Samarawickrama, Sumanthri, et al (eds), 2019, "Re-evaluating Space across disciplines": *Proceedings of the 12th International Conference of Faculty of Architecture Research Unit (FARU), University of Moratuwa, Sri Lanka, December 03, 2019 Colombo* pp. 18–24. ©

IMPACT OF COLOUR ON WORKER PRODUCTIVITY AND SATISFACTION IN THE GARMENT INDUSTRY
A case study implemented in Awissawella, Sri Lanka

GUNATHILAKA D.M.L.R.[1] & HETTIARACHCHI A.A.[2]
[1,2]Department of Architecture, University Moratuwa, Sri Lanka
[1]*lankarasadi@gmail.com,* [2]*anishkah@uom.lk*

Abstract
Attracting workforce to Sri Lanka's current apparel industry has become quite a challenge. Absenteeism and labour turn over have been recognized as critical factors on productivity of workers and consistent quality of the products. Accordingly, identifying strategies to enhance job satisfaction, performance and productivity of workforce is vital for the sustenance of the industry.

In view of this, the current investigation investigates the potential of colour, being an established psychophysiological agent to enhance worker satisfaction and productivity. A sample of female machine operators (n = 30, age – 25 - 60) of a garment factory in Awissawella, Sri Lanka was tested during a period of four weeks via a mixed method. Colour of the internal walls of the factory space was changed on a weekly basis to record the level of satisfaction and productivity induced by each colour. Existing wall colour (pink) was replaced initially by blue (a cool colour) and secondly red (a warm colour) followed by white (a neutral colour) using coloured fabric. Employees rated their level of satisfaction and productivity via a questionnaire survey while the records of their productivity were obtained from the administration.

The study substantiated the impact of colour to manipulate worker satisfaction and productivity. Most employees (77%) were satisfied to work in the blue interior while 73% of employees were dissatisfied in the red interior. 50% of workers were satisfied with white interior while 24% employees were dissatisfied. However, Red interior was found to maintain an average worker productivity of 70% compared to the existing productivity level of 63% with the pink interior. Average productivity induced by blue and white interiors were 65.4% and 56% respectively. Accordingly, red was found to improve productivity over blue and white though many employees were dissatisfied regarding the presence of red in the interior. It is recommended to extend this study seeking the favourable quantity, proportion or the percentage of colour red that needs to be incorporated in an interior to increase productivity of employees while being satisfied. Testing the combined impacts of red (warm) and blue (cool) hues and their corresponding proportions for an environment where employees are equally productive and satisfied can be another aspect to investigate.

Keywords: *Garment Industry; Interior Colour; Labour Turn Over; Productivity; Satisfaction.*

1. Introduction

Designing an environment incorporating diverse attributes such as temperature, sound, light, odour and colour with a specific layout can stimulate perceptual and emotional responses in users, affecting their behaviour. Being fundamental design elements, light and colour play a vital role in manipulating human emotions and behaviour. The diverse research carried out have proven that the colours which surround the humans in their day-to-day routine have a profound impact on their moods and behaviour (Babin, Hardesty, & Suter, 2003; Kwallek, Lewis, & Robbins, 1988; Kwallek, Woodson, Lewis, & Sales, 1997).

According to research findings of Kwallek et al (1997,2005), colours of the interior designs affect the level of satisfaction, performance and productivity of employees in work environments. Yet, colours are found to be used mainly for aesthetic and visual purposes in design interventions which can be identified as negative in terms of user perception and behaviour. This research mainly focuses on analysing the impact of colours on worker's productivity and satisfaction in industrial environments.

1.1 BACKGROUND OF THE STUDY

Garment industry plays a vital role in the Sri Lankan economy and it has become Sri Lanka's largest export industry since 1986. Due to the competition, their major focus is on maximizing their profits through a higher level of employee performance and an overall equipment effectiveness rather than proving a better working environment (Kelegama and Epaarachchi, 2003). As established by literature, there are assessable environmental and human parameters favourable for conducive work environment design. The lighting level, temperature level, ventilation, humidity sound level, the size and volume of

the building and availability of sensory stimuli (colour, lighting, texture, materials etc.) have been considered as vital environmental factors while job satisfaction, belief and trust, performance, motivation, job involvement, job satisfaction and organizational commitment are defined as human factors. It is apparent that job satisfaction has a strong impact on employee performance (Warnasooriya & Jayawardena, 2011). The current investigation recognises colour as a significant parameter leading to the level of satisfaction and productivity of factory workers.

