# Impact of Real Estate Environment on Knowledge Worker Performance in IT Companies: Evidence from Sri Lanka

## Prathap Kaluthanthri[1*] and Dulshika Abanpola[1]

[1]*Department of Estate Management and Valuation, University of Sri Jayewardenepura, Sri Lanka.*

***Authors' contributions***

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## ABSTRACT

Knowledge worker performance is becoming an increasingly important requirement in information technology (IT) firms for its competitiveness. Although employee performance is an extensively researched area, the impact of the real estate environment of office on the performance of employees is still unexploited. The impact of the physical and social workplace on cognition and knowledge sharing by the knowledge worker and its impact on the knowledge worker's performance are hardly discussed in the literature. In this context, this study aims to investigate the relationship between the physical and social workspace setting on the knowledge worker performances in the Information Technology (IT) industry in Sri Lanka. The outcome of the study provides insight to top management of IT companies to confirm how attributes of office real estate environment contributes to knowledge worker performance. The study applied a quantitative approach to explore the impact of the physical and social workspace on the performance of knowledge workers. The study employed a convenience sampling method for collecting data from 185 respondents who worked in IT industry using a self-administered questionnaire. Partial Least Squares Structural Equation Model (PLS –SEM) was used to analyze the data. The findings of the study confirmed that physical workspace support cognitive work and knowledge sharing of a knowledge worker. Physical workspace characteristics have the strongest impact on knowledge sharing than the cognitive work of the knowledge employee. In addition, the analysis confirmed that cognitive work also supports knowledge worker performance. Thus, findings suggest that a review of the physical workspace of

*Corresponding author: Email: prathap@sjp.ac.lk;*

the IT organization is an important strategic decision to ensure higher order performance of the IT employees. In summary, the study argued that the physical workspace of the organization seems to play a pivotal role in ensuring the higher performance of the employee via cognition. Thus, this paper contributes to IT company management to think out of the box to ensure an improved physical workspace for better employee performance.

## 1. INTRODUCTION

Information Technology (IT) professionals are knowledge workers who have high degree of education, expertise or experience and primary purpose of their jobs is involve of creation, distribution and application of knowledge [1]. Generally, IT sector is comprised knowledge incentive companies. Hence, it is essential to formulate strategies to accelerate performance of knowledge workers in IT firms. These knowledge workers work under strict deadlines and stress which leads to reduce their performance. This is identified as leading issue in IT industry where stressful nature of work leads to poor performance [2].

Researches had investigated diverse determinants of knowledge worker performance; for instance, organization structure [3,4], work practice [5], technology [4] and workplace environment [5,3,4]. Among those factors many researchers had identified workspace or real estate environment of the office of the knowledge worker as key factor which influence knowledge worker performance.

IT employees require a working place with open decision-making environments where they have a prosperous role in decisions [6]. This work environment has two main components: physical environment and behavioral or social environment [7]. The physical element of the office environment defined as physical work environment or workspace while office occupier etiquettes with each other are interconnected through the behavioral environmental components are identified as social environment or workspace. The employee interconnection with real estate office environment positively effect behavior of the individual employee. In this context it is noted that excellent physical workspace and social workspace is an utmost important requirement for employee performance [8].

Employee productivity is the most significant interest nowadays, and it is affected by the working environment in many ways [9]. Healthy and safe working environment can take a very central role in increasing productivity; unfortunately, most of the employers consider it as an extra cost and do not spend much on maintaining comfortable working environment [10]. Furniture design, ventilation, noise, light, supervisor support, workspace, communication, fire safety measures affect employee productivity [11]. Studies of social science confirmed that there is an impact of work environment on performance of the employee. The nature of the working environment contributes for performance of the employees. In the meantime, it is identified that physical boundaries of the office environment interact as barrier or ought to be spanned [12,13], permeated or blurred for employee collaboration. This impact on the knowledge sharing and cognition of employees. Meantime the removal of the spatial boundaries creates open environment for employees which bring more people into contact each other ultimately poster the collaboration and collective intelligence. The underline argument of this phenomena is propinquity, or proximity, predicts social interaction which support information exchange and collaboration [14]. This relationship has been tested in the context of co-working spaces [15] and corporate environment and verified that removal of internal barrier creates physically relaxed environment and lead to higher interaction. On the other hand, workplace research on physical environment focused on negative outcome such as illnesses, risks and sick leave [16]. Further, one of the salient features of the workplace and the health issues is that the heterogeneity on results in terms across different research field [17]. On the other hand, studies on employee affiliation on work environment confirmed that increase of employee motivation level and innovative behavior while lowering of absenteeism. A study of Chadburn, [18], confirmed that comfort, convenience, IT connectivity, good design and working to a specific time scale were strong

drivers of personal productivity of the employees. Also, same study proven that knowledge workers favor a flexible range of office environments that support both an engaging open and connected work environment, knowledge sharing, and collaboration, as well as quiet concentration spaces, free of noise and distractions [18].

