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SYMBIOTIC CO-EVOLUTION OF INFORMATION SYSTEMS QUALITY AND WORK-LIFE BALANCE

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ABSTRACT

In recent years, around the globe, about changes in work practices have been brought by information technology. One of the upcoming nations that has adopted the ever-changing era of information communication technologies and computing is Malaysia. Work and indirectly increased productivity and revenue have been transformed by Information Technology for organizations that embark into it. This technology enables borderless work and communication to be done from various remote locations. Therefore, impaired work life balance and techno-stress is increased. This issue has become a concern; thus, this study intends to uncover the symbiotic co-evolution between information systems towards better work life balance (WLB) among Malaysian ICT workforce particularly in the ICT service industry. This paper intends to seek the symbiotic co-evolution of information systems quality towards work life balance among the ICT workforce in Malaysia. The study was conducted among workforce in ICT companies, Malaysia. The findings of this study are in line with Malaysia's NKRA, a healthy and happy workforce. This will be helpful in the development of new implements and technologies that are driven by information system quality which can be helpful to devise suggestions to the ICT division on problems pertaining to sustainable progress/strategy formulation with indication to achieving equilibrium between work and personal obligations. As a result, this will ultimately allow populace in the ICT division to work remotely. Thus, addressing grave issues such as traffic jam social-family co-evolution. An enhanced work-life balance leads to better performance and indirectly increased organizational productivity. On a

happier note, a healthy and contented employee leads to better efficiency and cost savings in the end.

INTRODUCTION

Information and Communication Technology (ICT) has grown to be the most popular trade to guide Malaysia in the new era of globalization, knowledge and development. Fast technology development in Malaysia has lured ICT as the trendiest business in Malaysia in the last few years [1]. The Malaysian ICT industry has turned out to be more portable and bloodthirsty to meet the demands in this budding industry. ICT has made noteworthy inroads into our day to day tasks both in the place of work and at home. Indeed, sophisticated computing technologies have led to new forms of operational concepts such as telecommuting. The advent of portable computing and rising access to the Internet and its component technologies have paved the way for working from a remote location, as an alternative of the traditional office environment.

Nevertheless, not every organization allows such amenities for the benefit of their workforce. Thus, competing demands between work and home front have surfaced and increased the need for flexible working methods [2]. The increased usage of technological gadgets and dependence on such gadgets to perform work from a remote location has pushed working from a traditional nine to five job to round the clock, irrespective of the geographical location. Traditional literature review suggests that researchers were looking at technological perspective of information systems quality and psychological perspective of work life balance (WLB) and employee performance individually rather than collectively. The underlying problem shows that there is limited scholarly research that seeks to uncover possible relationships both from a technological as well as from a psychological perspective which eminently focuses on remote ICT workforce in Malaysian context. Work practices have changed over time due to globalization of commodities and adoption of a 24/7 operations and variety of services in the Malaysian ICT industry. Thus, a systematic review of literature based on the initial analysis suggests that WLB has been examined from the Information Systems (IS) perspective. Therefore, this study intends to unveil the relationship between IS quality (ISQ) and WLB.

LITERATURE REVIEW

Current aggressive global atmosphere and challenging work demands have brought many work life challenges in various sectors. The Malaysian ICT industry is regarded as a place with long working hours, painstaking work, heavy job stress and pressing targets to be met [1]. Numerous workforces in the ICT sectors are dependent on portable electronic devices and tools to work away from the traditional office. They rely extensively on remote connectivity to ensure that they have a balance of work and non-work responsibilities. Workforce specifically those from the 24/7 operations sector of the ICT industry tend to work from a remote office with schedule flexibility [3], [4].

According to several researchers, particularly Ammons & Markham [5] and Cabanac & Hartley [6], it is known that long working hours tend to deprive

workforce of the time they should spend with their loved ones leading to a stressful day and lack of quality family time. Thus, telecommuting was opted to be a possible solution for maintaining well-balanced life and career [3]. The need for telecommuting systems is also increasing, given the rise in the number of women in the work force, longer working hours and more sophisticated and complex technology that enables constant contact between workforce and workplace demands. Thus, the workforce is subjected to increased pressure to ensure they fulfil both their employment as well as social and family responsibilities. Several researches including [7], [8], [9], [10] noted that there were many factors influencing workforce' work-life balance (WLB).

