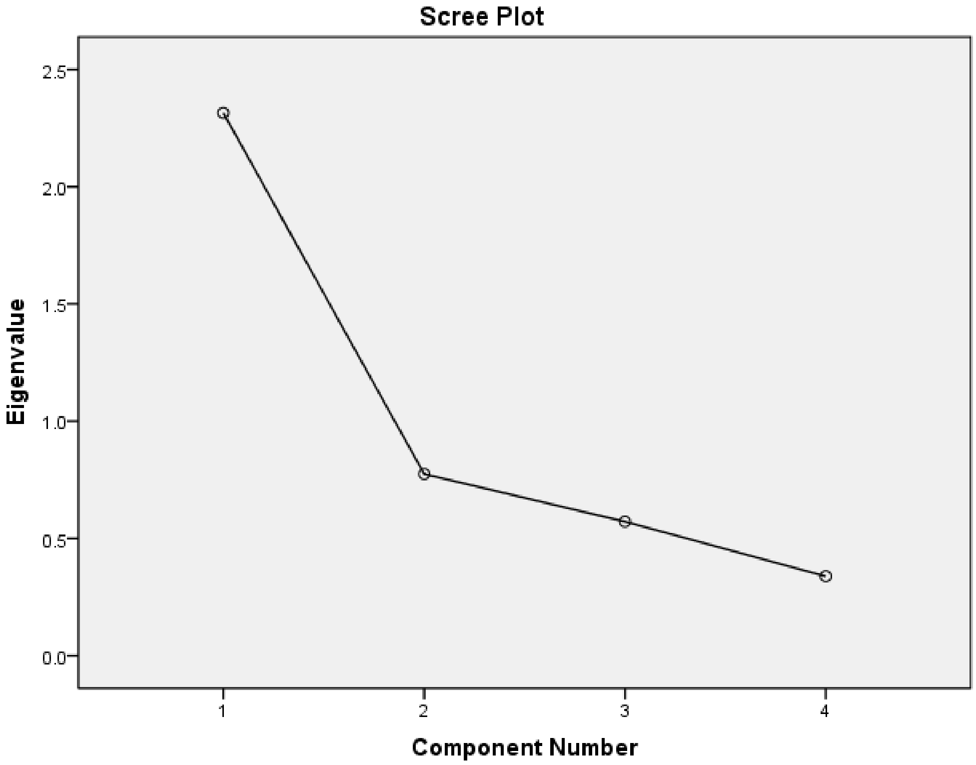
	Initial	Extraction
E1	1.000	.672
E2	1.000	.436
E3	1.000	.736
E4	1.000	.472

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.315	57.878	57.878	2.315	57.878	57.878
2	.775	19.374	77.252			
3	.572	14.293	91.546			
4	.338	8.454	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
E3	.858
E1	.820
E4	.687
E2	.660

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Factor Analysis of Safety Climate

Correlation Matrix

		B1	B2	B3	B4
Correlation	B1	1.000	.330	.602	.329
	B2	.330	1.000	.363	.619
	B3	.602	.363	1.000	.481
	B4	.329	.619	.481	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.656
Bartlett's Test of Sphericity	Approx. Chi-Square	262.631
	df	6
	Sig.	.000

Communalities

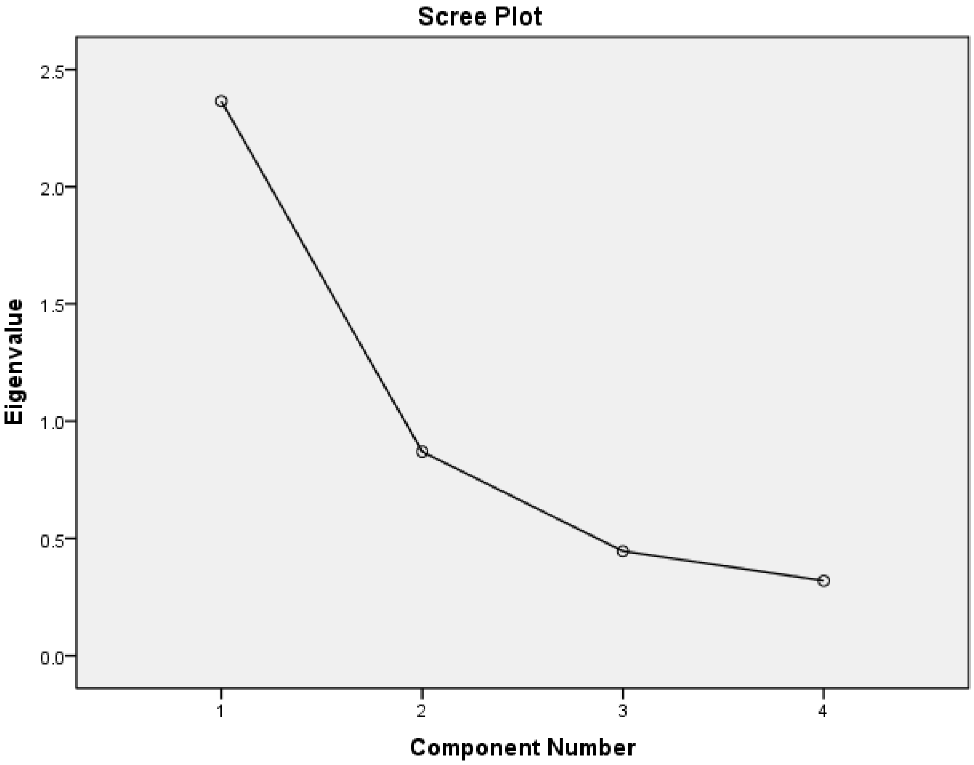
	Initial	Extraction
B1	1.000	.527
B2	1.000	.562
B3	1.000	.640
B4	1.000	.635

