Impact of Computer Mediated Communication Systems on Job Satisfaction: Employees in the Transmission Division of Ceylon Electricity Board, Sri Lanka

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Abstract

To fill the gaps in the computer mediated communication literature and to provide useful information on interpersonal relationships within an organization, this study aims to investigate how computer mediated communication (CMC) systems have impacted job satisfaction of employees of Ceylon Electricity Board, Sri Lanka. An empirical research was conducted to test the hypothesized relationships based on a conceptual framework developed through a comprehensive literature review on CMC and job satisfaction. This model consists of three independent variables (i.e., electronic mails, instant messaging, and computerized maintenance management) in computer mediated communication systems, and a dependent variable, which is job satisfaction. The sample of the study consisted of 100 respondents representing executive and medium level technical service (MLTS) staff of the Transmission Division of Ceylon Electricity Board in Sri Lanka. Self-administered questionnaire and the web-based questionnaire were used to collect primary data. The data was analyzed with Partial Least Squares path modeling (PLS) to test the hypotheses of the study. The research findings indicated that computerized maintenance management is the most significant factor impacting employees' job satisfaction. Moreover, it also identified that there is a positive and statistically significant impact of instant messaging and electronic mails on employees' job satisfaction. The results provide valuable input regarding instant messaging and job satisfaction. Therefore, managers should pay more and more attention to improve instant messaging as one of the communication media in an organization. In this research only three CMC

dimensions, which influence the job satisfaction, were considered; but there are more CMC dimensions used as organizational communication that can be explored in future studies.

Keywords: *Computer mediated communication systems, computerized maintenance management solution electronic mails, instant messaging, job satisfaction*

1. Introduction

With the development of technology, the communication process and pattern in work place has dramatically changed (Paraskeva, Eriksson, Johansson, & Peter, 2019). Today technological innovations and internet are major aspects which have influenced the communication approaches in organizations. Koschmann (2012) states that there is a rapid growth in the use of technology for communication every year, also that new advancements are made at the same frequency. Many organizations have begun to practice the use of new communication technology for employee communication (Anton, 2012). Especially Computer Mediated Communication (CMC) systems have radically emerged and been introduced in many workplaces to make a significant shift towards technological adoption in their communication practices (Sayago, Sloan, & Blat, 2011). In this era, computer-mediated communication is basic infrastructure that every organization needs to be equipped with.

The computer-mediated communication systems have done significant changes in the ways people communicate and associate with each other, in both government and private sector organizations today (Jayalal & Balasuriya, 2015). With the use of CMC systems information can be sent to single as well as multiple recipients, thus, making the distribution of information easier and quicker than ever before (Wellman, Salaff, Dimitrova, & Garton, 1996). Organizations believe that access to and use of this information would result in increased worker productivity and efficiency, and make it easier for them to communicate with employees (Bob & Sooknanan, 2014). With this rapid change in communication technology, the organizational culture and employees' working environment, organizational language, interpersonal relationships of the employee have totally changed. These changes, which were created due to CMC systems' influence, have made a significant impact on employees work life and their job satisfaction (Dhir, 2018). In line with the discussion, job satisfaction may be identified as a construct, which is basically concerned with the psychological incidents at the workplace, that adds greater linkage among employees, their jobs, and their organization (Okwudili, 2012).

On the other hand, the employees should have up-to-date technological skills or have to develop those skills to adapt to the digitalizing work environment. Learning and adapting to new technologies may increase the workload and cause stress (Bordi, Heikkilä, & Okkonen, 2014). The number of technologies used at work, constant changes in ICTs, plus malfunctions, and usability problems of the systems may increase the risk of lowered well-being and satisfaction (Day, Scott, Kelloway, 2010). Thus, if CMC systems have an impact on job satisfaction, then organizations using CMC systems have an effective tool to influence employee job satisfaction. With the technological advancements, most of the organizations get improved by adopting latest components to their communication practices (Lee, 2011).

Most of the researchers (Belle, Hall, Riekert, & Muganda, 2007; Lau, 2014; Bob &Sooknanan, 2014) have conducted researches on the topic of the impact of computer mediated communication on interpersonal relationship of couples, groups, or workers. Although, each and every organization, not only in western countries, but also all over the world, is using CMC systems as their main communication media, there are only few studies done on workers' performance or employee satisfaction in a CMC environment. However, most of the CMC studies focus on the CMC effect, use, and user satisfaction. According to the literature found (Epure, Ionescu, & Nancu, 2013; Giri, & Kumar, 2010; Mukahi, Nakamura, & Not, 2003) there is very little research done in the world to examine the impact of CMC on job satisfaction.

In the Sri Lankan context, a research to find the direct impact of CMC systems on the job satisfaction in the service sector of Sri Lanka is still not done. So, there is a question whether CMC practices can improve the job satisfaction of employees. Therefore, this research study is important to fill that research gap identified in the Sri Lankan context.

Ceylon Electricity Board (CEB) is a large scale organization, with its branches in every nook of the country to supply energy to all categories of power consumers, and for the sale of electrical energy island wide. CEB has also adopted CMC technology for organizational communication and other related tasks during the last decade. Due to the advancement of this technology, there is an increasing number of workplace activities that involve computer-mediated communication (CMC) systems, and CMC systems have changed the ways people communicate and relationships with each other in an organization. The research question, therefore, that leads in the direction of an empirical investigation in this study, is *"Does the adaptation of computer mediated communication (CMC) systems lead to job satisfaction of the employees in the Ceylon Electricity Board, Sri Lanka?"*

2. Literature Review

2.1. Traditional Communication to Modern Communication

Bordi, Tammi,, & Okkonen (2014) reveal that computer mediated communication and electronic documents are mostly favored over traditional telephone calls and paper, as they seem to be easier to manage, and increase the opportunity of having further control over employee's work. Before the 70s, some people thought using computers for information exchange as dangerous. Some people feel threatened by computers (Dahanayake, 2015). But after 1970s, some people started to feel that computers enhance their opportunities of making any information available to someone, and of supporting information exchange easily and speedily, regardless of the geographical distance (Palme, 2000).