1.2 NEED FOR THE STUDY

It is believed that the Sri Lankan garment industry specifically, the industrialized garment for the local market began in 1960's. The exportation of readymade garments began a decade later, which expanded speedily. After liberalization of Sri Lankan economy during 1977, it kept on expanding throughout 1980's representing 27% of all exports (Kelegama, 2005). Since 1986, Garment industry has been the Sri Lanka's largest gross export earner and accounted for more than 52% of the total export earnings of the country (Dheerashighe, 2009). Garment industry earned nearly 400 million US dollars in 1992 (Kelegama, 2005).

Employee satisfaction is an important factor in the success of the field of garment industry which entails with the working environment built through conducive factory design. However, most of the working spaces of the garment factories are designed having least concern on the employees' satisfaction. It is an obvious fact that employees working with dissatisfaction directly affect their level of daily productivity. As a result, the level of absenteeism and labour turn-over may also increase creating a major issue in the apparel industry. Improving productivity through reducing absenteeism and labour turn-over is essential to survive in this highly competitive apparel industry under quota free situation (Razzaue & Eusuf, 2007).

This research aims at assessing the impact of 'colour' on worker satisfaction and productivity and how it in turn influences reducing absenteeism and labour turn-over within the case study organization. The findings of the study can be helpful for Architects, Designers and Interior Designers in incorporating appropriate colours to create effective and conducive working environments in future industrial building design interventions.

1.3 RESEARCH GAP

Many research scholars have revealed the impact of colour on manipulating thoughts, emotions and behaviour of human beings. Colours are established to manipulate the perceived dimensions and qualities of space namely; perceived temperature, lighting level, volume, visual size, visual weight and even smell within built spaces (Mahnke,1996). There are several experiments done on the impact of colours on user satisfaction and performance which are mostly focused on office employees, academics etc. (Kwallek and Lewis 1990, Kwallek 2005). According to established literature, colours associated with worker satisfaction are quite different from the colours that improve productivity. For instance, Kwallek and Lewis's (1990) experiment revealed that the subjects who were working in a red office made the fewest errors, while the subjects in the white office made the most errors. Even if the workers were found to be more productive reporting less errors in the red office, they found the colour of their office more distracting than subjects who worked in the white office. The subjects in the white office reported that they would like to work in this environment and considered this colour as most appropriate for an office. However, Kwallek and Lewis (1990) speculate that a sterile, white environment may not be as conducive to work as is believed. Another study by Kwallek et al. (2005) conducted with office employees re-affirmed that the workers most satisfying colour is white while the office colour with highest perceived performance was red.

However, less attention has been paid on the impact of colour on worker satisfaction and productivity with reference to industrial buildings, which this research aims to cover with reference to the employees of a garment factory buildings in the local context.

1.4 THEORETICAL FRAMEWORK

Enhancing job satisfaction and productivity of workers are key factors to be considered in factory design. Satisfaction is identified in literature as a productivity indicator. For instance, Ostroff (1992) found that organisations with more satisfied employees tend to be more effective and productive than organisations with dissatisfied employees. As clarified by Myskova (2011), satisfaction lowers fluctuation of employees, positively influences productivity indicators and thus overall company output. A working environment should be comfortable and pleasant in terms of the sensory stimuli provided for the employees to be satisfied physically as well as psychologically enhancing their effective performance. As highlighted by Heerwagen and Wise (1998), absence of distractions and discomforts, presence of tools and environmental features that support thinking, offloading of cognition to the environment, support habitability and thereby foster positively toned moods and well-being and ability to control and adapt conditions to individual preferences are identified as conducive parameters of a working environment which lead to high level worker performance. Accordingly, providing appropriate levels of light, ventilation, temperature, acoustics and maintain healthy levels of indoor air quality (Locke and Lathan 1976) are identified as key factors of conducive factory design leading to high performance and productivity.

According to theory of colour, red is identified as a warm colour which stimulates, excites and activates people while blue is recognised as a cool colour having a pacifying, relaxing and calming effect (Mahnhke,1996). Further, white is acknowledged as a neutral colour which neither stimulates nor pacifies a user (Mahnhke,1996). Aligning with above established psychophysiological effects, red, blue and white colours were chosen as appropriate to explore the impacts on the satisfaction and productivity of garment factory workers.