Knowledge work is often characterized as the development, diffusion, or use of knowledge by highly trained, independent employees who use tools and theoretical concepts to achieve complicated, intangible, and concrete results. Physical spaces for meeting, virtual places for knowledge sharing, not just information sharing, are required for productive knowledge work, and social places are changing as a result of the learning of New Ways of Working and learning to use both physical and digital places. Furthermore, it was said that "work is something you do, not something you go to" [19]. According to Springer [20], "the Work today is changing, frequently swiftly." It is more cognitive and complicated, dependent on group communication, cooperation, and collaboration. This change has an effect on work and performance, both positively and negatively [20].

In this context, considering the high opportunity and impact of the Information Technology industry in Sri Lanka which includes more than 120,000 people and the 5th largest exporter in Sri Lanka, employees of the industry their workplace should be a place for collaborative learning environments for higher order performance. Even though, there were empirical studies on impact of workplace on performance on knowledge worker in an international context, so far, it has not been considered on analyze impact of workplace on knowledge worker performance especially in IT firms. Hence, importance of managing real estate assets is still not recognized enough by majority of IT firms. In this context, the aim of the paper is to demonstrate to extending knowledge related to how real estate office environment, in other words physical workspace and social workspace contributes to performance of knowledge workers in IT industry.

First section of this paper present literature on real estate environment of corporate entity, knowledge sharing, cognitive work and knowledge worker performance to support formation of the research model. Furthermore, it supports a foundation for measurement of variables related to this study. Next section of the paper summarized research approach/technical method and discuss results of the analysis. The concluding section explain implication and recommendation for future research.

## 2. LITERATURE REVIEW

Management of real estate becomes a new wave in corporate sector which is known as corporate real estate (CRE) management. Glatte [21] defines corporate real estate as "property assets of companies with a core business in anything but the acquisition, erection, management or disposal of real estate in non-property companies". CRE is important as a capital asset that support to accomplish organization goals [22]. Even though, high-cost associate real estate and inefficient utilization of workplace are burning issue, real estate assets (property plant and equipment) represent the highest value contributor within balance sheet of a company. Further, performance of other resources (labor, capital, knowledge & technology) significantly varies with the result of ineffective corporate real estate management [22,23]. Thus, CRE environment or in other words office work environment consist with all objects and stimulus that encounter in their day to work environment [24]. This environment is a complex psychological system which stimulate the employees objectively and subjectively [25]. Therefore, employee reaction might change as per the differences on work environment and their cognitive, emotional and relational responses to the physical environment [24].

According to the Aaltonen et al. [26], workplace of the knowledge worker can divide into two main dimensions, namely physical workspace, and social workspace. Physical workspace is the physical designs/working conditions that belongs to employees working area [27]. This environment includes diverse characteristics and companies have a tendency to design physical workspace with creative and innovative manner. Appel-Meulenbroek, et al. [27] categorized physical workspace into main seven categories base on modern work environment; such as place proximity, building services, climatic characteristics, personal work area, meeting areas, office equipment and desk/chair arrangement. From prior research done base on IT companies in Puna, India had recognized maintain quantity and quality of light system, control noise level, personalization of control lighting/ventilation and temperature and internal gym, meditation areas are main aspects that should concerned when managing physical

workplace in IT companies [28]. The physical workplace characteristics are not only limited to temperature, ventilation, texture and light, but also it includes diverse modern workplace characteristics such as proximity, building services, workplace arrangements and etc. Thus, physical workspace designs become complex in modern workplaces.

Humans favor to work socially. Hence organization workplace should facilitate social activity areas and publicly accessible areas (social workspace) to create productive space for employees. Social workspace characteristics define as space in office that attached with employee behavior [26]. Modern social workspace construct base on employees' behavioral factors such as nature of knowledge work, employee mobility, collaboration and occupational stress. Wagner & Watch [29] stated open-work floor setting, flexible workplace settings (moveable walls, equipment, furniture, machinery) and kitchen/café are some of innovative social workspace characteristics that can be noticed in modern workplaces. Besides, research done by Wroclaw University of Science and Technology had recommended additional social space helps to enhance productivity of IT project management team. Thus, innovative social workspace design is an essential requirement for companies.

Two-dimensional form of workspace brings complex feature to work environment which defined how knowledge sharing and cognitive work facilitate and support to knowledge workers' tasks in a distributed work setting. However, it is difficult to exactly differentiate clearly how physical workspace characteristics and social workspace characteristics contributed to formation of complex nature of workplace characteristics. The Table 1 shows contributory factors of different workspace characteristics of the workplace of an organization.