With the development of computer and internet technology, computer mediated communication (CMC) appropriated all forms of communication facilities in the workplace. CMC made the vertical and horizontal information flow across organizations more efficient, as well as the information intake of the organization. Not only the speed of CMC practice, but also the volume and portion of the organizational work done have become greater and greater rapidly. As a result of factors, such as greater access to organizational power, decision-making and creative processes, it has also been credited with significant improvement in task efficiency, planning, promoting timely, complete feedback, controlling organizational activities, managing time, initiating action plans, responding to the environment, and planning flexible work schedule (Bob & Sooknanan, 2014).

2.2. Computer Mediated Communication (CMC)

Different authors have different approaches towards defining computer mediated communication. According to Kim (2002), computer mediated communication is defined as any interpersonal or group level communication, which is mediated by a computer, but mass communication is eliminated here. December (1997) defined it as "a process of human communication via computers, involving people, situated in particular contexts, engaging in processes to shape media for a variety of purposes" (p.3), while based on the definition of Stasser (1992) CMC can be defined as a process of negotiating the meaning of various situations that arise between a group of social actors. In the claims of Metz (1992) computer-mediated communication (CMC) is described as any communication pattern mediated through the computer.

There are lots of advantages that employees can enjoy because of CMC systems introduced and developed in an organization. As Rowley(1999) claims, CMC makes responses quicker

than was possible through a letter or memo, as well as giving the opportunity to attach more files and communicate with groups on one occasion. So, CMC creates a faster, speedier and reliable communication service. Further, he discussed that the management and development of organizations is considered to be centralized with CMC; and, indeed, the style of communication can influence interpersonal relationships, and in turn, factors such as commitment and motivation. Gush (1999) conducted a research to examine the potential and limitations of computer mediated communication (CMC) in an educational context at Bournemouth University on two courses to serve the needs of students out on their work placement year. There he found that the CMC has the ability to facilitate learning at a distance by providing a sophisticated tool for communication. The advantage of this is, therefore, that it creates new knowledge and understanding, while working collaboratively with a view, and can deliver against desired outcomes (Bordi, Tammi,, & Okkonen, 2014).

2.3. Dimensions of CMC

Since computer mediated communication is rapidly developing technology, its dimensions vary with time. Various researches describe CMC systems with various models. According to Harold Dwight Lasswell's '5W' theory, CMC systems are a new form of communication with its own five characteristics: Subject, Host, Information resource, Channel, Relations and Effects. Further, researcher Yu (2011) identifies CMC as systems composed of humans and computers, that absorb and then extend the advantages of all former formats of communication, the instant interaction of oral communication, the intellectual logics of printing dissemination, and the vivid images of movie and television.

The researcher Simpson, (2002) further describes that where interaction takes place in real time is synchronous CMC, and where participants are not necessarily online simultaneously is asynchronous CMC. Synchronous CMC includes various types of text-based online chat, computer, audio, and video conferencing; asynchronous CMC encompasses email, discussion forums, and mailing lists. Stefan (2008) has done a research to explore formal and informal dimensions of CMC. In his paper he has further developed Fish's (1990) model of distinguishable characteristics of informal and formal dimensions of computer mediated communication (CMC). His findings revealed that a medium (Channel) may be more or less useful for supporting informal or formal communication.

According to Samarawickrama (2017), the usage of computer related communication has grown in government institutes of Sri Lanka. With the establishment of Sri Lanka Telecom (SLT) in 1991 and the initiation of SLT Internet service facility in 1996, adaptation to CMC increased in public and private sector organizations. Therefore, CMC systems and their dimensions, such as instant messaging, email, chat rooms, online forums, and social network

services, started to a play major role in organizational communication in education, health, banking, travel & Tourism and manufacturing industries in Sri Lanka. The commonly used CMC dimensions in Ceylon Electricity Board are discussed below, according to different views of different authors, to setup the hypothesis.

2.3.1. E-mails

Electronic mail or e-mail is defined as the transmission of messages over communications networks. Those massages may contain text, documents, sound, pictures, and even computer programs. Computers are generally used as terminals, but electronic agendas, cell phones, data communication terminals or other data exchange equipment can also be used to send emails (Beal, 2019). Currently more than 600 million people around the world use email as a means of communication for personal and business communication needs (Mertena& Gloorb, 2009). With the development of the World Wide Web, email has also continued to develop, with providers such as Hotmail, Yahoo, and Google offering free email accounts.

E-mail possesses the highest level of social presence, followed by other CMC dimensions as claimed by Tu (2002). He also reveals that email is more public, in public and private sector organizations today. Quaresma , da Silva , & Marreiros , (2013) empirically studied the use of e-mail in an organizational context, using a sample of the Portuguese population with an active e-mail account assigned by the employer. The results show that most users have what is considered appropriate behavior. The paper of Smith & Tabak, (2009) provides evidence of work outcomes of e-mail monitoring regarding employee attitudes and behaviors, such as organizational commitment, job satisfaction, and performance.

There is not only the positive impact, but also some drawbacks. Mertena & Gloorb,(2009) calculated e-mail responsiveness and conducted an individual job satisfaction survey. They identified patterns of productive and less-productive e-mail usage. Results indicate that central network position reduces e-mail responsiveness, while this position in the organization's social network also seems to be correlated with lower job satisfaction. The team which sent and received the most e-mail reported the lowest job satisfaction.

2.3.2. Instant Messaging

Instant messaging (IM), is the near real-time conversation in a private, back and forth style of communication of two users by exchanging messages through a stand-alone application or embedded software (Rouse, 2008). With the development of technology, now it can be transfer not only text messages, but also transfer files and images by using IM. According to (Larson, 2011)**'s** definition Instant messaging (IM) technology is a type of online chat that

offers real-time text transmission over the Internet. More advanced instant messaging can add file transfer, clickable hyperlinks, Voice over IP, or video chat. Instant messaging is gaining popularity in organizations because it speeds up the communication process.