These factors differed according to the type of employment sectors they worked in. It is no doubt that the progress and operation of information communication systems in the last couple of years has had and still has a major impact on all levels of society. To facilitate remote work, one cannot undermine the role of Information Systems [11]. The existence of good quality information systems is needed to ensure remote working possibilities can be achieved by organizations [12]. This in turn can pave the way for better Work Life Balance (WLB) imperatives [13].

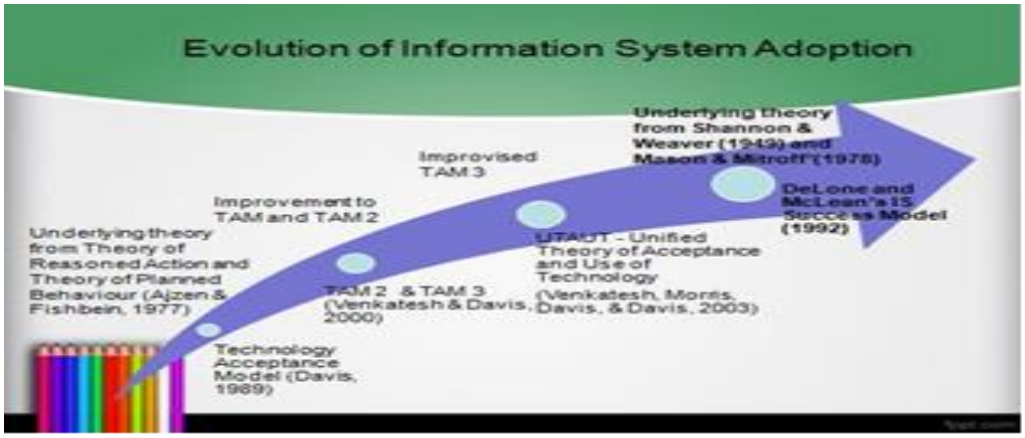
Hence, the symbiotic co-evolution between ISQ and WLB may have a significant impact on employees' health and well-being [2]. These properties have been under examine in the ICT setting where the way work is done may differ due to intense reliance on technology as compared to other environments. Albeit, in the last 25 years, the terminology of work life balance (WLB) has been coined; it has become a factor that is around much longer [14]. According to Roberts [14] the idea of work-life and multi-tasking balance begun with women who worked multiple roles during the World War II. This comparison was used to describe the idea of WLB to be flexible and can be pragmatic from an estranged viewpoint of balance between personal commitments and work [14].

Current investigation on WLB proposes three key areas that rise concern in regards to WLB [9], [15], [16], [14]:
i. density and amplification of work;
ii. emphasis on superiority of family and public life;
iii. attitude and morale of individuals.

Among the contributors for density and amplification of work, Guest [9] argues that call for quick responses and progress in the technology are two important issues that have to be examined [9]. Both societies as whole and individual lives have changed dramatically because of ICT implementation, therefore several researchers claimed that there may be significant impact of information system quality, processes and infrastructure in establishing a balanced work and family commitment [9], [2]. However, there have been limited significant studies done to prove the relationship between the elements of information system quality and its impact on the employee's work life balance (WLB) further leading to increased employee performance. Guest [9] stresses that with the need for a 24/7

operation and nature of the support job these stressors become exaggerated, which in turn provides a sound basis for this study to examine the symbiotic co-evolution of information system quality of the information systems infrastructure, hardware and software utilized to work away from the traditional office environment. This may have a significant relation to achieving a good WLB [9].