## 2.1 Knowledge Sharing

According to Apple-Mulenbroek [35] knowledge sharing is a process between internal sources is the subset of cooperation that engage with innovative process which enhance performance. It is a creative process of negotiation [36]. Further, it explained knowledge conversion model that conceptualized knowledge sharing in organizations. Knowledge conversion model

presented that knowledge sharing is taken place when both degree of interaction and degree of share use mode are in high [36]. Academics emphasized different behaviors/modes of tacit and explicit knowledge sharing. The explicit knowledge sharing happened at personal discussions while tacit knowledge sharing requires chatting, face to face interaction and networking. Nonetheless Nonaka and Konno [37] argued that tacit knowledge can only be exchanged through collaboration because more involvement is required for exchange attitudes/skills and experience. Apple-Mulenbroek [35] had mentioned collaboration and interaction are main two behaviors that attached to knowledge sharing within organizations. According to Table 2 prior studies précised that knowledge sharing occur through diverse modes/behaviors; for instance, discussions, chatting, face to face interaction, networking and etc.

## 2.2 Cognitive Work

Cognition is a process of conceptualization knowledge by an individual [36]. Cognitive work has two categories; namely individual cognitive work and collective/team cognitive work. Individual cognitive work needs workplace characteristics that aid concentration on work. However, group level workplace needs to facilitate effective use and flow of information [32]. Stress, interruptions and distractions are main obstacles for cognition [32]. Furthermore, they stated cognitive work can evaluate base on awareness, collaboration and brief interaction. Awareness means better understand about surrounding workplace environment. Higher level of awareness needs share information, coordination and better feedback for questions. Correspondingly, He et al. [38] had proved awareness about expertise location caused optimized team cognition of IT firms. Subsequently, brief interaction is related with social interaction such as asking questions, checking data, setting up meeting and greeting. Collaboration means form of people work to gather through information sharing, clarification, problem identification and decision making [32]. According to Table 2 cognition occur base on diverse behavior patterns as proved in previous literature. Moreover, high level of cognition support quality performance in software development through leverage the specialized knowledge of individual team members [38].

**Table 1. Workplace Characteristics: Physical workspace and social workspace, characteristics**

| Workplace characteristics | Variables | Source |
|---|---|---|
| Physical workspace characteristics | Ventilation | Haynes [30], Ning & Kam, [31] |
| | Temperature | Haynes [30], Ning & Kam [31] |
| | Lighting | Haynes [30], Wagner & Watch, [29] |
| | Inter visibility of interior walls | Haynes [30], Heerwagen, et al. [32] |
| | Open plan office layout | Appel - Meulenbroek, et al. [27], Wagner & Watch, [29] |
| | Proximity to each other | Apple- Mulenbroek [27], Appel - Meulenbroek, et al. [33], Wagner & Watch [29] |
| | Flexible walls and furniture | Wagner & Watch [29] |
| Social workspace Characteristics | Kitchen/cafe corridor | Wagner & Watch [29] Appel-Meulenbroek [34] |
| | Meeting rooms | Appel - Meulenbroek, et al. [33], Wagner & Watch [29] |
| | Coffee machine | Appel - Meulenbroek, et al. [33] |
| | Lobby | Wagner & Watch [29] |
| | Lack of barrier | Appel-Meulenbroek [34] |

**Table 2. Forms of Knowledge Sharing and Cognitive Work**

| Factor influence knowledge flow | Variables | Attributes | Source |
|---|---|---|---|
| Knowledge sharing | face-to face interaction | the meeting purpos-ely walk over to the other to talk | Apple- Mulenbroek [35], Haynes [30], |
| | Chatting | Informal discussions, storing with other employees in office brakes | Haynes [30] |
| | Discussion s as a team | Questioning, proposing and evaluating something together in broader way. | Pradhan & Jena [3], Appel - Meulenbroek, et al. [33], Wagner et.al. [29] |
| | Networking | Informal chat between two or more people while walking one place to another | Haynes [30]. |
| Cognitive work | Awareness about surrounding space | Share information, coordinate actions, and get rapid feedback to questions, lack of noise | Heerwagen, et al. [32], He et.al. [38]. |
| | Brief interaction | asking questions, checking data, setting up meetings, greeting | Heerwagen, et al. [32] |
| | Collaboration | group information-sharing, clarification, problem identification, problem-solving, merging data, decision-making | Heerwagen, et al. [38] |