Cho, Trier, & Kim, (2005) state IM to be a double-edged sword, because while IM helps to facilitate quality communication and trust, on the other hand, it interrupts work. However, the negative effects if IM are negligible. He further states that IM can usefully enhance other CMC tools, and create an effective and comprehensive CMC environment at the workplace, therefore, it leads to better work performance of employees. Another research done by Sias, Pedersen, Gallagher, & Kopaneva, (2012) to examine teleworkers' job satisfaction related to the use of and satisfaction with a variety of communication channels, and he reveals that teleconferencing and instant messaging ranked as least satisfying among a range of communication channels available to teleworkers.

2.3.3. Computerized Maintenance Management Systems (CMMS)

A computerized maintenance management system (CMMS) is a software package designed to maintain a computer database for an organization's maintenance operations and human resource functions (DeSanctis & Poole, 1994). Computerize Maintenance Management systems (CMMS) is help for scheduling all types of maintenance jobs, such as maintenance operations, labor handling, purchasing and inventory handling, and providing statistical reports. Each responsible employee for the above activities can be involved in their job simultaneously, even if they are geographically dispersed, because of CMC. CMMS is leading CMC systems in Sri Lanka for utility management. A computerized Maintenance Management Systems (CMMS) is a computer software program designed to assist in the planning, management and administrative functions required for effective maintenance. According to the findings of Higgins, Brautigam, & Mobley, (1995) CMMS managed maintenance information contributes to improved communication, decision-making capabilities, and improve the information and communication facilities of repair needs and work priorities. Further, they found in their research that CMMS has the capability of improving coordination through closer working relationships between maintenance and production. So, it increased maintenance responsiveness of employees.

Rastegari & Mobin (2016) say that electronic communication between offices in an organization improve with CMMS, because they can send work assignments to maintain the workforce through mobile devices, so that they can operate more efficiently in the field for timely completion of required maintenance and repairs. On top of that, CMMS lets your team communicate in a more efficient manner, which means the work can be started faster and subsequently finished under set deadlines. To attain a better understanding of how advanced

CMMS trigger satisfaction amid their resources (employees), the study hereby refers to Adaptive Structuration Theory (AST) to describe the process by which people incorporate advanced technologies into their work practices. Once applied, technologies should trigger structural change in terms of productivity, efficiency, and satisfaction to individuals and organizations (DeSanctis & Poole, 1994).

2.4. Employees' Job Satisfaction

Various researchers and practitioners have provided their own definitions of what job satisfaction is. However, some of the most common definitions describe job satisfaction as a psychological, behavioural and occupational response of employees' towards fulfilment at their job. It is an expression of an employee pertaining to a particular segment of the work (For instance, reward, authority, peers). Kumar (2002) has defined job satisfaction as a significant principle for the success of an organization that it is closely associated with life satisfaction. That means employees' satisfaction is directly proportional to organizational performance. Therefore, employees can make or break an organization (Deal, 2007). Brief & Weiss (2002) defined job satisfaction as "a pleasurable or positive emotional state resulting from the perception by the individual of his/her job as implementing or giving the opportunity to realize significant values available in the work, provided that these values are consistent with his/her needs" (p. 282). According to this definition job satisfaction is somewhat subjective. Weiss, (2002) also defines the same concept as "job satisfaction represents a person's evaluation of his or her job and work context" (pp. 173). Satisfaction depends on the level of discrepancy between what people expect to receive and what they experience. Further, Locke (1976) defines job satisfaction as a collection of attitudes about specific facets of the job. Employee satisfaction is equivalent to the expectations of the employee about the workplace, and his attitude towards his job. So, job satisfaction is also a moral obligation in many societies. Gradually it can be concluded that job satisfaction is subjective, 'a happy worker is a productive worker.'

The importance of job satisfaction for any organization is huge as it is linked to many variables, including productivity, absenteeism, turnover, etc. It is significant because a person's attitude and beliefs may affect his or her behavior (Saleem, Majeed, Aziz, &Usman, 2013).If the employees in an organization are satisfied with their job it will lower turnover, increase productivity, increase customer satisfaction, lower employee absenteeism, and help to earn higher revenues; moreover, satisfied employees tend to better handle pressure (Okwudili, 2012).Therefore, if the company has satisfied the employee base, that is the strength of the company.Perceived job satisfaction was measured by Epure, Ionescu, &Nancu, (2013) using six dimensions, named working conditions, promotion opportunities, frequency of trainings, wage and compensations schemes, employee fluctuation, and importance of

work within the organization in their research study. Also according to the Multi-Motivation Theory (Murasugi and Miki 1990), which was developed in Japan based on Maslow's (1954) and Herzberg's (1968) work motivation theories, employees are motivated by four factors. They are working conditions, interpersonal relations, satisfaction with job content, and company policy.

Communication, as well, was a subject of interest to many researchers who discussed its impact on employees' job satisfaction. The results of (Jacobs, Yuo, & Chavez, January 2016) research reveal that internal communication has a significant positive effect on employee satisfaction. According to Attar & Sweis (2010) communication is the variable that most contributed to employee satisfaction within contracting firms. Effective communication results in satisfied employees. The satisfied employee is mandatory for improving the firm's performance in the coordination of resources. According to Epure, Ionescu, & Nancu, (2013) who did the research on a Romanian company, job satisfaction is strongly affected by communication: the more the individuals communicate within companies, the more satisfied they feel with their job. Much research has empirically found that there was a positive relationship between effective communication and job satisfaction. Giri & Kumar, (2010) identified that organizational communication had a significant effect on job satisfaction and job performance of the employees. The analysis further indicated that the employees at different levels perceived job satisfaction differently. Thus, it can be seen that job satisfaction and performance are very much dependent on the communication behavior of the organization.

