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Protective Clothing – Identity of a Worker

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ABSTRACT

When one meets a stranger, the identity analysis of the stranger commences. First by the visual appearance/ communication through the clothes they wear, and subsequently by asking what do they do? Thus, making fashion and their work as major contributors towards perceiving their identities. Clothing is a mediator between the naked body and a self-symbol to the world. If one meets a group of people, who have qualified for doing a particular job, wearing particular clothing that ensures their safety and tackles danger for the wearer, it creates a sense of belonging and identity. Thus defining them as a community - a group of people having these characteristics in common. The challenge that this identity brings along is with a positive as well as a negative impact. The idealist will look at this identity as a boon, as a pride to celebrate what they do and where they belong. It creates a sense of self-assurance towards the safety. On the other hand, such identity creation could also lead to a sense of loss at the position in the work place. The authors look at conducting an in-depth qualitative analysis of workers using a questionnaire based on Likert scale and open-ended questions from petrochemical industries (n=200) of Northern and Western India to understand their acceptance, behavior and reaction to protective clothing (PC). They discuss how not just the wearer but also the audience perceives them in these work-wear. The statistical findings from the study indicate that the workers were well aware of the importance of PC in petrochemical industries. It was observed that earlier each one having different tasks assigned had different uniforms, but at present irrespective of the hierarchy, each worker is wearing PC with uniformity. The research shows how this creates a rising collective identity from an individual identity based on role-based identity.

Key Words : Protective clothing, Safety, Functional, Perception, Design

INTRODUCTION

Clothing contributes to how people define and perceive themselves and is a necessary part of their everyday lives. Clothing promotes a feeling of wellbeing and has the potential for a multidisciplinary functional approach. To be acceptable and comfortable, products must look stylish and attractive and function reliably in relation to technical and aesthetic concerns of the wearer. Good aesthetic and technical design, driven by meaningful end-user research, can help exploit niche markets where form and function work in harmony in the research and development of comfortable and attractive products that can assist us in many aspects of our daily lives (McCann, 2005). When one sees a person wearing camouflage print uniform, a direct relation with armed forces is made. Similarly, seeing a person dressed in white apron and carrying a stethoscope is a uniform universally accepted for doctors. These visual appearances based on uniforms create a sense of fashion semiotics and help build a community.

Origin of clothing started with the need of protection and modesty. The need for clothing to function for protection has given rise to protective clothing segment. Protective clothing (PC) is part of Personal Protective Equipment (PPE), which is designed with a sole intention of protecting the wearer from injury or infection. PC includes all clothing and equipment worn over or in place

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of normal work clothing for the purpose of protecting the workers from harmful chemicals, heat exposure, toxic gases etc.

This paper looks at PC for petrochemical industries. A petroleum refinery's main job is to split crude oil into its many parts (or fractions), which are then reprocessed into useful products. The type, number, and size of process units required at a particular refinery depends on a variety of factors including the type of crude oil and the products required. The interconnected units making up a refinery are a maze of tanks, furnaces, distillation towers (fractionating columns), reactors, heat exchangers, pumps, pipes, fittings, and valves.

Products of crude oil refineries include - fuels such as gasoline, diesel fuel, heating oil, kerosene, jet fuel, bunker fuel oil, and liquefied petroleum gas; petroleum solvents including benzene, toluene, xylene, hexane, and heptane, which are used in paint thinners, dry-cleaning solvents, degreasers, and pesticide solvents; lubricating oils produced for a variety of purposes, and insulating, hydraulic, and medicinal oils; petroleum wax; greases, which are primarily a mixture of various fillers; asphalt. These products can be hazardous not only in their final state but as they are being processed and refined.

Designing protective clothing:

Protective clothing may not do much to reduce the harmful effect of chemicals but it surely sets up barrier against chemicals thus enhancing the safety of the people working under hazardous conditions, while selecting or designing protective clothing many factors have been found to influence its effectiveness. Each potential hazard has different problem areas and requires specific solutions in form of PC.

Protective clothing should be similar in design or style to the regularly worn work clothing. Thus problems associated with chemical penetration, garment comfort, aesthetic styling and sizing should be solved at this stage. The key requirement of design development for PC involves functionality and comfort as the only focus. But at the same time the authors based on interviewing workers in chemical process based industries propose that for PC to be acceptable it needs to have a multidisciplinary approach to strike a balance between providing safety and protection, functionality, human comfort and psychosocial aspect. Along with these factors PC should be economical so that most of the small-scale industries can afford them.