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.365	59.125	59.125	2.365	59.125	59.125
2	.870	21.750	80.875			
3	.446	11.142	92.017			
4	.319	7.983	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
B3	.800
B4	.797
B2	.750
B1	.726

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Factor Analysis of Safety Training

Correlation Matrix

		C1	C2	C3	C4
Correlation	C1	1.000	.385	.388	.435
	C2	.385	1.000	.333	.421
	C3	.388	.333	1.000	.387
	C4	.435	.421	.387	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.756
Bartlett's Test of Sphericity	Approx. Chi-Square	154.914
	df	6
	Sig.	.000

Communalities

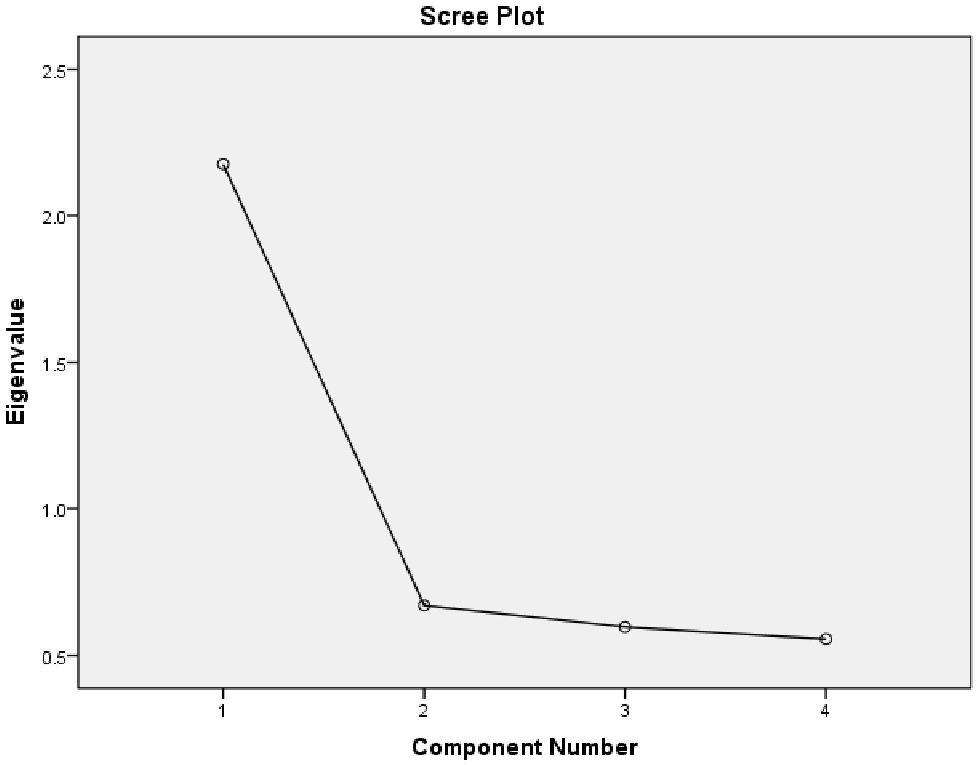
	Initial	Extraction
C1	1.000	.567
C2	1.000	.521
C3	1.000	.498
C4	1.000	.591

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.176	54.403	54.403	2.176	54.403	54.403
2	.671	16.771	71.174			
3	.597	14.933	86.106			
4	.556	13.894	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
C4	.769
C1	.753
C2	.722
C3	.705

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Factor Analysis of Safety Motivation

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
D1	4.7604	.42785	217
D2	4.6912	.46305	217
D3	4.6636	.47357	217
D4	4.3641	.48228	217

Correlation Matrix

		D1	D2	D3	D4
Correlation	D1	1.000	.489	.629	.268
	D2	.489	1.000	.453	.215
	D3	.629	.453	1.000	.397
	D4	.268	.215	.397	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.709
Bartlett's Test of Sphericity	Approx. Chi-Square	213.178
	df	6
	Sig.	.000

Communalities

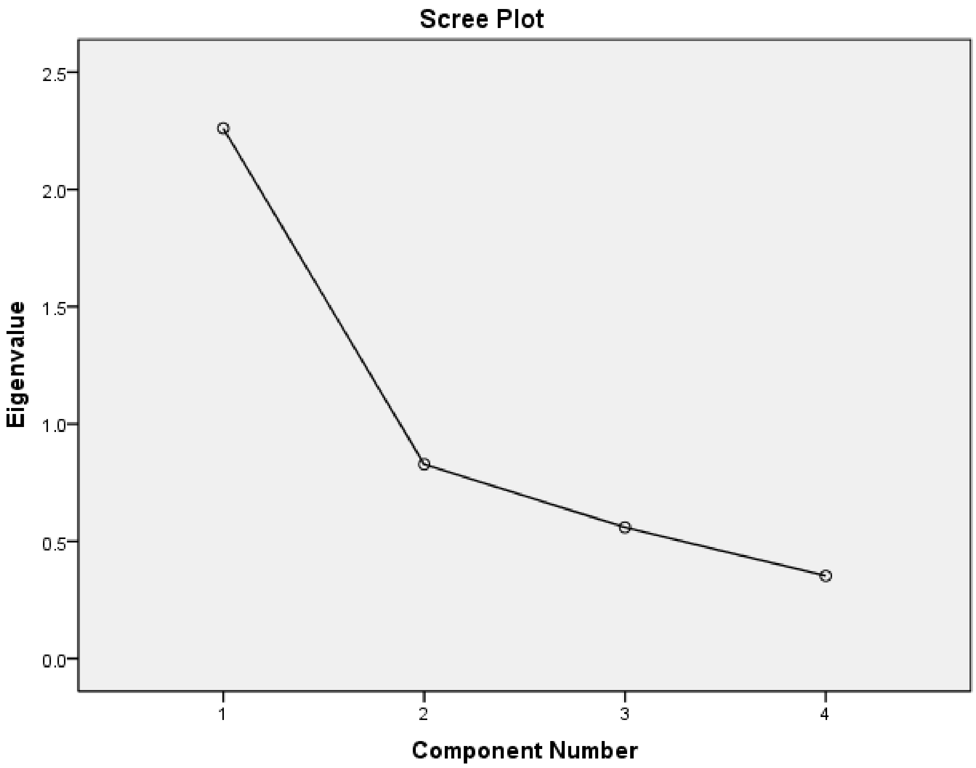
	Initial	Extraction
D1	1.000	.685
D2	1.000	.526
D3	1.000	.727
D4	1.000	.323