3. Methodology

3.1. Conceptual Framework and Hypotheses

As pointed out by (Balouch & Hassan, 2014) modern management science's philosophy considers job satisfaction as a baseline standard of satisfaction generated by many different characteristics of work and the workplace. There are various features of work and the workplace that are valuable for job satisfaction. Researchers have attempted to explain the effects of CMC using different theories. The media richness theory of Daft & Lengel, (1986) suggests that e-mail is a leaner medium due to the text based and asynchronous nature of e-mail. The impact of communication channel satisfaction, personality, and job satisfaction could be explored from a social influence perspective (Fulk, Schmitz, and Steinfield, 1990), or a media richness perspective to better predict how each variable will influence job satisfaction of teleworking employees (Waldeck, Seibold, &Flanagin, 2004). The other study by Cameron & Webster (2005) used the media richness theory to investigate why employees use IM at work. To attain a better understanding of how advanced CMMS trigger satisfaction amid their

resource (employees), Adaptive Structuration Theory (AST) will be referred to describe the process by which people incorporate advanced technologies into their work practices (Gopal, Bostrom& Chin, 1993). Once applied, technologies should trigger structural change in terms of productivity, efficiency, and satisfaction within individuals and organizations (De Sanctis & Poole, 1994). Therefore, the present study developed a conceptual framework (figure 1) to investigate the impact of email, instant messaging, and CMMS in the workplace, and its correlation with two core concepts of media choice theories: *media richness, social influence, and adaptive structuration theory (AST).*

3.1.1. Electronic Mails and Job satisfaction

Bob & Sooknanan (2014), and Urquhart, Bommelje, & Schmid (2002) found that there is a positive relationship between CMC dimension of email and job satisfaction. Based on the findings of Bob &Sooknanan, (2014), it is evident that the majority of employees felt that email usage had increased productivity and efficiency in the workplace. Mukahi, Nakamura , & Not, (2003) state that email usage is highly important for employees individually, as well as for the performance of the organisation. Further, they say that those organizations that manage CMC well can gain CMC effects and increase employee job satisfaction. The findings of all this research show that electronic mail usage strongly affects employee's job satisfaction. Based on the aforementioned arguments, the following hypothesis is formulated,

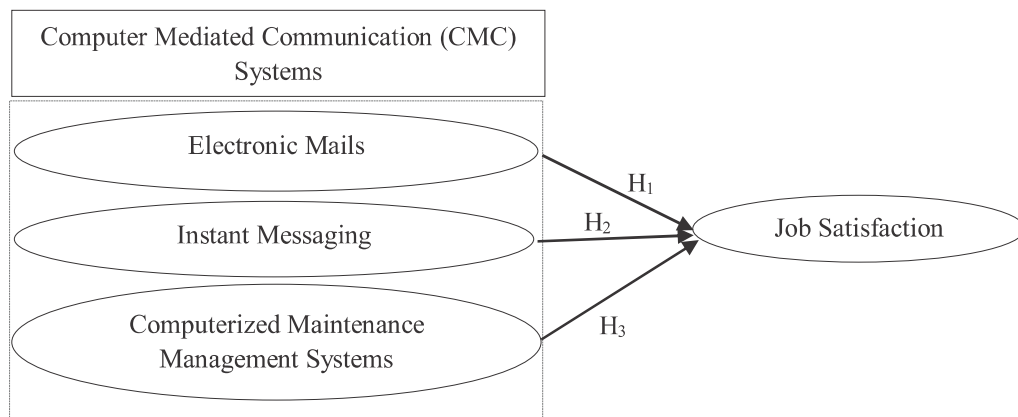H_1: There is a positive impact of electronic mails on job satisfaction.

Figure 1: Conceptual Framework

3.1.2. Instant Messaging and Job Satisfaction

As claimed by Iskandar, Arham, & Shohaime, (2017) there is significant relationship between the uses of instant messaging and performance. Instant messaging is one of the more prominent computer mediated communications, which is able to boost an instant reaction, similar to face to face communication. Ou, Sia, & Hui, (2013), and Cameron & Webster, (2005) stated that instant messaging allows employees to communicate in real time, and shows those online and currently available to receive messages. Lee, (2011) found in her research, which had been conducted to understand the potential impact of using IM in the workplace, the position power of the IM jointly influences employee satisfaction and subjective task complexity. Based on the above discussion following the hypothesis is proposed:

H_2: There is a positive impact of instant messaging on job satisfaction.

3.1.3. Computerized Maintenance Management Systems (CMMS) and Job Satisfaction

According to the findings of Higgins, Brautigam, & Mobley, (1995) CMMS managed maintenance information contributes to improve communication and decision-making capabilities, and improve the information and communication facilities of repair needs and work priorities. Further, he found in his research that CMMS have the capability of improving coordination through closer working relationships between maintenance and production. So, it increased maintenance responsiveness of employees. Rastegari & Mobin (2016) say that electronic communication between offices in an organization improves with CMMS, because they can send work assignments to maintenance workforce through mobile devices, and so they can operate more efficiently in the field, for timely completion of required maintenance and repairs. Even though prior empirical evidence on these relationships is less based upon the preceding discussion, the following hypothesis is proposed:

H_3: There is a positive impact of CMMS on job satisfaction.

3.2. The Sample, Study Variables, Questionnaire Design and Data Collection

Since Ceylon Electricity Board is a multi-divisional organization spread over every nook of the country, it is well recommended to do a descriptive cross sectional research study to test the formulated hypothesis. The primary data was collected using a structured questionnaire, and the secondary data was collected from previous research papers, Internet and books. The

research survey was carried out in a mixed mode, and it also included quantitative and qualitative questionnaires. Face to face interview would help to identify existing issues, and based on that research, the questionnaire has been created. The study selected executive and medium level technical service (MLTS) staff of the Transmission Division of CEB as the population of the study, while executive and medium level technical staff grade employees of Western and Southern provinces are the sample in this research. Simple random sampling method was applied to select the managerial level employees in the Transmission Division of CEB as a unit of this analysis. Out of 200 questionnaires delivered, 50 were delivered as web based questionnaires, and response rate was 50%; while the remaining 150 questionnaires were distributed personally. 75 questionnaires that personally distributed were usable for the survey, yet, there were six incomplete questionnaires, which made the response rate 54%. As such, the total of 100 usable questionnaires were considered for the analysis with 53% overall response rate. The structured questionnaire used in the study consisted of three parts, including a part for the demographic data of the respondents, a part to elaborate the background information of the respondents, and a part that relates to the hypothesis of the study.

