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Are the Ageing Workforce Satisfied with the Construction Work Environment?

Alex Torku¹, Turker Bayrak², Stephen Ogunlana², Albert Ping Chuen Chan¹, De-Graft Owusu-Manu³

¹ The Hong Kong Polytechnic University, 11 Yuk Choi Rd, Hung Hom, Kowloon, Hong Kong

² Heriot-Watt University, EH14 4AS, Edinburgh, Scotland, UK

³ Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
alex.torku@connect.polyu.hk

Abstract

The construction industry is experiencing a shortage of workforce and skill gap due to the significant reduction in the younger workers entering the construction industry compared to the exponential number of retiring workers. Providing ageing workforce with a satisfactory construction work environment (CWE) can be one of the ways to encourage them to remain in the construction industry. Therefore, this study aims to assess the level of satisfaction of the ageing workers with the CWE. The study adopted a quantitative approach and data was sourced from older construction workers in Edinburgh, Scotland using a questionnaire survey. Factor analysis and mean score analysis were employed to assess the older workers level of satisfaction with the CWE. The study identified five components of the CWE termed as organisational-psychological environment, physical environment, functional environment, policies and practices environment and auxiliary environment. The older workers were most satisfied with the functional environment, followed by the auxiliary environment, policies and practices environment, physical environment and lastly, organisational-psychological environment. The study recommended that the construction industry put in more effort in making the CWE very satisfying to all workers especially the ageing workforce. A very satisfying CWE should compensate and amend the losses accompanying ageing. The authors encourage future studies to explore the relationship between the level of satisfaction with the CWE and the quality of life of the ageing workforce.

Keywords: Ageing, Older Workforce, Construction Work Environment, Construction Industry.

1. Introduction

Population ageing has been one of the most significant social transformers of the twenty-first century with implications on virtually all sectors of the society, including the labour and financial markets, demand for goods and services and family structures [1]. The labour market will experience a shortage of workforce and skill gap in the next few years because the number of young people entering the workforce will significantly reduce compared to the number of people retiring [2]. The proposed solution to this dilemma is to make better or more flexible use of older workers and encourage them to stay in work longer [2]. Interestingly, the population of older workforce that forego retirement is increasing exponentially due to changes in retirement policies [3]. The trend of the aged remaining in the workforce has the potential to improve a nation's economy. Consequently, companies support the initiative of retaining

their older employees due to the valuable knowledge and experience they possess [3], [4]. This implies that within the next few years the current workplaces need to be re-designed not just to accommodate the ageing workforce but also to improve their quality of life (QOL), so they can age healthy and remain in the workforce for as long as possible. Therefore, the present study aims to assess the level of satisfaction of ageing workforce with the construction work environment.

1.1 The construction work environment (CWE)

The environment has been generally agreed as one of the important domains of QOL [5], [6]. However, the CWE is one of the most hazardous in almost every country. The picture painted is always a poor work environment. The nature of work in the CWE is described as tough, heavy and physically demanding [7], [8]. The CWE is unfavourable for workers of all ages; however this environment can only catalyse the deteriorating ageing changes of ageing workforce [8]. The proposed solution to this dilemma is to properly evaluate and modify the CWE to complement the needs of the ageing workforce [4].

As increasing older construction workforce forgo retirement and spend most of their time on construction site, they will need to depend on the environment on construction sites to overcome or compensate for the multiple and increasing physical impairments such as vision, hearing, strength, balance, and response time [9]. Environmental psychology researchers have devoted attention and resources on researching about the influences of the built and natural environments on the health, comfort, safety, behaviour and attitudes of occupants [10]. According to environmental psychologist, QOL largely depends on understanding the needs of the older workforce. The degree to which the older workforce needs are met determines their QOL [10]. This means that providing a healthy and comfortable CWE is fundamental to promoting and maintaining the QOL of not only the older workforce but also, the younger workforce.

In relations to this study, the CWE facets are the approaches, support services, adjustments, practices, policies or procedures that organisations implement which can positively or negatively impact the health, safety, comfort, productivity and QOL of older workforce (adopted from [3], [11]). The rationale is to improve person-environment fit by identifying facets in the CWE that affects fit between the older workforce and the CWE. Upon a critical literature review, 18 CWE facets were identified. These facets are listed in Table 1.

2. Methods

A total of eleven ongoing construction projects in Edinburgh, Scotland were invited to participate in the study. However, only five agreed to participate in the study. Purposive sampling technique was used to select older workers amongst all worker in the five construction projects. Older workers refer to participants who were aged 40 years and above (see [4], [12]). A total of 100 questionnaires were administered to older workforce, and 38 completed questionnaires were retrieved, representing a response rate of 38 per cent. Albeit the sample size was relatively small, statistical analysis could still be performed because according to the generally accepted rule, with a sample size of 30 or above, the central limit theorem holds [13]. A five-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied) was used to determine how the older adults were satisfied with the facets shown in Table 1. Due to

a large number of variables (18 facets), factor analysis was used to identify facets that measure the same underlying construct.