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.260	56.502	56.502	2.260	56.502	56.502
2	.828	20.705	77.207			
3	.559	13.979	91.186			
4	.353	8.814	100.000			

Extraction Method: Principal Component Analysis.



Component Matrix[a]

	Component
	1
D3	.852
D1	.828
D2	.725
D4	.568

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Appendix 8.1.4

Correlations

Correlations

		TSAFETY BEHAVIOR	TSAFETY CLIMATE	TSAFETY TRAINING	TSAFETY MOTIVATION
TSAFETY BEHAVIOR	Pearson Correlation	1	.202**	.463**	.533**
	Sig. (2-tailed)		.003	.000	.000
	N	217	217	217	217
TSAFETY CLIMATE	Pearson Correlation	.202**	1	.643**	.252**
	Sig. (2-tailed)	.003		.000	.000
	N	217	217	217	217
TSAFETY TRAINING	Pearson Correlation	.463**	.643**	1	.417**
	Sig. (2-tailed)	.000	.000		.000
	N	217	217	217	217
TSAFETY MOTIVATION	Pearson Correlation	.533**	.252**	.417**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	217	217	217	217

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

Correlations

		TSAFETY BEHAVIOR	B1	B2	B3	B4
TSAFETY BEHAVIOR	Pearson Correlation	1	.093	.489**	.044	.301**
	Sig. (2-tailed)		.170	.000	.517	.000
	N	217	217	217	217	217
B1	Pearson Correlation	.093	1	.330**	.602**	.329**
	Sig. (2-tailed)	.170		.000	.000	.000
	N	217	217	217	217	217
B2	Pearson Correlation	.489**	.330**	1	.363**	.619**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	217	217	217	217	217
B3	Pearson Correlation	.044	.602**	.363**	1	.481**
	Sig. (2-tailed)	.517	.000	.000		.000
	N	217	217	217	217	217
B4	Pearson Correlation	.301**	.329**	.619**	.481**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	217	217	217	217	217

**. Correlation is significant at the 0.01 level (2-tailed).

		TSAFETY BEHAVIOR	C1	C2	C3	C4
TSAFETY BEHAVIOR	Pearson Correlation	1	.086	.439**	.471**	.302**
	Sig. (2-tailed)		.207	.000	.000	.000
	N	217	217	217	217	217
C1	Pearson Correlation	.086	1	.385**	.388**	.435**
	Sig. (2-tailed)	.207		.000	.000	.000
	N	217	217	217	217	217
C2	Pearson Correlation	.439**	.385**	1	.333**	.421**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	217	217	217	217	217
C3	Pearson Correlation	.471**	.388**	.333**	1	.387**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	217	217	217	217	217
C4	Pearson Correlation	.302**	.435**	.421**	.387**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	217	217	217	217	217

Correlations

		TSAFETY BEHAVIOR	D1	D2	D3	D4
TSAFETY BEHAVIOR	Pearson Correlation	1	.391**	.466**	.497**	.350**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	217	217	217	217	217
D1	Pearson Correlation	.391**	1	.489**	.629**	.268**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	217	217	217	217	217
D2	Pearson Correlation	.466**	.489**	1	.453**	.215**
	Sig. (2-tailed)	.000	.000		.000	.001
	N	217	217	217	217	217
D3	Pearson Correlation	.497**	.629**	.453**	1	.397**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	217	217	217	217	217
D4	Pearson Correlation	.350**	.268**	.215**	.397**	1
	Sig. (2-tailed)	.000	.000	.001	.000	
	N	217	217	217	217	217

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix 8.1.5 Regression

Descriptive Statistics

	Mean	Std. Deviation	N
TSAFETY BEHAVIOR	4.3272	.47027	217
TSAFETY CLIMATE	4.1935	.69346	217
TSAFETY TRAINING	4.2903	.45496	217
TSAFETY MOTIVATION	4.2673	.44356	217

Correlations

		TSAFETY BEHAVIOR	TSAFETY CLIMATE	TSAFETY TRAINING	TSAFETY MOTIVATION
Pearson Correlation	TSAFETY BEHAVIOR	1.000	.202	.463	.533
	TSAFETY CLIMATE	.202	1.000	.643	.252
	TSAFETY TRAINING	.463	.643	1.000	.417
	TSAFETY MOTIVATION	.533	.252	.417	1.000
Sig. (1-tailed)	TSAFETY BEHAVIOR	.	.001	.000	.000
	TSAFETY CLIMATE	.001	.	.000	.000
	TSAFETY TRAINING	.000	.000	.	.000
	TSAFETY MOTIVATION	.000	.000	.000	.
N	TSAFETY BEHAVIOR	217	217	217	217
	TSAFETY CLIMATE	217	217	217	217
	TSAFETY TRAINING	217	217	217	217
	TSAFETY MOTIVATION	217	217	217	217

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TSAFETY MOTIVATION, TSAFETY CLIMATE, TSAFETY TRAINING	.	Enter

a. All requested variables entered.