The four study constructs of the study i.e., electronic mails, instant messaging (IM), computerized maintenance management systems (CMMS) and job satisfaction were operationalzed as multi-item constructs. The seven items of the electronic mails were adopted from Bälter (1998), Iskandar, Arham, & Shohaime (2017), and Quaresma, Da Silva & Marreiros (2013). Instant messaging consisted of seven items taken from Mahatanankoon (2010), Mukahi, Nakamura, & Not (2003), Lee (2011), and Iskandar, Arham, & Shohaime (2017). Meanwhile, computerized maintenance management systems (CMMS) consisted of seven items adopted from Mukahi, Nakamura & Not (2003), and Chauhan& Singh (2016). Job satisfaction consisted of 11 items adopted from Mukahi, Nakamura & Not (2003).

4. Data Analysis and Results

Structural equation modeling (SEM) was used in this study to assess the predictive power of the theoretical model and testing the formulated hypothesis. Internal consistencies of the constructs were examined using the composite reliability index. Discriminant validity indicates the extent to which a given construct is different from other latent constructs. Fornel and Larcker (1981) has suggested to use the average variance extracted(AVE) in evaluating discriminant validity of constructs. Partial least square technique using Smart PLS version 20 was used to test the hypotheses, while SPSS software package was used to check frequency statistics of the demographic variables.

Discriminant validity is the degree to which any single construct is different from the other constructs in the model (Carmines & Zeller, 1979). Discriminant validity is assessed by the test provided by Fornell and Larcker (1981), in which the pair-wise latent variable correlations between factors obtained are compared with the square root of the average variance extracted estimates for the constructs, making up each possible pair as illustrated in table 1.

Table 1: Discriminant Validity of the Latent Variables

	1	2	3	4
Electronic mails	0.865			
Instant Messaging	0.209	0.873		
CMMS	0.438	0.007	0.913	
Job satisfaction	0.587	0.232	0.619	0.912

4.1. PLS Path Model Estimation

Table 2: Results of PLS Path Model Estimation

	Job Satisfaction[a] Estimates (t-Value)
Path	
Electronic mails	0.35 (4.68***)
Instant Messages	0.16 (2.07**)
Computerized Maintenance Management Systemss (CMMS)	0.46 (6.91***)
Coefficient of Determination (R^2)	
Electronic mails	0.35
Instant Messages	0.15
Computerized Maintenance Management Systemss (CMMS)	0.46
F^2 Coefficient	
Electronic mails	0.20
Instant Messages	0.05
Computerized Maintenance Management Systemss (CMMS)	0.37
Q^2	0.234

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

[a]Dependent variable

In Partial Least Squares (PLS) method, the structural model and hypothesis were tested by computing path coefficients (β). Because PLS does not require normally distributed data it

was evaluated with R-squared calculation for dependent latent variables (Cohen, 1988), and the average Variance extracted (Fornell & Larchner, 1981). As shown in Table 2, results obtained by analysing the collected data and all the variables yielded significant values.

According to the results indicated in table 2, it is revealed that electronic mails have a positive and statistically significant relationship with employees' job satisfaction (β = 0.35, t = 4.68, p< 0.001), and that there is a positive relationship between instant messaging and employees' job satisfaction (β = 0.16, t = 2.07, p< 0.01). The results indicate that the relationship is in the expected direction, and the relationship is statistically significant. The relationship between CMMS and employees' job satisfaction (β = 0.46, t = 6.91, p< 0.001) is also positive and statistically significant.

Table 3: Confirmatory Factor Analysis of Constructs

Item	Standardized Factor Loadings (t-Value)	Composite Reliability/AVE
Electronic Mails		0.865/0682
The replies to my email messages are immediate and satisfactory in speed	0.822 (22.56)	
It is easy to express what I want to communicate through emails	0.786 (14.57)	
Since email communication is used mostly at my work place it is easy to work	0.866 (33.02)	
Instant Messages		0.873/0.762
The approvals and decision making is quicker because of instant messaging	0.866 (5.16)	
Communication within the work place has increased because of instant messaging	0.879 (6.77)	
Computerized Maintenance Management Systems		0.913/0.677
The speed of procurement, attending to maintenance work has increased after introducing CMMS	0.829 (25.38)	
There is a user friendly interface in CMMS, therefore, I am satisfied working with CMMS	0.874 (27.98)	
Functioning and accessibility of the system is always in the expected condition	0.814 (17.33)	
CMMS facilitates improved communication among my maintenance team	0.782 (22.07)	

The present CMMS system is easier since data and information are easily saved and can be accessed again when needed	0.810 (17.76)	
Job Satisfaction		0.912/0.512
My workplace is well-equipped with up-to-date equipment, such as physical facilities available for CMC (email, Viber, what's up, web base applications, etc)	0.703 (8.71)	
There is no tension at my workplace, because CMC systems increased organizational commitment and reduced work stress	0.824 (25.69)	
The availability of CMC helps to develop relationships, so there is improvement in teamwork at my workplace with CMC	0.693 (11.68)	
I can deliver the maximum output to the best of my ability using CMC in my present work	0.741 (14.44)	
The company policy on CMC systems matches my interests and expectations	0.756 (15.89)	
I recommend CMC systems for other government and private organizations	0.6 (7.29)	
I am pleased to work with CMC it has less paper work and can store files electronically	0.632 (6.59)	
Since I am provided an adequate training on the CMC systems I am happy to work with CMC	0.688 (10.67)	
I am happy to work with CMC because it delivers the service that I expected	0.797 (17.58)	
I feel more committed to the organization because CMC Systems allow us to be better informed and increase information sharing	0.707 (11.67)	

A confirmatory factor analysis was carried out on the data to verify the reliability of each measurement scale of variables (Forza, 2002). Standardized factor loadings and outer loading factors of each item, the composite reliability, and AVE value of each construct is presented in table 3. According to the provided guide lines of Bagozzi, Yi, & Phillips (1991) the composite reliability of various dimensions is higher than 0.7, and Average Variance Extracted (AVE) is higher than 0.5, and is accepted as significant. According to Hair, Black, Babin, & Anderson (2007), generally larger loadings are the stronger and the more reliable measurement models. The factor loadings of the latent variables are high and statistically significant. The results of CFA confirm that the indicator variables and their respective underlying constructs are

acceptable. The composite reliability values of the study constructs also reveal that the measurement model is reliable.