## 2.3 Knowledge Worker Performance

Employee performance identified as dominant factor of evaluate human resource effectiveness [3]. Generally, employee performance signifies in diverse forms; such as productivity, satisfaction, organization development and growth. In the meantime, a recent review done by Pradhan & Jena [3] define employee performance in new scales by developed a Triarchy Model (Fig. 1). According to the Triarchy Model employee performance implies base on three factors. First

factor task performance is related to cognitive ability which is deals with task knowledge, task skill and task habits. The task knowledge is defined as having technical knowledge to perform particular task. Task skill means application of knowledge to complete task. Task habits refers the employee respond to assigned job. Second factor adaptive performance denotes understanding changes in business environment and update knowledge related change. Ability to manage situation, mutual understanding in work team, mobilized collective knowledge and effectively face change as a team are main attributes of adaptive performance. Third factor was named as contextual performance which can define as collaborate work with colleagues in workplace that support social context. Individual contextual performance is measure through attributes like help coworkers as and when ask a help, participate discussion/meetings, sharing new knowledge with team members and discuss problems to find solutions. This model is effective for measure performance of IT professionals because researchers had developed this associated to manufacturing and service industries [3].

Besides that, it is identified that knowledge worker performance impact different specific factors. Palvalin [5] emphasized work environment and knowledge worker are main factors that determine knowledge worker performance. Furthermore, scholars categorized environment as physical, social and virtual environment while knowledge worker as individual work, practice and evaluate wellbeing at work. This research has concluded that knowledge worker wellbeing and work practice has higher impact on knowledge worker. However, research findings conclude that social workplace environment indicated a higher impact on employee performance compare to physical workplace environment [5]. In addition, some researchers originate that number of theories and models linked with performance. Haynes [30] developed workplace connectivity model that indicates connection between real estate environment and performance. According Haynes's model high performance and productive workplace interconnected position, purpose, place, paradigm, process and people are all in alignment. Further, he stated workplace (place) as a main aspect that determined performance. Simultaneous study done by Apple-Meulenbroek [33] has identified 51 corporate real estate aspects that impact organization performance. Thus, it is argued that workplace is a prominent factor that impact performance [30,5,33]. However, those studies were not directly address the impact of workplace on knowledge worker performance. In this context the study formulates a conceptual model to evaluate impact of physical and social workspace on knowledge worker performance though knowledge sharing and cognitive work The Fig. 2 of the study present the conceptual framework.
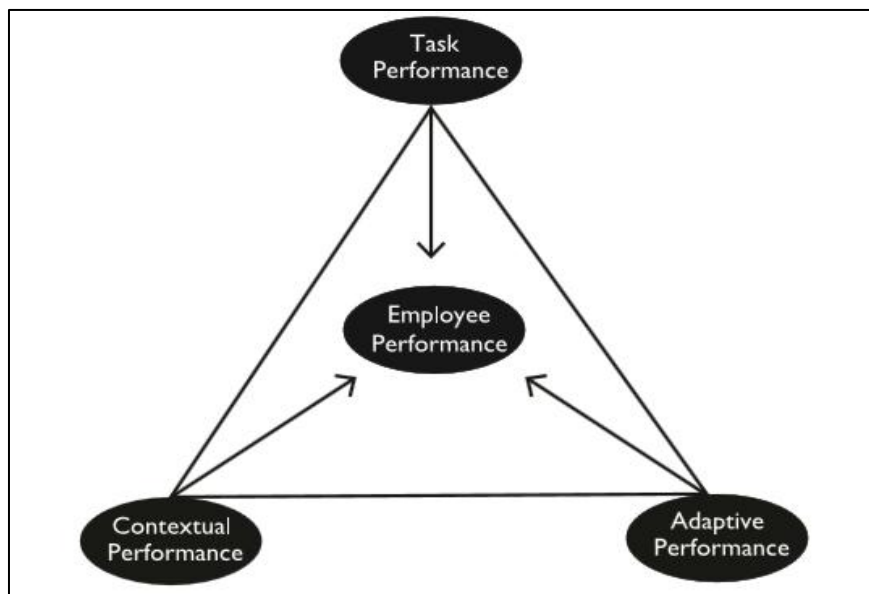


**Fig. 1. The Triarchy Model of Employee Performance**
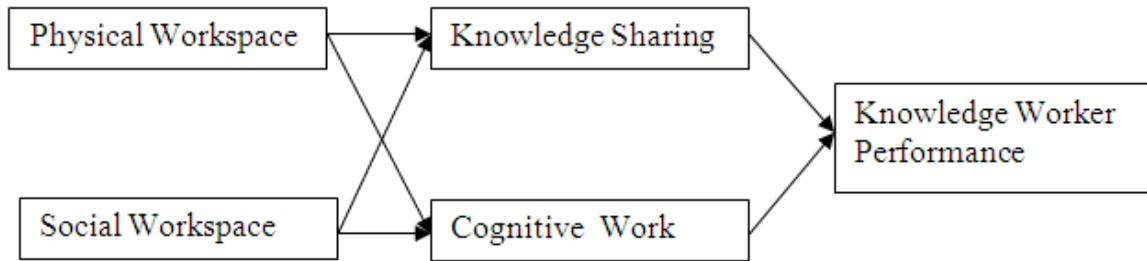*Pradhan and Jena [3]*

**Fig. 2. Conceptual framework**

Considering the relationship presented in the conceptual model, below hypothesis defined.