1.5 SCOPE AND LIMITATIONS

The study was limited to test the impact of a warm colour (red), a cool colour (blue) and a neutral colour (colour). Considering practical and ethical aspects, coloured fabric of the said colours was incorporated instead of painting the walls. The research subjects were limited to machine operators and the gender was limited to only females since there were no male machine operators. Investigation time period per colour was reduced to one week in order to respect their schedules. The study was limited to measure worker satisfaction and worker performance/productivity among a range of human factors associated with factory design with reference to 30 nos of participants.

2. Research Design

Initially, seven garment factories located in Maharagama, Ratmalana, Horana, Kurunegala, Dehiwala, Diyathalawa and Awissawella were considered via direct observations and interviews with the management to assess their suitability to conduct the final study. Being an export industry, which is accessible and having fixed parameters in terms of the design being produced, the calibre of workers, lighting level, temperature, number of participants and working hours, a garment factory in Awissawella was selected for the case study considering the criteria mentioned below. Ever since, the quota abolishment took place in 2005, the selected company has been facing tough challenges with shrinking margins. As stated by the management, they are in a continuous struggle to increase employee satisfaction using different means.

2.1 METHODOLOGY – FIELD WORK

The colour of the internal walls of the factory space was changed to observe the reactions of the machine operators. The existing pink colour was initially replaced by red (a warm colour) followed by blue (a cool colour) and finally with white (a neutral colour) using colour fabric. Taffeta, an opaque fabric which was used for interior decorations selected as the best option to cover the wall.

Figure 1: Blue, red and white fabrics introduced to the factory interior

While the daily productivity of employees was calculated with the assistance of the administration, their perceived productivity and level of satisfaction were recorded through a questionnaire survey. Once the current status was observed for a period of one-week, blue (a cool colour) colour was introduced to the interior walls using blue fabric. After the first colour change the employees carried out their normal routine for a week and interviews were carried out with the supervisors/top management and questionnaire was given to the employees. Several variables were measured including gender, age group, type of work, sicknesses of the participants etc. The subjective variables measured included occupant job satisfaction, satisfaction with the colour scheme and self-reported productivity.

A questionnaire survey with a 5-point Likert scale was adopted to collect qualitative data namely, worker satisfaction, self-reported productivity and response to the introduced colours. The conditions of the working environment and interior space were observed and recorded. Interviews were conducted with factory employees and the management to obtain information/statistics on employee turnover and absenteeism of the machine operators. Random interviews were also conducted with employees to obtain information about their feelings and satisfaction levels after introducing each colour scheme. The Jenkins Achievement Striving Scale, an instrument with a 5-point Likert scale which assess the presence of achievement-related behaviour and attitudes in employees from much less too much more than others was adopted to measure the level of satisfaction. The Eysenck Personality Inventory (EPI), an item which has a dichotomous response (Yes or No) (Kwallek et al, 1997) was adopted as well. However, there were some issues when measuring satisfaction due to the lack of understanding of the Likert scale by some of the employees.

Information related in measuring productivity were taken from the management. Measured productivity is the ratio of a measurement of overall outputs to a measure of inputs used in the production of garments (Kapuria, Rahman and Haldar 2017). Accordingly, the equation below was adopted to measure productivity in the whole factory.

$$\text{Efficiency} = \frac{Total\ output\ per\ day\ per\ line \times SMV \times 100}{Total\ man\ power\ per\ line \times Total\ operating\ minute}$$

3. Findings and analysis

3.1 PRODUCTIVITY

As per the findings, the highest average productivity (70%) of machine operators was observed under the exposure to red interior while the lowest average productivity (56%) was reported in the white interior. This finding is in parallel with the work of Kwallek and Lewis's (1990) and Kwallek et al. (2005). Though productivity under exposure to blue colour was observed as lower compared to red (65%), it was observed as higher compared to their normal overall productivity when exposed to the existing pink interior (60%) and the white interior (56%). Aligning with the existing literature red colour was identified as the best colour to boost productivity in factory workers.