5. Discussion

The main aim of this research is to examine how computer mediated communication (CMC) systems, such as e-mails, IMs, and CMMS, impact job satisfaction of employees in the Ceylon electricity Board. The results of the study confirmed the positive and significant impact of electronic mails on job satisfaction of employees. This finding is in line with the findings of Bob &Sooknanan (2014), and Urquhart, Bommelje, & Schmid (2002). Moreover, based on the findings of Bob &Sooknanan (2014), it is evident that the majority of the employees felt that email usage had increased productivity and efficiency in the workplace. As said by Mukahi, Nakamura, & Not (2003) email usage is highly important for employees, as well as for the performance of organization. Further, he says that those organizations that manage CMC well, can gain CMC effects, such as increased employee job satisfaction. In addition, the result of the study reveals that a positive and significant impact is found between instant messaging (IM) and job satisfaction. Many of the studies (Chang & Wan-Zheng, 2014) suggest that IM impacts employees' job satisfaction. Further, they suggest that the management team of an organization should try to construct a new organizational culture of using IM for communication and problem solving. Also in line with these findings, Mahatanankoon, (2010) expresses that instant messaging leads to creativity, and influences the increase of job satisfaction. As claimed by Iskandar, Arham, & Shohaime, (2017) there is a significant relationship between the uses of instant messaging and performance. Instant messaging is one of the more prominent computer mediated communications, which is able to boost an instant reaction, similar to face to face communication. Ou, Sia, & Hui, (2013) and Cameron & Webster, (2005) stated that instant messaging allows employees to communicate in real time, and shows those online and currently available to receive messages.

According to the findings of the research two dimensions of electronic mails and CMMS have a positive significant impact on job satisfaction. Since CMMS is implemented only in the Transmission Division of CEB, these findings will help higher management to step towards CMMS implementation in other divisions of the CEB as well. The results also show that investing in CMMS implementation in the organization is worthwhile. Therefore, managers can pay more attention to developing facilities for electronic mailing and CMMS without any hesitation. Rastegari & Mobin (2016) say that electronic communication between offices in an organization improves with CMMS, because they can send work assignments to maintenance workforce through mobile devices, and so, they can operate more efficiently in the field, for timely completion of required maintenance and repairs. So, these findings can help mangers

to decide whether they should extend usage of communication tools of CMMS further to increase job satisfaction.

5.1. Managerial Implications

Quaresma, da Silva, & Marreiros, (2013) empirically studied the use of e-mail in an organizational context, using a sample of the Portuguese population with an active e-mail account assigned by the employer. The results show that most users have what is considered appropriate behavior, and show the positive significant impact on job satisfaction. Therefore, in line with the previous studies, this study also positively related to empirical study. Therefore, according to these findings, the mangers should consider solutions to enable better management of e-mail by its employees, by paying more attention to email security. The response speed, easiness of expressing ideas, and ease of work in electronic mails are more important in achieving a higher level of job satisfaction. Additionally, the managers can understand by the findings that the user friendly interface, good access condition, saving and re-accessing data, and making good communication among a team on CMMS is more important in achieving higher level of job satisfaction.

On the other hand, the results show that there is a positive and a significant impact of instant messaging on job satisfaction. Therefore, managers should pay more and more attention to improving instant messaging as a communication media in an organization. Some IM applications can use push technology to provide real-time text, which transmits messages character by character, as they are composed. More advanced instant messaging can add file transfer, clickable hyperlinks, Voice over IP, or video chat (Lee, 2011). Therefore, such findings imply managerial efforts should be paid to facilitate better IM application than at present to improve the employee's job satisfaction. Cho, Trier, & Kim, (2005) identified IM as a double-edged sword. That means IM usage has both positive and negative impacts on employees' job satisfaction and performance. Therefore, managers have a huge responsibility to identify these negative impacts and take decisions to eliminate them. However, Cho, Trier, & Kim (2005) further state that IM can usefully influence other CMC tools, and create an effective and comprehensive CMC environment in the workplace, which in turn leads to better work performance of employees. So, academics can do further studies to find the way to use IM more effectively and comprehensively in the workplace in future.

On the other hand, the study conducted by Iskandar, Arham, & Shohaime (2017) on one of the public service departments in Malaysia with 132 respondents found that there is significant relationship between the use of instant messaging and social network, and performance. Instant messaging is one of the more prominent computer mediated communications, which is able to boost an instant reaction, similar to face to face

communication. Ou, Sia, & Hui (2013) and Cameron& Webster (2005) state that instant messaging allows employees to communicate in real time, and shows those online and currently available to receive messages. Therefore, there should be a proper mechanism to increase instant messaging usage in an effective and advance way in the public sector in Sri Lanka than at present.

5.2. Limitations and Future Research

Executive grade engineers and medium level technical service grade employees at the Transmission Division were the key respondents in this study. However, the other employee categories and other divisions of the CEB could have a different response for the study. The sample size was limited to 100 respondents, and this too could hinder the generalization of the findings. This research considered only three CMC dimensions that influence job satisfaction. However, there are more CMC dimensions used as organizational communication at present. In this study I selected a reputed leading company in public sector, but the employees in another public sector or private sector organization could respond differently. Therefore, it is important to consider more CMC dimensions in private sector organizations as well in future studies. In this study, only the positive effects of CMC in the workplace were examined. Future research on comparing the advantages and disadvantages of using CMC and addressing their impacts on individual performance can enhance the entire study. The research was limited to the internal organizational communication of CMC. In future studies, external organizational communication in CMC with customer satisfaction can be considered, or how CMC systems impact the revenue collection of the organization can be studied.

References

Anton, C., (2012) McLuhan, Formal cause, and the Future of Technological Mediation. *Review of Communication,* 12(04), pp. 276-289.doi: 10.1080/15358593.2012.687115

Attar, G. A., & Sweis, R. J. (2010) The Relationship between Information Technology Adoption and Job Satisfaction in Contracting Companies in Jordan. *Journal of Information Technology in Construction (ITcon),* 15, pp.44-63. http://www.itcon.org/2010/3.

Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991) Assessing Construct Validity in Organizational Research. *Administrative Science Quarterly.* pp. 421-458.