Design concept for functional protective clothing, where design criteria for functional protective clothing must be unequivocal specified; for example protection from chemicals is achieved by blocking their penetration and permeation through the fabrics of the clothing. This is an effective method for providing sufficient protection; however, total blockage of the penetration and permeation also affects the transport of any heat and moisture generated by the wearer of the protective clothing, and results in possible heat stress. It witnesses the complexity of designing protective clothing and asks for even higher requirements when designing this type of protective clothing, both from the point of view of protection and comfort, and from that of functionality. Thus, the current status of PC shows clearly a need for developing PC that is functional, comfortable and also has aesthetics. The same was reflected in the interviews with the workers, which will be discussed later in the paper.

Taking cue from Lurie's The Language of Clothes, clothing is adorned as a part of communication where clothing stands as a metaphor to disguise one's identity (Lurie, 1981). Blending the designing of PC with identity generation leads to a sense of team building with uniformity. Similar to Lurie, Rouse in Understanding Fashion, further adds communication as important function of clothing. This was based on Malinowsski's (a functionalist anthropologist) research stating that shelter and protection are part of cultural responses to basic physical needs (Rouse, 1989).

Based on the statistics that had been gathered, it had been proven that the there is no guarantee that the personal safety equipment would be able to prevent the accidents that would result in injuries from happening but would be able reduce the possibilities for it to happen (Hrynyk, 2015). According to Rosli Ahmad, precise safety applications could help in lowering accidents at various Petrochemical industries and also to reduce production prices, growth productiveness and profitability as well as it has extra importantly that can save lives of people.

According to PR Newswire (New York) January, 2014 the Protective Clothing Market is expected to grow at a CAGR of 6.0% over the next five years to reach $8 billion by 2018. Asia-Pacific, with its flourishing economy and rapidly expanding industrial sectors, is an emerging market and will experience the second-highest growth in demand during 2013 to 2018, after North America. This global market is analyzed in terms of revenue ($million) application-wise, on the basis of fabric type,

end-user industry-wise, and user type-wise for all major regions, namely, North America, Europe, Asia-Pacific, Middle East and Africa, and Latin America. Major countries in respective regions further break down the revenue figures. Aramid and blends, polyolefin and blends, polyamide polyethylene, cotton fibers, laminated polyesters, and others (various rubber types, leather) are the major materials used for the production of protective clothing. The major users of this clothing are by the consumers for personal use and industrial users in risky and hazardous working conditions.

There is a distinct lack of safety culture in India, in spite of so many chemical Industries the concept of protective clothing is still at an infancy stage. The solution to this problem lies in educating the workers about safe handling of chemicals. In majority of the units/industries workers are wearing work clothes but that hardly provides any protection against harmful chemicals or the Protective suit available is uncomfortable. Workers are provided with accessories like goggles, gum boots, masks helmets and gloves, which hardly they are using because of discomfort in wearing them in hot and humid climate (Suri, 2002).

Notion of building a Global Community:

Global Community means people of varied origins from national and international regions who together form a community within and outside of a designated physical space while catering to diverse norms and values, which communicate their perspectives and visions about their beliefs and world. It is a notion of belongingness created by individuals and groups to integrate cultural norms and values that are acceptable into their everyday lives in meaningful ways. Implementation of the goal of building global communities within an identified context-corporate organization, educational institution, as well as corporate and community services, for example-encourages a favorable partnership in which social responsibility and accountability for actions are situated within the framework of the broader participating community that engages in that intercultural communications event in any way whatsoever**.** The researcher believe that building global communities is an attainable and honorable goal; one that requires a deep respect, love and compassion for humanity commitment to social responsibility and upholding of social justice and the belief that together it can overcome adversity. Even individuals have different roles or have been assigned different tasks but they all have social responsibility roles. Their social responsibility roles create an imperative for them to make a concerted effort to contribute to global community building.

Uniforms, as the word suggests, are clothes that unify and are constructed to the same repetitive format. Most people have experience of school uniforms, others of specific working clothes such as surgeons who wear special gowns when in the operating theatre, nurses who attend to them or guards' uniforms on public transport and in museums and art galleries. What one wears influences how fellow human beings see each other. People talk of 'dressing for the occasion' and work clothes often differ from those that one wears for relaxation (sometimes called 'home clothes') or other non-work occasions. Work wear is a visible part of the corporate image. Work uniforms that are presentable and appropriate are an essential factor with regards to occupational safety and comfort at work. There are different kinds of uniforms throughout the world that give people a distinctive ordered identity. Uniforms are generally functional but can also be aesthetically comfortable. These uniforms generate an idea as the wearers participate in specific activities, which help develop a sense of belonging, in turn generating an identity that is beyond the person. This belongingness can take over other pieces of a person's identity and create a larger brand image.