b. Dependent Variable: TSAFETY BEHAVIOR

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.606[a]	.368	.359	.37655

a. Predictors: (Constant), TSAFETY MOTIVATION, TSAFETY CLIMATE, TSAFETY TRAINING

b. Dependent Variable: TSAFETY BEHAVIOR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.568	3	5.856	41.302	.000[a]
	Residual	30.201	213	.142		
	Total	47.770	216			

a. Predictors: (Constant), TSAFETY MOTIVATION, TSAFETY CLIMATE, TSAFETY TRAINING

b. Dependent Variable: TSAFETY BEHAVIOR

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	1.179	.291		4.050	.000	.605	1.753					
TSAFETY CLIMATE	-.103	.048	-.151	-2.127	.035	-.198	-.008	.202	-.144	-.116	.586	1.705
TSAFETY TRAINING	.403	.078	.390	5.146	.000	.248	.557	.463	.333	.280	.518	1.932
TSAFETY MOTIVATION	.434	.064	.409	6.824	.000	.308	.559	.533	.424	.372	.826	1.211

a. Dependent Variable: TSAFETY BEHAVIOR

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	TSAFETY CLIMATE	TSAFETY TRAINING	TSAFETY MOTIVATION
1	1	3.974	1.000	.00	.00	.00	.00
	2	.017	15.400	.07	.59	.00	.11
	3	.005	27.241	.61	.04	.04	.86
	4	.004	30.602	.32	.37	.96	.03

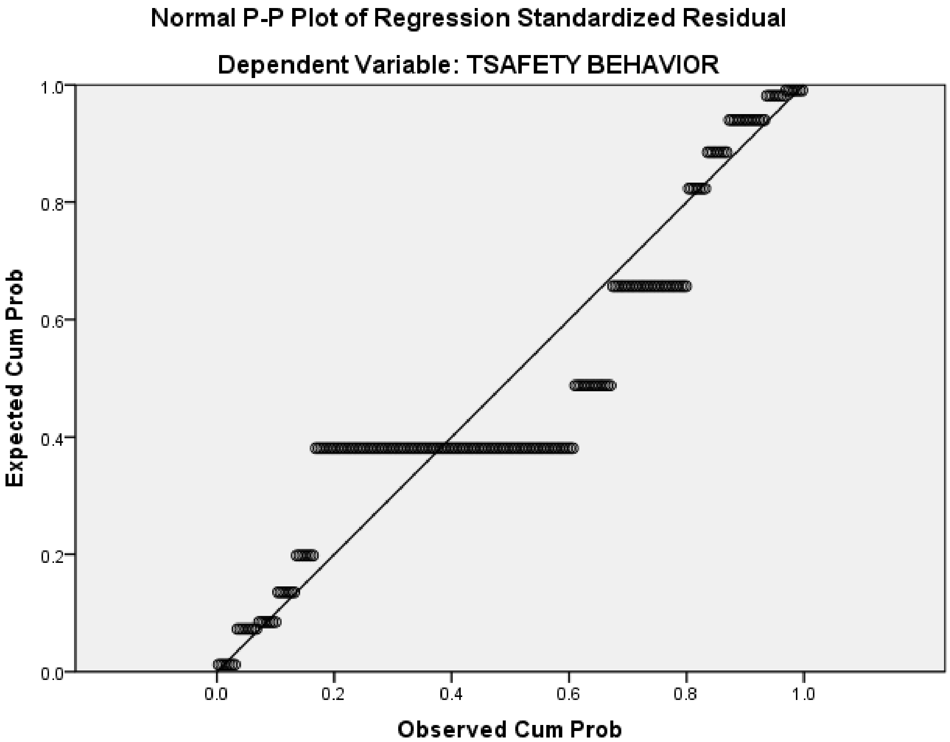
a. Dependent Variable: TSAFETY BEHAVIOR

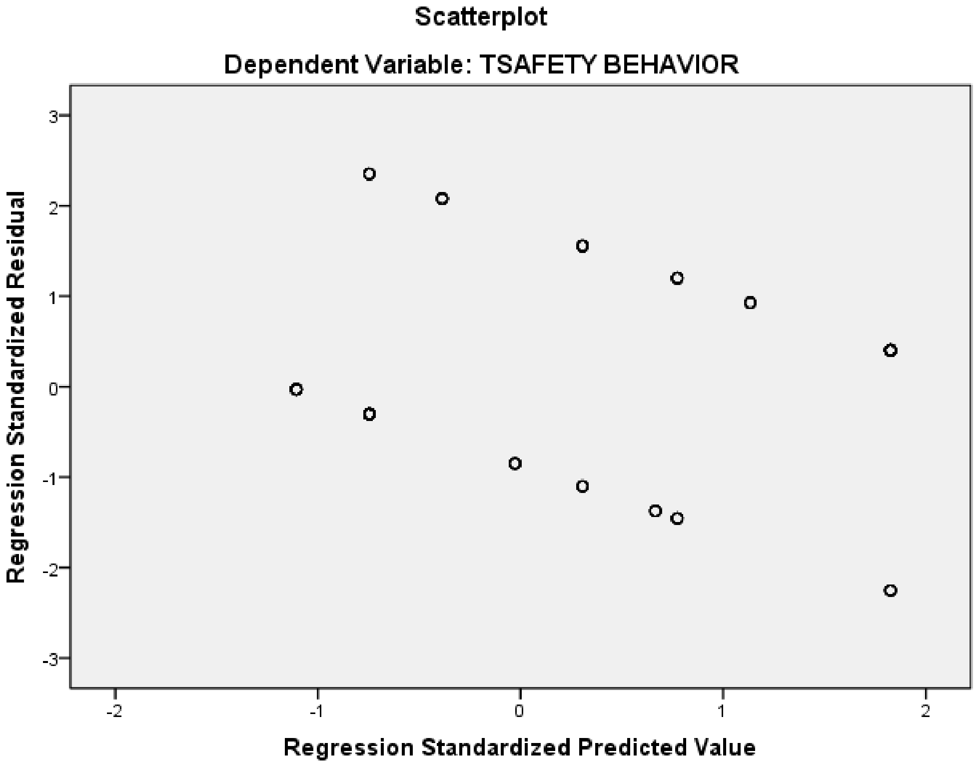
Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.0116	4.8480	4.3272	.28519	217
Std. Predicted Value	-1.107	1.826	.000	1.000	217
Standard Error of Predicted Value	.032	.098	.048	.017	217
Adjusted Predicted Value	4.0119	4.8669	4.3274	.28551	217
Residual	-.84801	.88579	.00000	.37393	217
Std. Residual	-2.252	2.352	.000	.993	217
Stud. Residual	-2.277	2.361	.000	1.004	217
Deleted Residual	-.86686	.89226	-.00023	.38255	217
Stud. Deleted Residual	-2.300	2.387	.001	1.010	217
Mahal. Distance	.571	13.526	2.986	2.900	217
Cook's Distance	.000	.029	.006	.008	217
Centered Leverage Value	.003	.063	.014	.013	217