Pundits in the field of technology and behavioural aspects had warned years ago that advances in technology would lead to the threat of an intense overworking culture in the ICT sectors [9]. A broad range of factors can be identified leading to the question whether the issue of quality in terms of the information system used could be possibly linked to work life balance and employee performance. Researchers have evaluated evidence of the link between IS success and organizational impact [17]. The authors provided new insights on links between system quality to organizational performance within the IS Success Model [18], [19]. Other issues such as the quality of access, software, and hardware as well as communication infrastructure may have some possible relationship to achieving a good work life balance in order to ensure increased employee performance [20]. There were various other technical issues discussed in information system adoption. Solutions were provided but there was no study done to uncover the psychological issues surrounding the workforce and how they perceived the quality of work life balance (WLB) in their daily operations. The main constructs of the model Information Quality (IQ), System Quality (SQ) and Service Quality (SvQ) was adopted in this study. Nevertheless, these researchers never examined the role Information Systems Quality (ISQ) had to play in an individual's Work Life Balance (WLB) especially in times that they relied heavily on connectivity, infrastructure and gadgets to enable them to function from a remote location. The evolution shown in Fig. 1 illustrates how



IS has changed over the last couple of decades.

Figure 1: The evolution of Information System (IS) theories

Importance of ISQ in Work Life Balance among Malaysian ICT workforce

The last 10 years has seen great evolution in IS from standalones, client serves

networked systems, SAP / ERP systems, various IS systems and software specializing in support of the various departments such as human resources (HR), management information systems (MIS), production information systems and so on. The current buzzword in the ICT sector is "cloud computing, remote services, global support, big data, and many others." The trend is moving towards going green, paying more attention to simplicity of performing a task. However, the role of information system is inevitable in any organizations as it has become a driving force to enable them to have a competitive advantage in the environment. Since, information system has become part of our daily lives; it allows better distribution of work and thus enabling a more balance between work and family commitments. The availability of various gadgets and tools, cloud computing, with a state-of-the-art mobile digital platform, greater distribution of work, better decision-making, and collaboration can be achieved. This leads to more time available for workforce to spend with their family and social engagements.

Role of MSC and MDEC in IS research in Malaysia

"Malaysia Digital Economy Corporation Sdn. Bhd. (MDEC) is the holistic, government-owned agency launched in 1996 to pioneer the transformation of Malaysia's digital economy. Its roots stemmed from Vision 2020, the plan to develop Malaysia into a fully developed nation by 2020" (MDEC Website, 2016). "MDEC pursues a digital future that unlocks significant economic, environmental, and social value within the nation. MDEC was entrusted to oversee the development of the MSC Malaysia initiative, the platform to nurture the growth of local tech companies whilst attracting foreign direct investments (FDIs) and domestic direct investments (DDIs) from global multinational companies. The impact of this includes increasing Malaysia's Gross National Index, bridging the income gap and improving standards of living" (MDEC Website, 2016). MDEC's engine harnessed the collaborative energy, potential and forethought of the futuristic government, businesses and people in order to achieve the four key pillars. A solid and practical computerized economy requires populaces who have the significant advanced capabilities, as well as are motivated to take an interest. MDEC in this manner works towards a command of comprehensive selection that urges Malaysians to grasp innovation in their everyday lives to enhance their financial prosperity. MSC Malaysia is at the heart of MDEC. It is a national initiative which grows local digital businesses into global players and at the same time working to continuously future-proof the local digital ecosystem. Therefore, being a charter in developing the local ICT industry with the entrance of globally positioned ICT companies into Malaysia, MSC and MDEC plays an evident role in nurturing these industries towards achieving a K-Economy status in the years to come. Great deal of IS research has been conducted in collaboration with MSC and MDEC where funds were allocated to drive such research. Multimedia University, a pioneer university in state-of-the-art ICT education and research has been a center of research studies conducted in collaboration with MSC and MDEC. Various researches in the past have been funded by MDEC in order to provide improvements and innovations towards digitization in the country. Funding is

not only focused on technical aspects but also some non-technical areas too.