Objective of the study:

– To identify the Petrochemical Industries in Northern and Western regions of India and understand their acceptance, behavior and reaction to protective clothing.

– To conduct a survey to analyze if protective clothing brings a sense of belonging and building a community that promotes well being and safety wear in the industry.

– To signify that this rising community spreads positive notes of wellbeing to future generations and promoting personal safety practices at work places.

– To explore experiences of the compliance of PC and its effects on building confidence in a worker and to be able to look at themselves as part of a global movement

METHODOLOGY

The authors used Likert scale and open-ended questionnaire to gather information with respect to PC

and it's scope of identity generation. In all, workers from 50 process based industries pan India were studied covering a sample size of 200 respondents. These people were interviewed based on random sampling method. The following research questions were addressed in this study and evaluated using a 5 –point Likertscale:

– How do employees perceive wearing Protective clothing in Petrochemical Industries?

– What are the main factors describing Protective Clothing or Personal Protective equipment?

– How can the workers be motivated to use Protective Clothing?

– What role do comfort and fashion play in the selection of Protective Clothing?

– How can we increase the acceptability of Protective clothing among the workers?

– Do the wearing and features of Protective wear influence overall job satisfaction?

The questions asked in the questionnaire are based on a Likert scale and open-ended question. Likert scale questionnaire require each respondent to rate the statement on a 5-point. Such as scale 1 = strongly disagree, scale 2 = disagree, scale 3 = neutral, scale 4 = agree, and scale 5 = strongly agree. Drawing on Karch, et al., a questionnaire was developed attempting to measure the demographics, uniform influences on performance, organizational identification, other job related data, and job satisfaction as well as several uniform features (such as style, appropriateness, functionality, material, colour, comfort, etc.). The operationalization of the items measuring uniform influences on performance was based on the earlier work of Nelson *et al.*, and used a 5-point-Likert-scale. The overall approach towards compliance of PC was measured.

RESULTS AND DISCUSSION

The clothing designed should always be ergonomically fit. With Safety, comfort and fit, plays an important role. No discrimination to be done amongst workers and higher safety officials for the uniform designed to be 100% acceptable amongst all. The protective clothing should be similar to the uniforms worn by the workers to ensure greater acceptability by them. The choice of materials, design parameters, fiber and fabric properties all play critical roles in the designing of protective clothing. Findings from research involving forecast study, trend spotting and drawing inspirations from corporate wear and sports wear to make the uniform more acceptable to the wearer were a key part while designing the protective clothing. In the entire blueprint response is targeting risk, working safer, working smarter and working together. PPEs have to be improved by use of modern fabrics that are comfortable. There is a need for comfort and fit that plays a part in durability, since garments that fit better wear better. The focus is on three areas: continuing and improving the high level of protection; increasing movement through the back and arms while bringing the garment closer to the body and improving on the look of PC to encourage the wearing compliance.

The participants who have served in these process industries for many years will have a certain level of professional knowledge, maturity and ability to provide data for this research which showed in the table 1. The highest percentage of respondents answered this questionnaire are from the company established for 5-10 years which represent 41%. While the lowest percentage is the company establish for a period less than 2 years, which represent 1%.

Table 1 : Participants Working Experience in Petrochemical Industries

		Total	Percentages
Years	Less than 2 years	2	1%
	2-5 years	20	18%
	5-10 years	82	41%
	10-20 years	65	32.5%
	More than 20 years	31	15.5%
	Total	200	100%

Table 2 shows the level of awareness of the Workers and Professionals on using the Personal Protective Clothing (PC) in. Based on the table, most of them were aware that PC is very important in the Petrochemical Industries. All the respondents are aware regarding the dangers that are present in the industries is as important as the usage of the personal protective clothing (Muhaimin, 2014). Moreover, the supervisors are encouraging to wear Protective clothing and it followed by the safety officer conduct the training of Personal Protective Clothing (PPC) for the workers. Based on the result, the industry Safety Departments had understand and supported that training had been regarded as one of the compulsory measures or requirements that the construction companies would have to provide for the workers as well to ensure that the workers are well-

Table 2 : Workers and safety professionals, engineers response to PC			
Workers and safety professionals, engineers response to PC	Mean score	Rank	Rating
Compliance of PC by participant at Petrochemical Industries	4.89	1	Agree
Importance of PC	4.8	2	Agree
Training Conducted	4.3	3	Agree
Design components suffice your requirements	3.78	4	Agree
Role of Fashion in PC	3.5	5	Agree
(open ended questionnaire)What changes would you like to see in the PC with these characteristics?			

equipped with the knowledge to carry out the work at the construction site with minimal safety hazards (Smith, 2014).