H₁:    There is a relationship between physical workspace characteristic and cognitive work of knowledge worker

H₂:    There is a relationship between physical workspace characteristics and knowledge sharing among knowledge worker.

H₃:    There is a relationship between social workspace characteristics and cognitive work of knowledge worker

H₄:    There is a relationship between social workspace characteristics and knowledge sharing among knowledge worker

H₅:    There is a relationship between cognitive work and performance of knowledge worker

H₆:    There is a relationship between knowledge sharing and knowledge worker performance of knowledge worker

## 3. METHODS

### 3.1 Study Area

The Information Technology industry in Sri Lanka refers to business process outsourcing, knowledge process outsourcing, software development, IT Services, and IT education. According to the Sethi et al. [39], Sri Lanka is ranked within the top 50 outsourcing destination for IT sector in worldwide. The export revenue of this industry grew from USD 213 million in 2007 to USD 1089 million in 2019. Thus, industry is identified as one of the main outsourcing destinations in Asian region. Generally, IT sector includes diverse types of knowledge-based workforce. According to workforce survey done by Information and Communication Technology Agency (ITCA) of Sri Lanka, majority of IT employees are working as programming/software engineers. The second highest specialization professionals within IT workforce includes software quality assurance engineers.

Furthermore, Business System Analyst, Technical Architect and Technical Writing are identified as next tier of IT workforce in Sri Lanka. All IT companies and IT employees of Sri Lanka registered with Sri Lanka Association for Software Services Companies (SLASSCOM). It consists with over 200 member companies with a 30,000 plus IT employee base. The SLASSCOM is identified as the national chamber for knowledge and innovation industry in Sri Lanka and acts as the catalyst of growth.

### 3.2 Research Design, Approach, Population and Sample

The quantitative research approached was used in this research. The study applied reflective constructs of the PLS-SEM for analysis as where it can test theoretically supported linear plus additive causal models [40,41]. According to Wong [41] PLS is more applicable for research projects which consist for limited participants and skewed data distribution. On the other hand, PLS-SEM works efficiently with small sample and complex models and makes practically no assumptions about the underlying data. Further, it is noted that concept applied in wide variety of research situation including social sciences which is fitted with study area of this study. SmartPLS 3.3.3 version used for analysis and conceptualized measurement and structural model. The analyzed done as per decision rules applicable to PLS-SEM studies.

According to Wong [41] validity test estimate quality of instruments and reliability test estimate consistency of measurement instrument of the study. As reflective nature of the questionnaire, reliability and validity test carried out to check whether the model data as reflective indicators are highly correlated and interchangeable.

The internal consistency of the measurement model measured using Cronbach's Alpha and it point out a conservative measurement in PLS

[40,41]. In addition to Cronbach's Alpha, Composite Reliability (CR) used to interpret internal consistency of reflective models. Chin. et al. [40] state that values gain for Cronbach's Alpha should equal or greater than 0.7 and CR should equal or greater than 0.5 to establish internal reliability. A factor is considered as significant if the loading value equal or greater than 0.7 [40,41]. The convergent validity of the measurement model was tested based on Average Variance Extracted (AVE). According to Chin. et al. [40] AVE should equal or greater than 0.5. The next step of measurement model validation is the review the discriminate validity. According to Hair et al. [42], more reliable criterion of discriminant validity is HTMT ratio over Fornell-Larcker and cross loading. The threshold value is defined as 0.85.

The structural model evaluation of the PLS-SEM analysis involves examination of model's predictive capability and the relationship between constructs. The running of algorithm estimates structural model relationship, which represent the hypothesized relationship among the constructs. The bootstrapping standard error enables computing the empirical t value and p values for all constructs path coefficients. The critical value of two tailed test is 1.96 at significant level of 5 percent while threshold for p value estimated as smaller than 0.05. As per the Hair et al. [43] and Henseler et.al [44], $R^2$ values of 0.75, 0.5 or 0.25 for endogenous constructs can be described as respectively substantial, moderate and week. In addition to the $R^2$ estimation, the study also examines the Stone-Geisser $Q^2$ value. In the structural model $Q^2$ values larger than zero for a specific reflective endogenous latent variable indicates the path model's predictive relevance for a particular dependent construct.