METHODOLOGY

This section looks at the research method, appropriateness of the research design and an in-depth review on population and sample selection. According to Collis & Hussey [21] investigation of a phenomenon perhaps can be considered based on the hypothetical notions, which elucidates the theory with reference to the world and knowledge characteristics [21]. Creswell argues that "research consists of knowledge claims (theoretical perspective), strategies for conducting the research (methodology) and data collection and analysis (validating the claims of the researcher)" [22]. This section discusses the various methods used to obtain data, the epistemology or philosophy of the study, the instrumentation, the role of theory and analysis procedure of acquiring statistical data and building pertinent conclusions. This research is a quantitative investigation that challenges to collect data, which was analyzed to look for pertinent relationships between information systems quality and work life balance and how this contributes to employee performance [23]. It entails a systematic plan to study the effects of information systems in terms of various constructs on work life balance of Malaysian ICT workers who are dependent on technological gadgets to work from remote locations to fulfil the 24/7 operations. The organizations will be determined and selected because they are either Info Tech (IT) companies or Shared Services Outsource (SSO) companies. Companies and workforce from ICT companies was purposively selected focusing on the criteria set: (i) 24/7 operated SSO and IT companies (ii) verification of alternative working methods that allow remote working for the workforce.

The population size was approximated based on the list of companies outlined by the Multimedia Development Corporation (MDeC). The sample size for analysis was derived as 54 based on G-Power. Data was collected by administering questionnaires to the selected respondents. Two stages were used i.e. Pre-test and Final Data collection. In Stage 1, five (5) team or technical leads involved in 24/7 operations from selected companies were nominated for the Pre-test survey distribution and two academic experts who have vast experience in research methodology aspects were consulted for the verification of the questionnaire in terms of methodological viewpoint. This stage was repeated for two (2) cycles to ensure the correctness and aptness of the scale. In Stage 2, finalized questionnaires were distributed to 100 service and support engineers (technical leads and team leads inclusive) working in a 24/7 operations remotely in the ICT environment – to capture data that was required for framework testing purposes. The minimum sample size was calculated of 54 at 95% certainty $(1 - \alpha)$ and based on the availability of time, 100 questionnaires were sent out and 78 responses were received. The test population was derived based on the criteria set below because workforce should work for at least a particular duration and in a shift operation to be able to state how it has affected their perception of WLB. The following criterion was finally agreed upon:

• Malaysian workforce from Shared Services Outsourcing & Info Tech companies with MSC status and registered with the Multimedia Development Corporation.
• Workforce should be working for at least 1.5 years in the remote working environment.
• Workforce must be working in a shift schedule.

The data was analyzed using SPSS (Statistical Package for the Social Sciences) and SmartPLS 3. These software programs will be used to organize the data and perform relevant statistical analysis. Partial Lease Squares (PLS) was selected since it helps "to specify, estimate, assess and present models to show hypothesized relationships among variables" [24], [25]. PLS is chosen because of its capability in concurrently estimating a range of inter-dependence among constructs. According to Hair [26] "PLS is deemed to be more efficient in analyzing the correlation and causal relationships among unobserved construct as well as observed variables" [26]. It also eases checking for logical irregularities in the data acquired and aids the process of data cleaning. Before the actual analysis process commenced, a proper data mining activity was done. Each respondent's response was duly coded prior to being finalized to the data file. The number of factors and the loading values was examined using factor analysis. Composite reliability (CR) and Cronbach Alpha (CA) reliability measures were checked for every variable to ensure the validity and reliability of the constructs. The most preferred statistical tool used for analyzing the inter-relationships among variables currently is SmartPLS, whereby single or multiple regressions could be expressed [27]. Hair [27], elaborates that Partial Least Squares (PLS) is the prevailing statistical tool accessible because of its ability to simultaneously run multiple regression models. SmartPLS always considers data to be not normalized. Therefore, a process called bootstrapping is done to normalize the data. Hence, according to Ramayah [25] and [28] "this technique is opted in this research because it is a very powerful multivariate analysis technique, and has been widely used and provided successful results". Several researchers namely Nicholas, et al. and Venkatesh et al. [29]-[30] have argued that "Partial Least Squares (PLS) allow both confirmatory and exploratory modelling, which indicates that they are suited to both theory testing as well as theory development" According to Preacher & Hayes [31] "the use of Partial Least Squares (PLS) was successful in various studies especially in testing models with mediating relationships". Partial Least Squares is usually used in studies with small sample sizes and as the sample required for this study was only 54 and respondent data obtained was only 78 thus this tool was used to make relevant analysis and further conclusions.