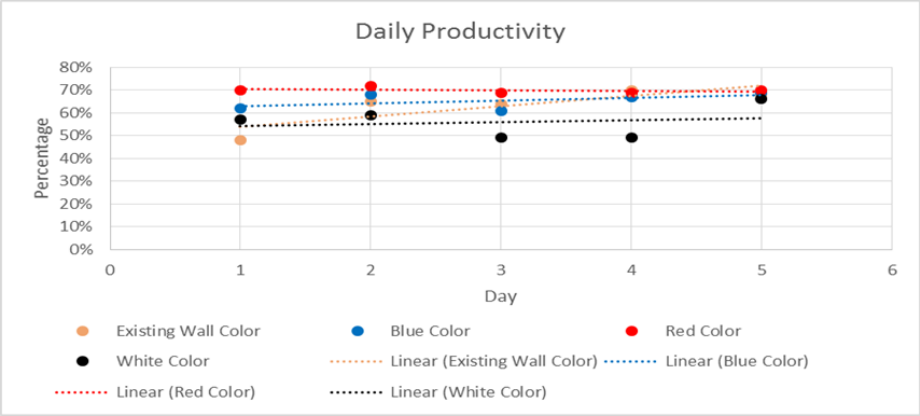

Figure 2: Daily Productivity vs Colour exposure

3.2 OVERALL SATISFACTION

•Level of satisfaction on the existing working environment: While 57% of the workers were unsatisfied, 20% of them remained neutral. Only 23% of employees were found to be satisfied with their existing working environment.

•Stress Level related to the existing working environment: 44% of the workers' responses were neutral regarding their stress level at the existing factory setup while 30% were found as not stressed and another 26% mentioned that they are stressed with the company.

•Level of satisfaction regarding the job: Only 27% subjects were found to be satisfied about their job. While 30% of the workers responded as unsatisfied, 43% remained neutral.

3.3 PERCEIVED PRODUCTIVITY:

The workers reported their perceived productivity under the three-colour schemes per day of the 3 weeks. Quite significantly they have reported a higher level of perceived productivity on Wednesday out of which red exposure dominates (73%) as the highest followed by blue (56%) and white (43%).

3.4 CONDUCIVE COLOURS FOR FACTORY INTERIOR BASED ON WORKERS RESPONSES:

According to the workers' responses; a majority of employees have reported to be satisfied with the blue interior (77%) while only 10% of them are unsatisfied. Conversely, a majority is unsatisfied with the interior with colour red (73%) whereas only 7% are satisfied. However, demonstrating a diversity in the level of satisfaction to white 50% of the employees were satisfied, 17% were not satisfied and 27% indicated a neutral response. This was also evident in the responses given by the workers in the qualitative study. For instance, participant no 12 highlighted that, "blue is a simple colour and it is pleasant to see during the time of work. On the other hand, as stated by participant no - 13, "red background was uncomfortable to the eyes and it was difficult to look at the wall. But white is a very calm colour which is a pleasant sight". Further elaborating the same notion participant no – 18 stated that, "white background can increase the productivity because it is pleasant to see and therefore red is not suitable for the working environment.

Quite opposingly there were workers who were satisfied about working in a red interior. For instance, according to participant no-22, "red colour is a very attractive colour and the white colour interior is not attractive as it is boring to work. Participant no.24 was found to be satisfied with the red colour because it attracts his eyes. However, most employees were found to be happy and relaxed under the exposure of blue working environment. On the other hand, the highest number of distressed (sad, stressed, and bored) employees were reported with reference to the red interior.

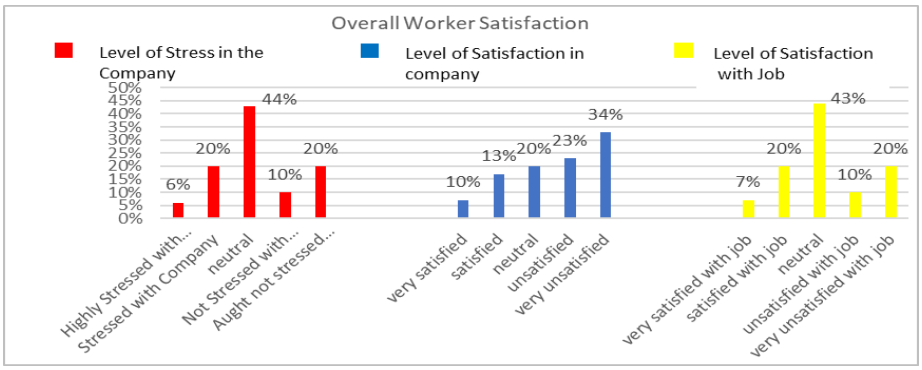

Figure 3: Overall worker satisfaction

3.5 CONDUCIVE COLOURS FOR FACTORY INTERIOR BASED ON WORKERS RESPONSES

44% of the employees preferred blue as the best interior colour for their factory interior. Red was seen as the least suitable colour for the interior as per the workers' preference. Only 6% of employees were identified to be satisfied with the red interior. On the other hand, 37% of employees selected white as the best interior colour. 13% of employees responded that any other colour can be suitable for the factory interior.