Table 1. CWE facets and reliability results

Code	CWE Facet	Source
CF1	Job Security/Employment tenure	[4], [12], [14]
CF2	Salary	[4], [14], [15], [16]
CF3	Payment structure	[4]
CF4	Employment flexibility	[4]
CF5	Shift-work patterns	[4], [12]
CF6	Career opportunities/advancement	[12], [14], [17]
CF7	Managerial attitude	[12], [17], [8], [18]
CF8	Management plan and style	[17], [8], [14], [18]
CF9	Personal protective equipment	[4], [8]
CF10	Environmental exposures such as heat, dust, noise and weather	[4], [12], [19]
CF11	Repetitive task	[4]
CF12	Manually handling heavy materials	[4], [8]
CF13	Performing wet work	[4]
CF14	Task allocation/schedule approach	[4], [12], [8]
CF15	Engaged in more skilled, but less physically demanding task	[4]
CF16	Tools and equipment	[4], [12]
CF17	Social networks	[12], [19], [20]
CF18	Environmental control	[17]

3. Results

The overall Cronbach alpha value of the 18 facets is 0.853 which is higher than 0.7. This implies that there is a good internal consistency and reliability with the dataset and the five-point Likert scale adopted for the study [21]. The KMO value for the 18 facets is 0.616 which is higher than 0.5, confirming that factor analysis is appropriate for the study [21], [22]. The facets were further subject to principal component analysis with varimax rotation. The number of components to be extracted was determined using both Guttman-Kaiser rule and the Cattell scree test. Guttman-Kaiser rule suggests that factors with eigenvalue greater than one should be retained. Therefore, five components with eigenvalue greater than 1.00 were extracted with varimax rotation after six iterations, explaining 74.010 per cent (see Table 2) of the total variance. The level of satisfaction with each of the five components is derived using mean score analysis as shown in Table 3.

Table 2. Total variance explained

Com	IE			ESSL			RSSL		
	Total	% Var	Cum %	Total	% Var	Cum %	Total	% Var	Cum %
1	5.858	32.543	32.543	5.858	32.543	32.543	4.414	24.521	24.521
2	2.680	14.891	47.434	2.680	14.891	47.434	3.265	18.138	42.659
3	1.972	10.955	58.389	1.972	10.955	58.389	1.945	10.808	53.467
4	1.513	8.403	66.792	1.513	8.403	66.792	1.871	10.394	63.860
5	1.299	7.218	74.010	1.299	7.218	74.010	1.827	10.150	74.010
6	.984	5.466	79.476						
7	.758	4.212	83.688						
8	.651	3.616	87.304						
9	.541	3.007	90.311						
10	.437	2.429	92.740						
11	.350	1.942	94.682						
12	.268	1.490	96.172						
13	.195	1.083	97.255						
14	.180	.999	98.254						
15	.134	.745	98.999						
16	.073	.407	99.406						
17	.069	.381	99.787						
18	.038	.213	100.000						

C=Component IE= Initial Eigenvalues ESSL= Extraction Sums of Squared Loadings
RSSL= Rotation Sums of Squared Loadings Cum=Cumulative Var=Variance

4. Discussion

The organisational-psychological environment has the potential to positively or negatively affect the mental well-being of older workforce. A dissatisfaction in these factors can lead to constant mental stress for older workforce [19]. The level of satisfaction falls in between ‘neither satisfied nor dissatisfied’ and ‘satisfied’ according to the level of satisfaction scale adopted. The older workers were not very satisfied with their payment structure, salary, job security/employment tenure and career opportunities/advancement plausible because the construction industry is very competitive, and most contracts are won based on price and time for completion. Consequently, determining the salary and payment structure which gives financial reward for speed. This environment that rewards speed is unfavourable for older workers who are experiencing increasing physical impairments which affects their speed. Obviously, the older worker would perceive this as discrimination and threat to their job security and career advancement in the construction industry. As argued by [4] and [16] salary inequality and discrimination treatment affect CWE. Furthermore, the older workers were somewhat not very satisfied with their management plan and style, attitudes of management, environmental control and shift-work pattern. The temporary nature of construction projects resulting in different management on a different project can inhibit management-worker relationship. Different projects come with a different management plan, style and attitude towards the older worker. A mismatch between the environment created by different management and the older workers preferences can cause psychological stress which affects job performance, health, well-being and QOL [12], [14].