The Group Identification Scale by Doosje *et al.* (1995) used. This measure consists of 4 items (e.g. "PC is our Uniform", PC gives us a unique identity", "PC is comfortable"). Participants were asked to rate each item on a scale from 1 (totally disagree), to 10 (totally agree). The whole scale had a reliability of 0.71.

Table 3: Reason for Non compliance of PC			
Reason for non compliance of PC	Mean Score	Rank	Rating
Restriction of movement	4.5	1	Agree
Uncomfortable	4.5	2	Agree
Not given instruction	4.3	4	Agree
Creates Disparity	4.5	3	Agree
Unattractive	4.3	5	Agree

There is a necessity of work wear for workers in Petrochemical Industries. Such work wear is a visible part of the corporate image creating a role-based identity. Smart appropriate work uniforms are an essential factor from the perspective of occupational safety and feeling comfortable at work. Success of a design is measured by the level of acceptance from the workers who use the clothing on a daily basis without supervision or complaints about poor garment comfort, fit and style.

While conducting research intervening with the participants from Petrochemical industries and evaluating their identities where each one had a task assigned had a different work wear which created disparity in spite of similar educational qualification. Today irrespective of the hierarchy each one is wearing PC with uniformity. From an Individual identity to the Role based identity and today a rising collective identity - acommunity giving service to the world and been shielded in the most fashionable attire. Fashion has played a smart role in giving a boost to all employees in the industries visited by providing a sense of belongingness irrespective of the hierarchy – one Fashion Identity of a group of people having the PC with characteristics of comfort, functionality and safety with style. The same is visible in Fig. 1 and 2 where one can observe that the uniforms have created a group identity for the wearers based on the identity through their work practices and clothing.

Fig. 1 : Workers in Petrochemical Industry sporting uniform as part of protective clothing

Fig. 2 : Workers in Petrochemical Industry sporting uniform as part of protective clothing

Still debatable as this change for few is accepted positively and for the rest still seen as difficult to accept as the tag of officer and frontline worker is hidden in the smart fashion. The study explored the attribution of uniform that can shape and distribute power to different groups of social actors on a basis of cultural representation as a symbol in Industries. It covered the consequences of wearing a Protective work wear and how their identity perception is shaped by the work wear. It was also observed, that wearing PC as part of daily uniforms, created a sense of well being and safety amongst the workers. Knowing that the uniform has the potential to protect them from various accidental hazards was self assuring. These sensibilities are not restricted to a nation but become part of a global phenomenon. Workers across all nations, who continue to wear protective clothing as part of uniform for their safety, celebrate the same beliefs, values and commitment towards work. This creates a global belongingness.

Conclusion:

In the conclusion, all of the objectives are achieved in this study. Based on the result and data analysis, it can be concluded that the awareness and the effectiveness among the participants in industry may not be as high awareness, but based on the rating in the first and second objective (Table 2 and 3) showed that it is growing. It shows that, workers are already aware of using personal protective equipment (PPE) and know the importance of personal protective equipment (PPE) to reduce the scope of accidents and hazards. However it was observed, that with donning these protective clothing as part of uniforms in the industry, they workers sensed an enhanced feeling of safety and confidence. It was observed that they could connect with the rest of the workers as promoter of safe industrial working practices. They could relate with their counter parts across the globe in similar industries as practitioners of right and appropriate working practices and aiming at preventing hazards in the industry.

During the research, an in-depth study was done with majority of safety professionals and engineer. Through this interaction it was observed that fashion has played its major role, serving the industry by giving a design solution which gives all employees an identity, which is purely role based hence creating a community, which stands out from common group of people even outside the industry. The findings revealed that experienced workers as well as less experienced workers have a great commitment towards compliance of PC while on field as mentioned by Mr. Rathore (Head of Safety Dept., Hindustan Zinc, Rajasthan, India).

'Fashion provides one of the most ready means through which individuals can make expressive visual statements about their identities' (Bennett, 2005).

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