a. Dependent Variable: TSAFETY BEHAVIOR

Charts





Regression

Descriptive Statistics

	Mean	Std. Deviation	N
TSAFETY BEHAVIOR	4.3272	.47027	217
TSAFETY CLIMATE	4.1935	.69346	217

Correlations

		TSAFETY BEHAVIOR	TSAFETY CLIMATE
Pearson Correlation	TSAFETY BEHAVIOR	1.000	.202
	TSAFETY CLIMATE	.202	1.000
Sig. (1-tailed)	TSAFETY BEHAVIOR	.	.001
	TSAFETY CLIMATE	.001	.
N	TSAFETY BEHAVIOR	217	217
	TSAFETY CLIMATE	217	217

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TSAFETY CLIMATE	.	Enter

a. All requested variables entered.

b. Dependent Variable: TSAFETY BEHAVIOR

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.202[a]	.041	.037	.46161

a. Predictors: (Constant), TSAFETY CLIMATE

b. Dependent Variable: TSAFETY BEHAVIOR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.957	1	1.957	9.185	.003[a]
	Residual	45.812	215	.213		
	Total	47.770	216			

a. Predictors: (Constant), TSAFETY CLIMATE

b. Dependent Variable: TSAFETY BEHAVIOR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3.752	.193		19.488	.000	3.372	4.131					
	TSAFETY CLIMATE	.137	.045	.202	3.031	.003	.048	.227	.202	.202	.202	1.000	1.000

a. Dependent Variable: TSAFETY BEHAVIOR

Collinearity Diagnostics[a]

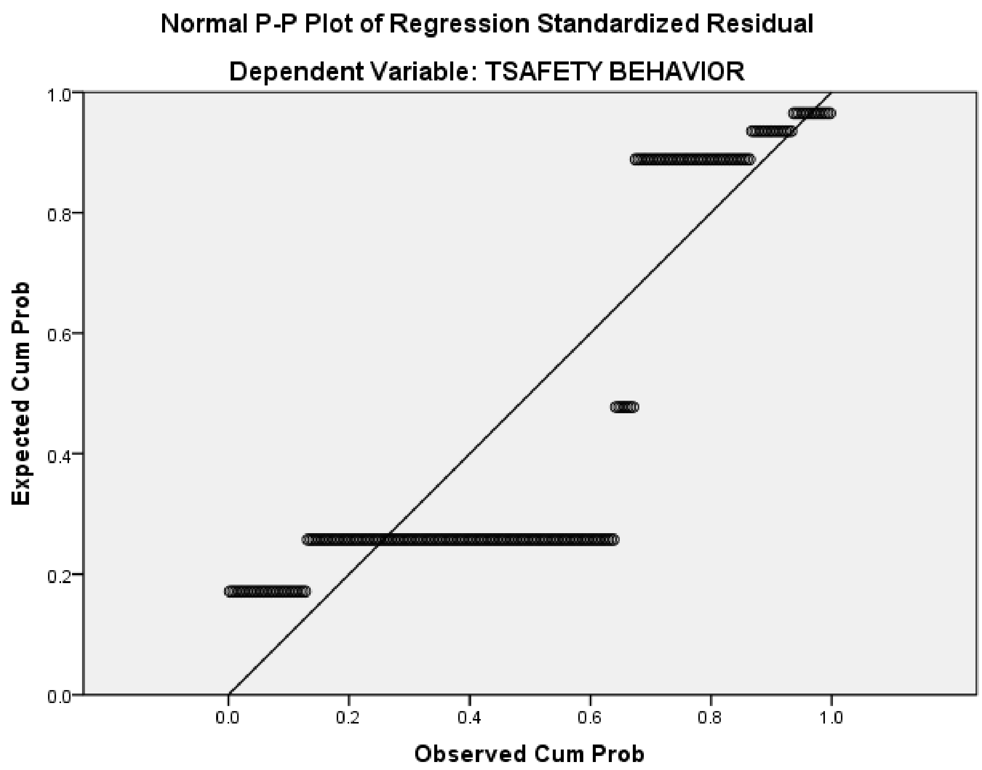
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	TSAFETY CLIMATE
1	1	1.987	1.000	.01	.01
	2	.013	12.204	.99	.99