Table 3. Ranking of CWE Facets

CWE Facet	Mean	Rank	SD	SEM
Component 1 – Organisational-Psychological	3.60	5th	.835	.135
Payment structure	3.71	1st	.654	.106
Career opportunities/advancement	3.66	2 nd	.745	.121
Salary	3.63	3 rd	.633	.103
Management plan and style	3.63	4 th	.883	.143
Attitudes of management	3.63	5 th	.913	.148
Job security/employment tenure	3.63	6 th	1.051	.170
Environmental control	3.53	7 th	.951	.154
Shift-work patterns	3.37	8 th	.852	.138
Component 2 – Physical	3.72	4th	.838	.136
Performing repetitive tasks	3.89	1 st	.863	.140
Manual handling of heavy materials	3.84	2 nd	.886	.144
Performing wet task	3.68	3 rd	.775	.126
Task allocation/schedule approach	3.45	4 th	.828	.134
Component 3 – Functional	4.08	1st	.673	.109
Engagement in more skilled, but less physically demanding task	4.08	1 st	.673	.109
Component 4 – Policies and Practices	3.78	3rd	.778	.126
Personal protective equipment (PPE)	4.45	1 st	.686	.111
Protection from environmental exposures	3.89	2 nd	.689	.112
Employment flexibility	3.00	3 rd	.959	.156
Component 5 – Auxiliary	3.84	2nd	.648	.105
Tools and equipment	4.00	1 st	.520	.084
Social networks (opportunity to socialise) in the workplace	3.68	2 nd	.775	.126

SD=Standard deviation SEM=Standard error of mean

Furthermore, the degree of environmental choice or empowerment older workforce feel they have through decision-making processes can also impact the QOL in the construction industry [17]. The physical environment deals with how tasks are performed within the construction industry. The level of satisfaction falls in between ‘neither satisfied nor dissatisfied’ and ‘satisfied’ according to the level of satisfaction scale adopted. The construction industry is dominated with repetitive tasks, manual handling of heavy materials, and wet works. Older workforce engaged in repetitive tasks such as hammering can lead to worsening joint problems and heavy manual tasks such bricklaying can result in MSDs, and wet tasks such as plastering can lead to rheumatic problems [4]. Since the older workers are not very satisfied with the physical environment, it can be inferred that the physical environment is currently catalysing the deteriorating ageing changes of the older workers. This calls for alternative measures such as nail guns instead of hammer can make repetitive tasks less demanding, and the same applies to manual handling aide, lifting devices and alternative materials and methods to reduce wet task such as dry lining [4], [8]. Closely linked to this is how tasks are allocated in the construction. Adopting task allocation approaches such as job rotation and job sharing where older workers perform tasks with younger and more energetic workforce can increase the older workers physical environment satisfaction level.

The functional environment deals with engaging the older workers in construction work related task and activities where their functional competence overcome or match with the environment. The level of satisfaction falls in between 'satisfied' and 'very satisfied' according to the level of satisfaction scale adopted. The nature of work in the CWE is described as tough, heavy and physically demanding [7], [8]. Engaging older workforce in unskilled tasks which are more physically demanding will only catalyse the deteriorating ageing changes of ageing workforce [8]. Interestingly, most of the older workers that participated in the study were engaged in skilled works that are less physically demanding. For example, all the 60 and over aged group that participated in the study were health and safety managers or site managers. Therefore, it is not surprising that the older workforce perceived and ranked their functional environment as the most satisfactory amongst others. This is plausible because their functional competence increases when they are engaged in more skilled tasks.

This environment deals with the policies and practices that are implemented to protect the older workforce from exposure to construction workplace hazards and risk of injury. The level of satisfaction falls in between 'neither satisfied nor dissatisfied' and 'satisfied' according to the level of satisfaction scale adopted. The older workforce seems to be somewhat satisfied with current policies such as health and safety policy and PPE policy. However, the older workforce will be more satisfied if these policies are modified to focus more on older workforce and adequately put into practice.

The auxiliary environment deals with additional support and measures used to sustain and boost the performance of the older workforce. The level of satisfaction falls in between 'neither satisfied nor dissatisfied' and 'satisfied' according to the level of satisfaction scale adopted. Tools and equipment to some extent can minimise the demanding nature of task in the construction industry. However, tools and equipment that are not purposively designed for older worker can be a hindrance to the functioning of the older workers. Also, an excellent auxiliary environment should provide an opportunity for its members to interact and socialise. Social interaction with other people is a source of emotional support, companionship, instrumental help, and advice [20]. The degree of loneliness and isolation experienced by older workforce somewhat depends on the interaction opportunities created by the auxiliary environment [20].

5. Conclusions

The study identified 18 CWE facets through a thorough review of the literature and was further evaluated using close-ended questionnaire survey. The 18 facets were further reduced using principal component factor analysis into five principal components termed as organisational-psychological environment; physical environment; functional environment; policies and practices environment; and auxiliary environment. The older workers were asked to rate how satisfied they felt about the 18 CWE facets. The level of satisfaction was measured with a five-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). The mean scores of the responses were used to rank each facet to provide a clearer understanding of the agreement reached by all the respondents. The older workers were most satisfied with the functional environment, followed by the auxiliary environment, policies and practices environment, physical environment and lastly, organisational-psychological environment. The study recommended that the construction industry put in more effort in making the CWE very satisfying to all workers especially the ageing workforce. A very satisfying CWE should compensate and amend the losses accompanying ageing; critical attention should be given to

the identified CWE facets to reinforce recovery, adaptation and psychological growth amongst the older workers.

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