3.6 SELF-REPORTED PRODUCTIVITY IN DIFFERENT COLOUR EXPOSURE

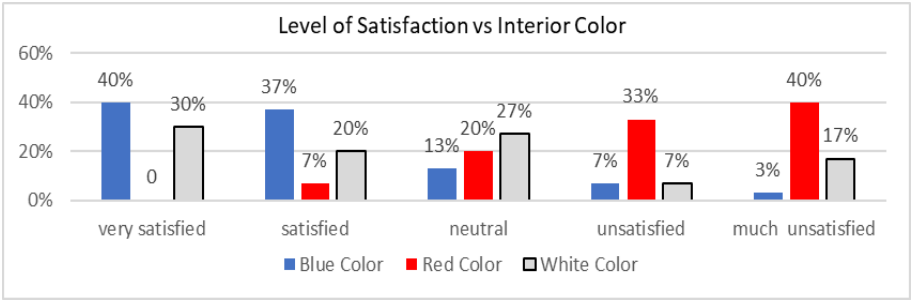

Figure 4: Level of satisfaction – Interior colours

As per employee's response towards the self-reported productivity, most of the employees (94%) responded that they were productive within the red working environment (very productive - 67%, productive – 27%). This is parallel with their actual productivity (average -70%) demonstrated during exposure to the red colour. Accordingly, the study validates the findings of Kwallek et al (1997 and 2005) obtained from studies implemented in the western context to a study sample of an eastern context.

84% of the employees have perceived themselves as being productive in the blue colour working environment as well (very productive - 47%, productive – 37%). This finding too corresponds with the workers actual productivity which is reported in the statistics (Overall- 65%).

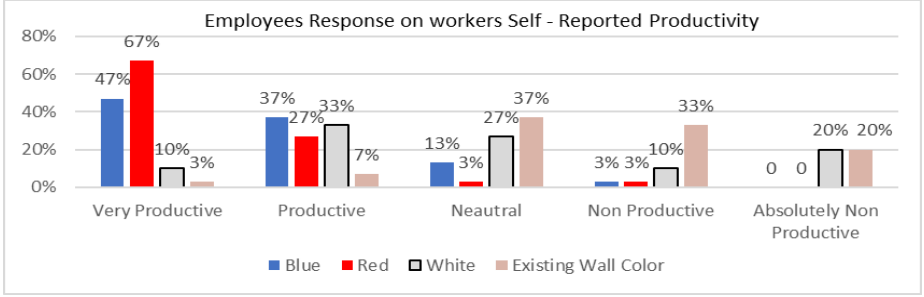

Figure 5: Self-reported productivity in different colour exposure

Self-reported productivity during the exposure to white colour demonstrated quite a variation. For instance, 33% felt that they were productive in white environment and opposingly 30% perceived that they were not productive. Another 27% workers were neutral in their response. However, in the actual scenario lowest productivity was reported in the white interior (56%). On the other hand, most of the workers (53%) believed that they are non-productive in the existing pink setup in which they are conditioned for a long time. Further elaborating the same, only 10% of workers believed that they were productive in the pink setup while 37% were neutral. Nevertheless, the actual average productivity in the existing pink setup was 63%.

4. Conclusion and Recommendations

Regardless of the deviation between the impact of colour on worker productivity vs. satisfaction the study obtained positive results proving the possibility of colour beyond its aesthetic and visual purposes to manipulate worker satisfaction and productivity in the factory buildings.

Accordingly, Red was found to increase productivity compared to all the colours tested yet the employees were very much dissatisfied with the use of red in the factory interior. On the other hand, the workers were satisfied in the blue interior, but blue colour did not help in increasing overall productivity in comparison with the red interior. White colour did not have a significant impact on productivity compared to red, blue or the existing pink colour.

It is recommended to extend this study seeking the favourable quantity, proportion or the percentage of colour red that needs to be incorporated in an interior to increase productivity of employees while being satisfied. Testing the combined impacts of red (warm) and blue (cool) hues and their corresponding proportions for an environment where employees are equally productive and satisfied can be another aspect worth investigating.

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