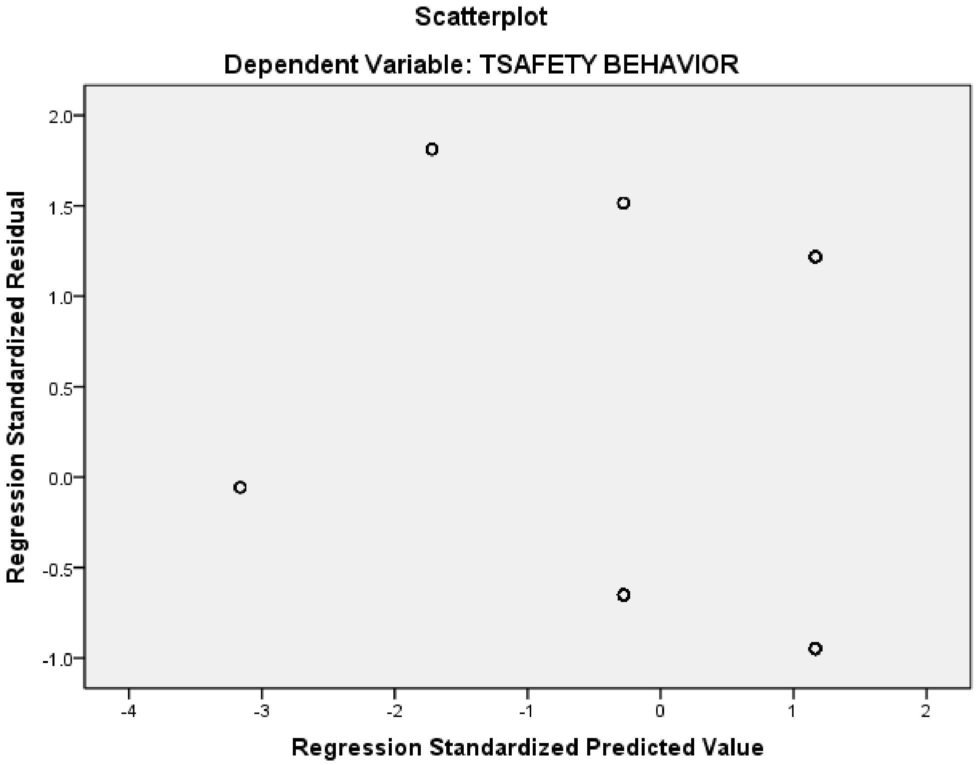
a. Dependent Variable: TSAFETY BEHAVIOR

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.0261	4.4379	4.3272	.09519	217
Std. Predicted Value	-3.163	1.163	.000	1.000	217
Standard Error of Predicted Value	.033	.104	.042	.015	217
Adjusted Predicted Value	4.0275	4.4427	4.3262	.09611	217
Residual	-.43789	.83665	.00000	.46054	217
Std. Residual	-.949	1.812	.000	.998	217
Stud. Residual	-.954	1.829	.001	1.003	217
Deleted Residual	-.44270	.85226	.00101	.46531	217
Stud. Deleted Residual	-.954	1.839	.003	1.005	217
Mahal. Distance	.078	10.006	.995	1.848	217
Cook's Distance	.000	.031	.005	.007	217
Centered Leverage Value	.000	.046	.005	.009	217

a. Dependent Variable: TSAFETY BEHAVIOR





Regression

Descriptive Statistics

	Mean	Std. Deviation	N
TSAFETY BEHAVIOR	4.3272	.47027	217
TSAFETY TRAINING	4.2903	.45496	217

Correlations

		TSAFETY BEHAVIOR	TSAFETY TRAINING
Pearson Correlation	TSAFETY BEHAVIOR	1.000	.463
	TSAFETY TRAINING	.463	1.000
Sig. (1-tailed)	TSAFETY BEHAVIOR	.	.000
	TSAFETY TRAINING	.000	.
N	TSAFETY BEHAVIOR	217	217
	TSAFETY TRAINING	217	217

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TSAFETY TRAINING	.	Enter

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TSAFETY TRAINING	.	Enter

a. All requested variables entered.

b. Dependent Variable: TSAFETY BEHAVIOR

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.463[a]	.214	.211	.41785

a. Predictors: (Constant), TSAFETY TRAINING

b. Dependent Variable: TSAFETY BEHAVIOR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.231	1	10.231	58.595	.000[a]
	Residual	37.539	215	.175		
	Total	47.770	216			

a. Predictors: (Constant), TSAFETY TRAINING

b. Dependent Variable: TSAFETY BEHAVIOR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.275	.270		8.438	.000	1.743	2.806					
	TSAFETY TRAINING	.478	.062	.463	7.655	.000	.355	.602	.463	.463	.463	1.000	1.000

a. Dependent Variable: TSAFETY BEHAVIOR

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	TSAFETY TRAINING
1	1	1.994	1.000	.00	.00
	2	.006	18.957	1.00	1.00