The research targeted all the knowledge workers of IT industry in Sri Lanka who registered under the SLASSCOM. Knowledge workers population reflects IT professionals namely, Software Engineers, Software Quality Assurance Engineers, Business Analyst and Consultants. Convenience sampling technique was used to collect data. The sample size of the study decided based on G-power F tests linear multiple regression fixed model where $R^2$ increase analysis. The priori analysis confirmed the required sample size as 107 [45]. To reach this end, questionnaire designed as a Google form distributed via email to employees of IT companies who registered under the SLASSCOM. A total of 250 emails sends and 196 responses were received. Out of this 185

was selected for final analysis after removing missing data and partly filled questionnaires. This is well above of required sample size of 107 for estimated by G-Power analysis with the error probability of 0.05. Further, study confirmed the 185-sample size is well above the ten-time thumb rule of PLS-SEM analysis defined by Marcoulides & Saunders [46], Chin. et. al. [40]; Wong, [41]. According to the given thumb rule required sample size was 20 where the sample size is determined based on the maximum number of arrows point at a latent variable.

## 3.3 Survey Design and Analysis

The questionnaire of the study designed with reflective statement to measure latent construct of the study; namely Physical workspace (PE), Social Workspace (SE), Knowledge Sharing (KS), Cognitive work (CG), Knowledge Worker Performance (PER). The questionnaire consists with two sections. First section was used to collect data related to respondents' demographic data such as gender, designation, work experience and apps developed. The second section includes perception of respondents on constructs of the study. The questionnaire designed following the guidelines of Partial Least Square Structural Equation Model (PLS-SEM) analysis requirements and measurement scale was defined as five-point likert scale ranging from "strongly disagree" to "strongly agree".

## 4 RESULTS

### 4.1 Profile of Respondents

The respondent of the study includes IT professionals who works at the different capacities in leading IT firms in Sri Lanka. The demographic profile of the respondents is shown in Table 3.

The majority of the respondents were male (72 per cent), while 28 per cent of the respondents were females. Out of 185 respondents' majority were Software Engineers (44 per cent) followed by Quality Assurance Engineers (24 per cent), System Engineers (25 per cent), Software Architects (4 per cent) and other knowledge workers (3 per cent). Approximately 70 per cent of the respondents have less than 3 years' work experience in IT industry. Meanwhile, 20 per cent professionals have working experience between 3 years to six years and 10 per cent have experience more than six years in the industry.

**Table 3. Profile of the Respondent**

| Demographic Profile | Percentage |
|---|---|
| **Gender** | |
| Male | 133 (72%) |
| Female | 52 (28%) |
| **Age Group** | |
| 20-30 | 22 (12%) |
| 30-40 | 70 (38%) |
| 40-50 | 57 (31%) |
| Above 50 | 35 (19%) |
| **Expertness** | |
| Software Engineers | 81 (44%) |
| Quality Assurance Engineers | 44 (24%) |
| System Engineers | 46 (25%) |
| Software Architects | 07 (04%) |
| Other | 06 (03%) |
| **Experience** | |
| Less than three years | 130 (70%) |
| Three years to six years | 37 (20%) |
| More than six years | 19 (10%) |

*Source: Computed from Survey Data, (2022)*

## 4.2 Results of the Measurement Model

At the beginning, reliability and validity test were carried out as a mandatory requirement before a hypothesis testing. Factors with loading values lesser than 0.7 were eliminated to establish reliability of model indicators. With this argument, the model established indicators with factor loadings ranged from 0.707 to 0.881, after elimination of indicators which scored lower factor loading compared to 0.7.

The internal consistency measured using Cronbach's Alpha. The Cronbach's Alpha values records ranged from 0.760-0.892 and CR values ranged from 0.843-0.925 in this study. The AVE of this study varies from 0.573 to 0.756 and established the threshold level. With this construct reliability and validity of the study established. Refer Table 4 for details.

The discriminant validity estimated using HTMT threshold level 0.85 and confirmed the discriminant validity as all HTMT values are clearly lower than the more conservative threshold value of 0.85. Refer Table 5 for details.

Accordingly, the measurement model evaluation confirmed the establishment of all threshold level of the internal consistency, convergent validity and discriminant validity.

## 4.3 Results of the Structural Model

Once the study confirmed the construct measures are reliable and valid, then it addresses assessment of the structural model. This involves examination of model's predictive capability and the relationship between constructs. The structural model given in Fig. 3.

As per the results of algorithm estimates of the structural model given in Table 6, it is revealed that path coefficient of Cognitive Work on Knowledge Worker Performance, Physical Workplace on Cognitive Work and Physical Workplace on Knowledge Sharing satisfied the threshold level of both p value and t value. Also results satisfied the Threshold level of confidence interval which does not include zero within the interval valuers [42]. Refer Table 6 for details.