Balouch, R., & Hassan, F. (2014) Determinants of Job Satisfaction and its Impact on Employee Performance and Turnover Intentions. *International Journal of Learning & Development*. pp. 120-140.

Bälter, O. (1998) *Electronic Mail in a Working Context*. Nada, Royal Institute of Technology, Sweden: Interaction and Presentation Laboratory (IPLab).

Beal, V. (2019) *Email - electronic mail*. Webopedia.

Belle, J. P., Hall, N., Riekert, E., & Muganda, N. (2007) Exploring the Impact of Computer-mediated Communication on Interpersonal Relationships*:* A Tentative Model Using Characteristics and Behavioural Outcomes. Alternation,14 (1).

Bob, K. & Sooknanan, P. (2014) The Impact of Computer Mediated. *Advances in Journalism and Communication,* 02, pp. 45-50.

Bordi, L., Heikkilä, K., & Okkonen, J. (2014). *Digital Work Environment And Employees' Satisfaction With Customer Work.*

Brief, A. P., & Weiss, H. M. (2002). Organizational Behavior: Affect in the Workplace. *ResearchGate, 53*, 279–307.

Cameron, A. F. & Webster, J., (2005). Unintended consequences of emerging communication technologies: Instant Messaging in the workplace. *Computers in Human Behavior , 21(1), pp. 85-103.*

Carmines, E. G., & Zeller, R. A. (1979). Reliability and Validity Assessment (Vol. 17). *Thousand Oaks, CA: Sage.*

Chang, H.-J., & Wan-Zheng, I. (2014). Instant Messaging Usage and Interruptions in the Workplace. *International Journal of Knowledge Content Development & Technology, 4*(2), 25-47

Chauhan, S. P. & Singh, D. . S., (2016). Study Of Computerized Maintenance Management Systems (Cmms) And Computer Aided Maintenance Planning (Camp) In Production Systems. *International Journal Of Scientific & Engineering Research , 7(12), Pp. 315-318.*

Cho, H.-K., Trier, M. and Kim, E. (2005) The use of instant messaging in working relationship development: A case study, Journal of Computer-Mediated Communication, 10, 4: http://jcmc.indiana.edu/vol10/issue4/cho.html

Cohen, S. (1988) Psychosocial Models of the Role of Social Support in the Etiology of Physical Disease. *Health Psychology*, 7, 269 –297.

Daft, R. L., & Lengel, R. H. (1986). Organizational Information Requirement, Media Richness and Structural Determinants. *Management Science*, 32, 554–571.

Dahanayake, C. (2015). Discursive-Linguistic Practices and the Construction of Identity in the Sri Lankan SMS, Social Affairs: *A Journal for the Social Sciences,* 1(2), 15-32.

Day, A., Scott, N. & Kelloway, K., (2010). Information and Communication Technology Implications for Job Stress and Employee Well-being. *Research in Occupational Stress and Well Being,* 8, pp. 317-350.

Deal, J. J. (2007). *Retiring the generation GAP*. San Francisco: Jossey-Bass/Wiley.

December, J. (1997). *Notes on defining of computer-mediated communication*. Retrieved February 25, 2012, from http://www.december.com/cmc/mag/1997/jan/december.html

DeSanctis, G. And Poole M.S. (1994) Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science,* 5(2), 121–147.

Dhir, S. (2018). *The Changing Nature of Work, Leadership and Organizational Culture in Future Ready Organizations*. Claremont: Claremont McKenna College.

Epure, D. T., Ionescu, A., & Nancu, D.. (2013). *The Impact of Communication in Job Satisfaction: an Empirical Investigation within Romanian Companies*. Galati: Fascicle I. Economics and Applied Informatics.

Fish, F.E. (1990) Wing Design and Scaling of Flying Fish with Regard to Flight Performance. *Journal of Zoology*, 221 (3), pp. 391 403.

Fornell, C., and Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. J*ournal of Marketing Research,* (18:1), pp. 39-50.

Forza, C. (2002) Survey Research in Operations Management: A Process-Based Perspective. *International Journal of Operations & Production Management*, 22 (2), pp. 152-194.

Fulk, J., Schmitz, J., & Steinfield, C. W. (1990). A Social Influence Model of Technology Use. In J. Fulk& C. Steinfield (Eds.), *Organizations and Communication Technology,* pp. 117-140. Newbury Park, CA: Sage.

Giri, V. N., & Kumar, P. (2010). *Assessing the Impact of Organizational Communication on Job Satisfaction and Job Performance.* National Academy of Psychology (NAOP) India.

Gopal A, Bostrom, R.P. & Chin, W.M. (1993) Applying Adaptive Structuration Theory to Investigate the Process of Group Support Systems Use. *Journal of Management Information Systems* 9(3), 45–69.

Gush, J. (1999). The Use of Computer Mediated Communication in the Industrial Placement Year. *Emeraldinsight, 41* (2), 63-72.

Hair, J. F., Black, W. C., Babin, B. J. & Anderson, R. E., (2007). *Multivariate Data Analysis.* Seventh ed. s.*l.*:Alaeddine Bagga.

Herzberg, F. (1968). One More Time: How Do You Motivate Employees?. *Harvard Business Review.* 46 (1): 53–62.

Higgins, L.R., Brautigam, D.P. and Mobley, R.K. (1995), *Maintenance Engineering Handbook.* 5th ed., McGraw-Hill Inc., New York, NY

Iskandar, A. I., Arham, A. F., & Shohaime, N. (2017). The Use of Social Media, E-Mail and Instant Messaging as the Predictors of an Employee's Work Performance. *Journal of Academia UiTM Negeri Sembilan , 5*, 127-136.

Jacobs, M. A., Yuo, W., & Chavez, R. (January 2016). The Effect of Internal Communication and Employee Satisfaction on Supply Chain Integration. *ScienceGate, 171*(1), 60-70.

Jayalal, S., & Balasuriya, U. C. (2015). *Impact of Social Network Usage on the Job Performance of IT Professionals in Sri Lanka.* Kelaniya: ResearchGate.