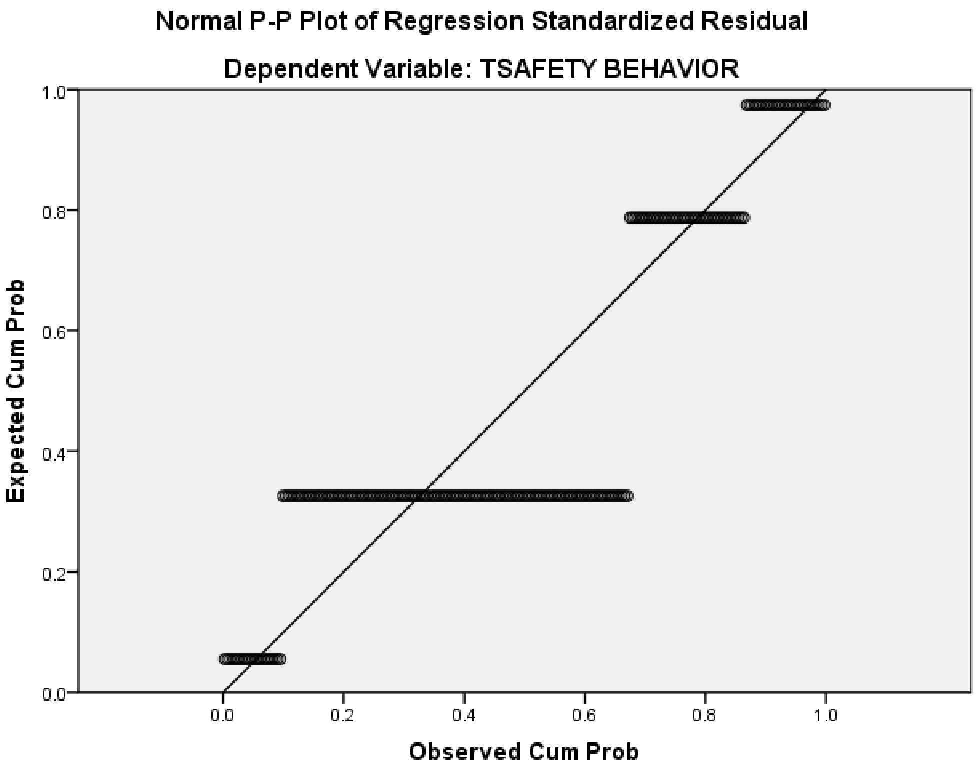
a. Dependent Variable: TSAFETY BEHAVIOR

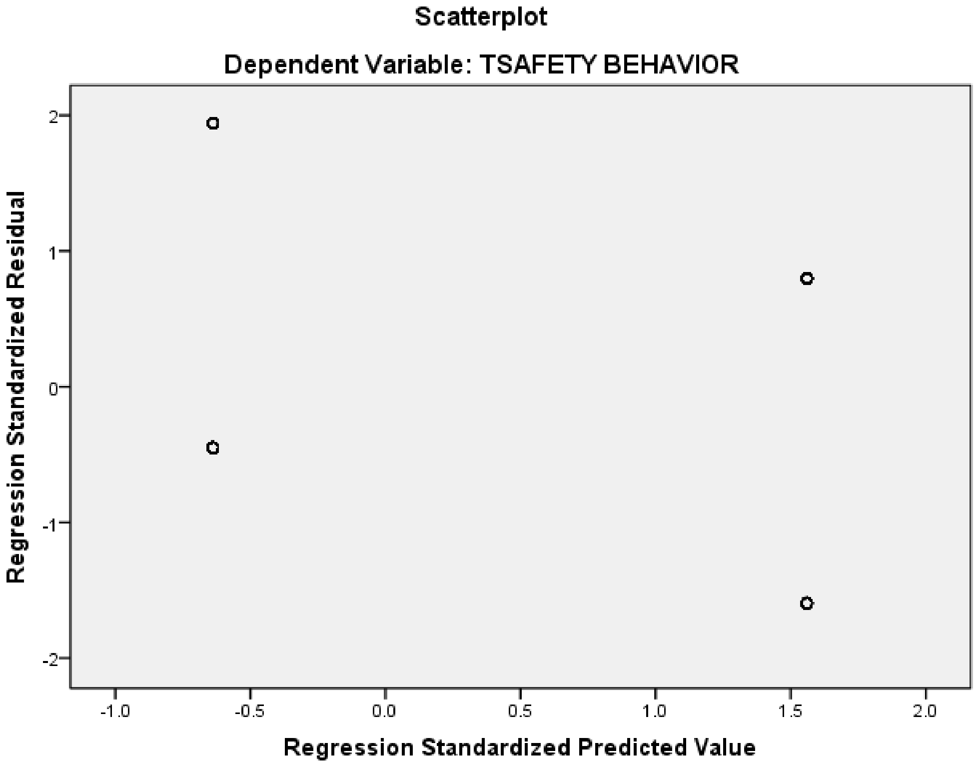
Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.1883	4.6667	4.3272	.21763	217
Std. Predicted Value	-.638	1.560	.000	1.000	217
Standard Error of Predicted Value	.034	.053	.039	.009	217
Adjusted Predicted Value	4.1830	4.6774	4.3272	.21768	217
Residual	-.66667	.81169	.00000	.41688	217
Std. Residual	-1.595	1.943	.000	.998	217
Stud. Residual	-1.608	1.949	.000	1.003	217
Deleted Residual	-.67742	.81699	.00000	.42110	217
Stud. Deleted Residual	-1.614	1.962	.001	1.007	217
Mahal. Distance	.407	2.433	.995	.922	217
Cook's Distance	.001	.021	.005	.007	217
Centered Leverage Value	.002	.011	.005	.004	217

a. Dependent Variable: TSAFETY BEHAVIOR

Charts





Regression

Descriptive Statistics

	Mean	Std. Deviation	N
TSAFETY BEHAVIOR	4.3272	.47027	217
TSAFETY MOTIVATION	4.2673	.44356	217

Correlations

		TSAFETY BEHAVIOR	TSAFETY MOTIVATION
Pearson Correlation	TSAFETY BEHAVIOR	1.000	.533
	TSAFETY MOTIVATION	.533	1.000
Sig. (1-tailed)	TSAFETY BEHAVIOR	.	.000
	TSAFETY MOTIVATION	.000	.
N	TSAFETY BEHAVIOR	217	217
	TSAFETY MOTIVATION	217	217

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TSAFETY MOTIVATION	.	Enter

a. All requested variables entered.

b. Dependent Variable: TSAFETY BEHAVIOR

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.533[a]	.284	.281	.39878

a. Predictors: (Constant), TSAFETY MOTIVATION

b. Dependent Variable: TSAFETY BEHAVIOR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.580	1	13.580	85.395	.000[a]
	Residual	34.190	215	.159		
	Total	47.770	216			

a. Predictors: (Constant), TSAFETY MOTIVATION

b. Dependent Variable: TSAFETY BEHAVIOR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.915	.262		7.297	.000	1.398	2.432					
	TSAFETY MOTIVATION	.565	.061	.533	9.241	.000	.445	.686	.533	.533	.533	1.000	1.000

a. Dependent Variable: TSAFETY BEHAVIOR

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	TSAFETY MOTIVATION
1	1	1.995	1.000	.00	.00
	2	.005	19.337	1.00	1.00