**Table 4. Construct Reliability and Validity**

| Construct | Loading | AVE | CR | Cronbach's Alpha |
|---|---|---|---|---|
| **Cognitive Work (CG)** | | 0.646 | 0.879 | 0.819 |
| CG1 | 0.793 | | | |
| CG2 | 0.807 | | | |
| CG3 | 0.727 | | | |
| CG4 | 0.881 | | | |
| **Knowledge Sharing (KS)** | | 0.573 | 0.843 | 0.760 |
| KS1 | 0.770 | | | |
| KS2 | 0.758 | | | |
| KS3 | 0.791 | | | |
| KS4 | 0.707 | | | |
| **Physical Workspace (PE)** | | 0.605 | 0.859 | 0.783 |
| PE1 | 0.763 | | | |
| PE2 | 0.724 | | | |
| PE3 | 0.811 | | | |
| PE4 | 0.810 | | | |
| **Knowledge Worker Performance (PER)** | | 0.713 | 0.908 | 0.865 |
| PER1 | 0.775 | | | |
| PER2 | 0.882 | | | |
| PER3 | 0.862 | | | |
| PER4 | 0.854 | | | |
| **Social Workspace (SE)** | | 0.756 | 0.925 | 0.892 |
| SE1 | 0.881 | | | |
| SE2 | 0.881 | | | |
| SE3 | 0.870 | | | |
| SE4 | 0.844 | | | |

*Source: Computed from Survey Data, (2022)*

**Table 5. Discriminant Validity: Heterotrait-Monotrait (HTMT 0.85) Results**

| | CG | KS | PE | PER |
|---|---|---|---|---|
| KS | 0.459 | | | |
| PE | 0.493 | 0.612 | | |
| PER | 0.525 | 0.411 | 0.379 | |
| SE | 0.361 | 0.423 | 0.603 | 0.261 |

*Source: Computed from Survey Data, (2022)*

**Table 6. Path Coefficient of Structural Model and Hypothesis Testing**

| Hypothesis | Path Coefficient | T Value | Confidence Interval | | P Value | Decision |
|---|---|---|---|---|---|---|
| | | | **2.50** | **97.50** | | |
| CG -> PER | 0.391 | 2.620 | 0.122 | 0.657 | 0.009 | Supported |
| KS -> PER | 0.213 | 1.058 | -0.196 | 0.566 | 0.290 | Not Supported |
| PE -> CG | 0.374 | 2.428 | 0.077 | 0.636 | 0.015 | Supported |
| PE -> KS | 0.462 | 3.171 | 0.179 | 0.720 | 0.002 | Supported |
| SE -> CG | 0.111 | 0.904 | -0.166 | 0.361 | 0.366 | Not Supported |
| SE -> KS | 0.148 | 1.168 | -0.095 | 0.385 | 0.243 | Not Supported |

*Source: Computed from Survey Data, (2022)*
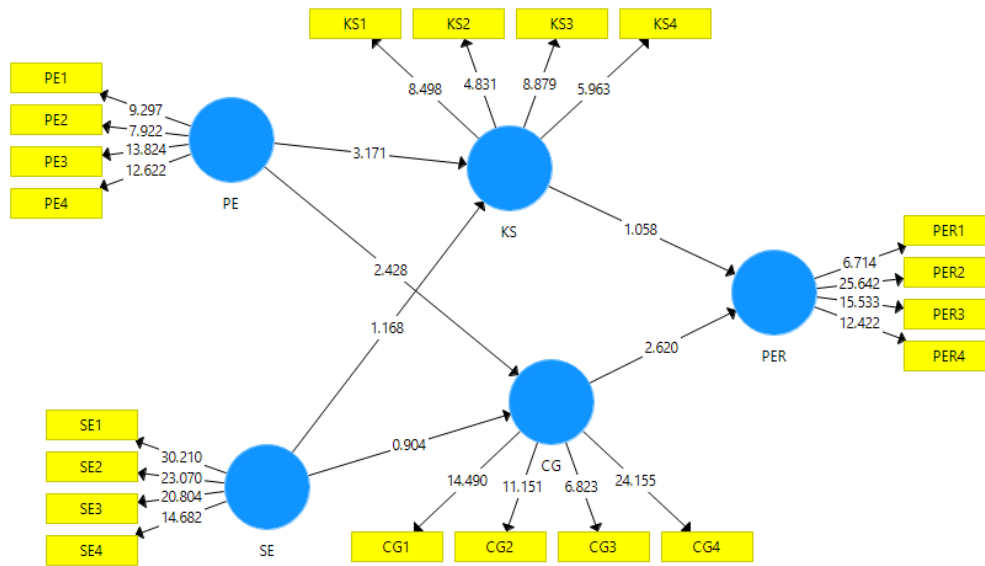
**Fig. 3. Structural Model of the Study**

**Table 7. $R^2$ and $Q^2$ Values**

| Endogenous Variable | $R^2$ | $Q^2$ |
|---|---|---|
| Cognitive Work | 0.178 | 0.097 |
| Knowledge Sharing | 0.277 | 0.127 |
| Knowledge Worker Performance | 0.242 | 0.142 |

*Source: Computed from Survey Data, (2022)*

The results of the Table 6 confirmed that out of the six hypotheses, only three hypotheses were accepted while there is no relationship between Knowledge Sharing on Knowledge Worker Performance, Social Workspace on Cognitive Work of Knowledge Worker and Social Workspace and Knowledge Sharing among Knowledge Worker.