Kim, J. (2002). *Interpersonal Interaction in Computer Mediated Communication (CMC) : Exploratory Qualitative Research based on Critical Review of the Existing*

Theories, Proceedings from the Annual Meeting of the International Communication Association, San Diego, California, pp. 1-26.

Koschmann, M. A., (2012). Developing a Communicative Theory of the Nonprofit. *Management Communication Quarterly*, 26(1), pp. 139-146.

Kumar , P. M. (2002). *Job satisfaction among permanent and contractual information technology workers.* Temple University: Unpublished manuscript.

Larson, G. W. (2011). *Instant Messaging.* Ensiclopedia Britannica.

Lau, K. (2014). *Computer-Mediated Communication:.* Fresno: California State University.

Lee, J., Park, D. and Han, I. (2011), The Different Effects of Online Consumer Reviews on Consumers' Purchase Intentions Depending on Trust in Online Shopping Malls: An Advertising Perspective. *Internet Research*, 21 (2), pp. 187-206. https://doi.org/10.1108/10662241111123766

Locke, E. A. (1976). *The nature and Causes of Job Satisfaction.* Handbook of Industrial and Organisational Psychology.

Mahatanankoon, P. (2010). Exploring the Impact of Instant Messaging on Job Satisfaction and Creativity. *International Conference on Information Resources* (pp. 1-10). CONF-IRM 2010 Proceedings.

Mertena, F. & Gloorb, P. (2009).*Too Much E-Mail Decreases Job Satisfaction.* Georgia, USA., Science Direct.

Maslow, AH (1954), Motivation and Personality, Harper, New York.

Mertena, F. & Gloorb, . P., (2009). *Too Much E-Mail Decreases Job Satisfaction.* Georgia, USA., ScienceDirect.

Metz, J. M., (1992). *Computer Mediated Communication:Perception of a New Context*, Chicago II: Paper presented at the speech Communication Association.

Mukahi, T., Nakamura , M., & Not, R. D. (2003). *An Empirical Study on Impacts of Computer-Mediated Communication Management on Job Satisfaction.* Adelaide, South Australia: 7th Pacific Asia Conference on Information Systemss,.

Murasugi, K & Miki, S (1990), Double dual systemss of work motivation: an empirical research on the Multi-Motivation Theory in work organization (part 1). *Journal of Japan Industrial Management Association*, 41 (3), pp. 178-184.

Okwudili, O. M. (2012). *Determinant of Effective Job Satisfaction in Public Sector Organization.* University Of Nigeria: Department Of Management Faculty Of Business Administration.

Ou, C. X., Sia, C. L., & Hui, C. K. (2013). *Computer-mediated Communication and Social Networking Tools at Work.* Emeraldinsight.

Palme , J. (2000). *A Personal History of CMC.* Honorary Publication.

Paraskeva, W., Eriksson, Y., Johansson, G. & Peter, A. (2019) Visual Representations for Communication in Geographically Distributed New Product Development Projects. *Journal of Engineering Design*, 30, pp. 8-9, 385-403, DOI: 10.1080/09544828.2019.1661362

Quaresma , R. F., da Silva , S. P., & Marreiros , C. G. (2013). E-Mail Usage Practices In An Organizational Context: A Study With Portuguese Workers. *Journal of Information Systemss and Technology Management,* 10 (1), pp. 05-20.

Rastegari, A., & Mobin, M. (2016). Maintenance Decision Making, Supported By Computerized Maintenance Management Systems. Tucson, AZ, USA: The 2016 Reliability and Maintainability Symposium (RAMS®).

Rouse, M. (2008). *Unified Technology Communications Basis.* Tech Target.

Rowley, J. (1999). *Computer Mediated Communication – is it Good for Organizations.* Ormskirk: Industrial and Commercial Training.

Saleem, S., Majeed, S., Aziz, T., & Usman, M. (February 2013). Determinants of Job Satisfaction among Employees of Banking Industry at Bahawalpur. *Journal of Emerging Issues in Economics, Finance and Banking (JEIEFB),* 1(2), 150-162.

Samarawickrama, P. (2017). *Factors that motivate to use Computer mediated Communication (CMC) on Faculty Reaserch Productivity in SRi Lankan.* Nugegoda: Knowledge Organization in Academic Libraries.

Sayago, S., Sloan, D., & Blat, J. (2011, September). Everyday Use of Computer-Mediated Communication Tools and its Evolution Over Time: An Ethnographical Study with Older People. *Interacting with Computers*, pp. 543-554.

Sias, P., Pedersen, H., Gallagher, E., Kopaneva, I. (2012). Workplace Friendship in the Electronically connected Organization. *Human Communication Research,* 38, 253-279.

Simpson, J. (2002). *Computer Mediated Commuication.* ETL Journal.

Smith , W. P., & Tabak, F. (2009). Monitoring Employee E-mails: Is There Any Roomfor Privacy? ResearchGate.

Stasser, G, (1992). *Pooling of Unshared Information during Group Discussion.* InS. Worchell, W. Wood, & J.A. Simpson (eds.), Group processes and productivity(pp.48-67). Newbury Park, CA: Sage

Stefan, H. (2008) Asynchronous & Synchronous E-Learning. *Educause Quarterly*, 3, 51 – 55.

Tu, C. H. (2002). The Impacts of Text-based CMC on Online Social Presence. *The Journal of Interactive Online Learning, 1*, 1-24.vog

Urquhart, S., Bommelje, R., & Schmid, W. (Spring 2002). The Impact of Computer-Mediated Communication on the Workplace. *The Florida Communication Journal, 30*, 12-24.

Waldeck, J. H., Seibold, D. R., & Flanagin, A. J. (2004). Organizational assimilation and communication technology use. *Communication Monographs, 71*(2), 161-183.

Weiss, H. M. (2002). *Deconstructing JobSatisfaction* (12 ed.). Human Resource Manangement Review.

Wellman,B., Salaff, J., Dimitrova, D. & Garton,L (1996) Computer Networks as Socila Networks: Collaborative work, Telework, and Virtual Community. *Annual Review of Sociology*, 22, 213 – 238.

Yu, B. (2011). Computer mediated Communication systems. Beijing: Triple C.