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	TSAFETY MOTIVATION	.	Enter

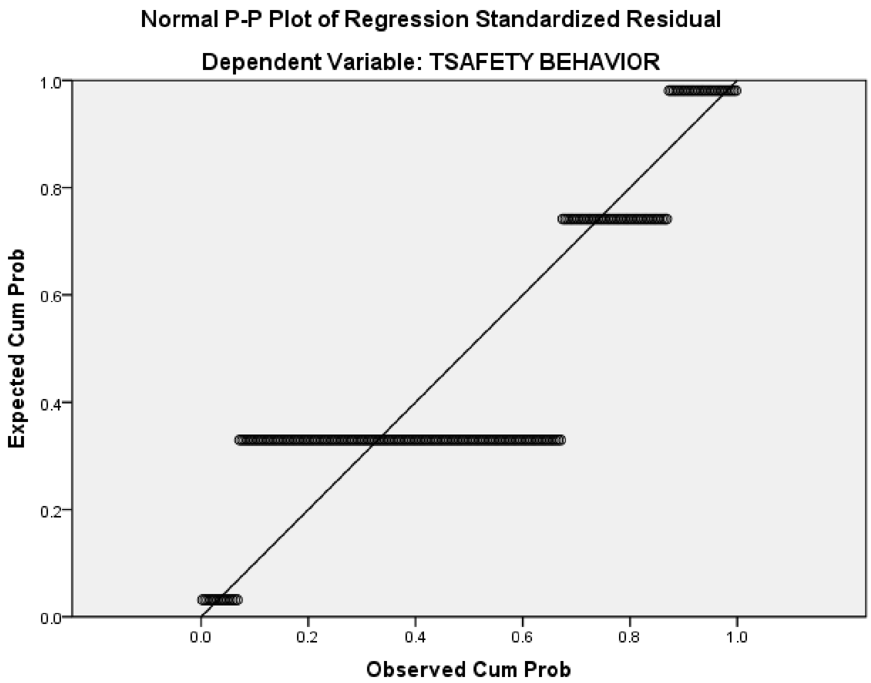
a. Dependent Variable: TSAFETY BEHAVIOR

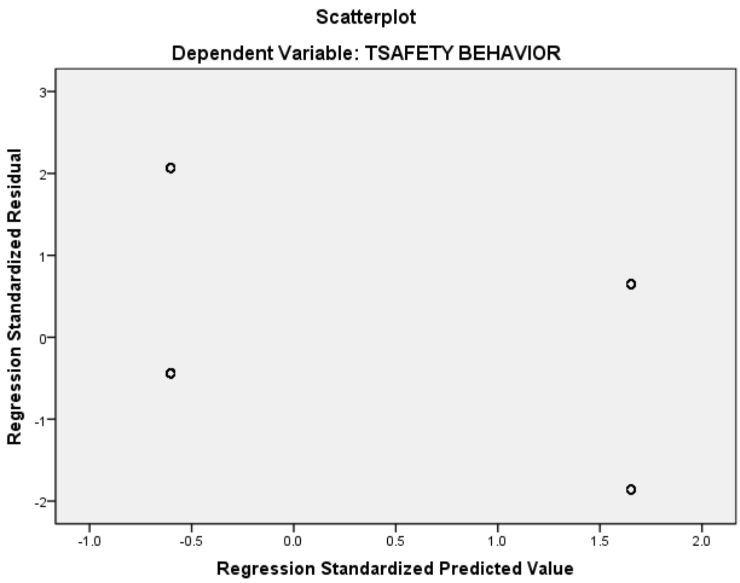
Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.1761	4.7414	4.3272	.25074	217
Std. Predicted Value	-.603	1.652	.000	1.000	217
Standard Error of Predicted Value	.032	.052	.037	.009	217
Adjusted Predicted Value	4.1709	4.7544	4.3272	.25078	217
Residual	-.74138	.82390	.00000	.39785	217
Std. Residual	-1.859	2.066	.000	.998	217
Stud. Residual	-1.875	2.073	.000	1.003	217
Deleted Residual	-.75439	.82911	.00000	.40183	217
Stud. Deleted Residual	-1.886	2.089	.002	1.008	217
Mahal. Distance	.363	2.729	.995	1.049	217
Cook's Distance	.001	.031	.005	.008	217
Centered Leverage Value	.002	.013	.005	.005	217

a. Dependent Variable: TSAFETY BEHAVIOR

Charts





Note:

Safety Behavior (DV)

E1 – I use all the necessary safety equipment to do my job

E2 – I ensure the highest levels of safety when I carry out my job

E3 – I put in extra effort to improve the safety of the work place

E4 – I voluntary carry out tasks or activities that help to improve workplace safety

Safety Climate (IV)

B1 – Management places a strong emphasis on work Place safety and health

B2 – Safety is given priority by the site's management

B3 – My employer consider safety to be important

B4 – My employer consider safety to be important

Safety Training (IV)

C1 – The training covered all the health and safety risks associated with my job

C2 – Training give me clear understanding on the critical aspect regarding safety at site

C3 – Workers are consulted to establish their training needs

C4 – Training give me more confidence in executing my work

Safety Motivation (IV)

D1 – I feel is worthwhile to put in effort to maintain or improve my personal safety

D2 – I feel it is important to maintain safety at all times

D3 – I believe it is important to reduce the risk of accidents in the work place

D4 – I follow rules to avoid being reprimanded