The next step of the study is estimation of the coefficient of determination ($R^2$) which measures the predictive power of the model. Results confirmed the 0.178 $R^2$ value for cognitive work, 0.277 and 0.242 for Knowledge sharing and Knowledge worker performance respectively. As per the Hair et.al, [43] and Henseler et al. [44], $R^2$ values confirmed weak predictive accuracy. The results given in Table 7 confirmed the predictive relevance of the model as all $Q^2$ were well above zero.

## 5. DISCUSSION

Results of this study generates two core findings. Initially, the results of hypothesis testing reveal a significant relationship between physical workspace and cognitive work (H1) and physical workspace and knowledge sharing (H2). Further test results of (H5) confirmed that cognition confirm the significant positive impact on employee performance. This confirmed that physical workplace characteristics has an impact on knowledge worker performance via cognition. It has been shown empirically that changes in the physical environment indirectly and positively influence employee performance over cognition. These results are in line with the opinions of Van Heck [47] and corroborates the findings of Gerards et al. [48] where appropriate design of physical workspace is essential for increased work engagement and ultimately leads to organizational performance. However, relationship between social work environment and knowledge sharing or cognation significantly not validate by the study results. This is contradicted with research finding in Finland case study where it confirmed that social workspace environment has a higher impact on employee performance compared to physical workspace environment in any organization [5]. Furthermore, same study point toward majority of employees in western countries have a positive attitude towards social workspace aspects. Given the facts in the literature it is not evident in tested

model in Sri Lankan IT industry where social environment does not have significant relationship with cognition or knowledge sharing. In this context, this phenomenon should be revisited in future studies. A qualitative approach recommended [49].

Above observation aims to conceptualize how the present investigation contribute theoretical and practical aspects. In the view of theoretical perspective, the results of the study contribute for academic models of corporate real estate management. Results theorize that any investment on workspace environment of IT firms should focused on physical characteristics which ultimately support for cognization as well as knowledge sharing of IT employees. Thus, contributory factors of physical environment namely ventilation, temperature, lighting, inter visibility of interior walls, open plan office layout, design aspects of proximity to each other and flexible walls and furniture are important within the physical work setting. In the meantime, it is recommended to ensure the participatory physical environment planning process to ensure maximize employee ideas into the final design stage of the physical office environment. A poor consideration about knowledge worker preference when design physical workspace could cause poor performance of knowledge employees. Thus, findings of this study are significant as it proves corporate real estate has a significant impact on knowledge worker performance in IT companies. The operationalization of the theory can identified as practical application.

For practical perspective organization should assess the perception of its employees to identify the weight of the physical workspace factors which contributes cognition and knowledge sharing before moving to major overhaul of physical workspace of the organization. Such application positively contributes work target and performance target of the organization.

Moreover, when making changes to the physical workspace, they should consider how it will be influenced by such changes. It is testified that favorable work environment not just an appropriate alignment of human but also appropriate configuration of physical environment.

Finally, it draws attention to the necessity of proper management of corporate real estate aspects in IT firms. This research is only focus on analyzing whether there is an impact of CRE on knowledge worker performance in IT industry. But this can be followed up with more comprehensive manner. In further studies can evaluate CRE aspects using quantifiable scales to rank CRE aspects according to level of influence. This type of comprehensive study will support to invest and manage the right CRE aspect for accelerate knowledge worker performance in IT industry.

# 6. CONCLUSION

Corporate real estate is an important contributory factor for performance of the employees. This study revealed that there is a significant relationship among physical workspace and cognition as well as knowledge sharing of the IT employees. However, among the variable examined, social workspace is not a statically significant predictor on knowledge sharing and cognition. The study confirmed that physical work environment is one of the strongest factors that could influence the cognition and thereby support to employee performance. This confirmed that if physical workspace adequately taken care of, the knowledge workers cognition and knowledge sharing will improve and indirectly support for employee satisfaction in IT industry in Sri Lanka. IT employees could take the advantage of conducive physical workspace and build and maintain appropriate work relationship which ultimately enlighten their thoughts and reasoning which support to complete software developments. It is believed that the results of this study will be useful to other researchers to study the employee performance among IT professionals and physical and social workspace.

# CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

# COMPETING INTERESTS

Authors have declared that no competing interests exist.

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