ANALYSIS AND DISCUSSION

A total of 100 sets were distributed and only 87 sets were returned and after screening process only 78 cases were found to be usable. The balance 9 cases were found to have double entries, missing and uncompleted pages, respondent that did not fit the criteria, thus they were rejected. Based on G-Power analysis the minimum sample size for statistical power of 0.8 was calculated to be 54. Therefore, 78 cases were deemed to be sufficient for analysis. Data cleaning was

performed to detect and correct errors pertaining to data entry and any inconsistencies in the data obtained. Demographic details and descriptive statistics were run and results are outlined in Table 1. Since data was obtained from a single source, it was checked for common method bias by using Harman's Single Factor Analysis in SPSS to check if the dataset suffers from common method bias. The variance attributable to measurement method rather than to the construct or constructs purportedly represented by the measures is called common method variance (CMV). The total variance extracted shows that the extractions sums of loadings on the first factor is 23.827% which is less than 50%, therefore we can conclude that this data set does not suffer from common method bias [32].

Measurement model shown in Fig. 2, was derived using PLS to test the following hypotheses:
H1: Information Quality positively influences workforce' work-life balance.
H2: System Quality positively influences workforce' work-life balance.
H3: Service Quality positively influences workforce' work-life balance.

Table 1: Descriptive statistics

		Frequency	Percentage (%)
Gender	Male	39	50
	Female	39	50
Work Experience	Less than 2 years	20	25.6
	2 – 7 years	39	50
	8 – 13 years	13	16.3
	14 years and more	6	7.7
Length of time in remote working	Less than 2 years	36	46.2
	2 – 5 years	28	35.9
	6 years and more	14	17.9

According to several studies "the measurement model can be tested by assessing indicator reliability, internal consistency reliability, convergent validity and discriminant validity of the model" [28]. Initial evaluation found that AVE values for some of the constructs were found to be below 0.5. Therefore, the factor loading values were examined to see the possibility for deletion of low factor loading items to increase the AVE ratings. Hence, the need to increase these values the factor loadings of the items was re-examined. Based on this some of the factor loading below the threshold of 0.6 was removed to increase the AVE rating [27]. The new factor loading (FL) ratings were then calculated after running the PLS algorithms for the model as illustrated in Fig. 2. All indicator reliability, convergent validity and multi-collinearity values are illustrated in Table 2. All values fall within the recommended range [AVE>= 0.5; CA>= 0.7; CR>= 0.7 and VIF should be > 0.2 and <=5] [27]. The indicators of a formative measurement model represent the latent variable's independent

drivers and should not correlate highly with one another. Therefore, it is necessary to check for possible multicollinearity [33], which is measured by the variance inflation factor (VIF). In this study the VIFs of the entire construct measured as well as their individual items fall within the range of > 0.2 and <=5.

Discriminant validity is the extent to which the items that measure of constructs vary from one another. This method also tests to see whether the items in a construct accidentally measure something else. Two types of measures are available in Partial Least Squares (PLS) for testing discriminant validity mainly, using cross loadings or the Fornell-Lacker [34] criterion "which looks on the average variance (AVE) value". In this study the values of the off-diagonals do not exceed the square root of the AVE (in the diagonals) as illustrated in Table 3. Thus, indicating sufficient discriminant validity. Due to the limitations and criticisms in the Fornell-Lacker's [34] criterion, heterotrait-monotrait ratio (HTMT) is used to determine discriminant validity using two methods i.e. 1) as criterion and 2) as a statistical test. If HTMT is examined as a criterion the value that is larger than 0.85 [35], or 0.90 [36], it is deemed that there is an issue of discriminant validity. "The second criteria is according to Henseler et al. [37], is to test the null hypothesis (H0: HTMT ≥ 1) against the alternative hypothesis (H1: HTMT < 1) and if the confidence interval contains the value one (i.e., H0 holds) this indicates a lack of discriminant validity" [37]. Hence, in this study the HTMT values are tested in Table 4 shows values are all within the stipulated range of < 0.85 [35].3

The R2 significant factor measures a construct's proportional difference. It is described by the tiny proportion of the total variation in the dependent variable explained jointly by the independent variables or the model [38]. The R2 value ought to be amply high for the model to have a lowest level of descriptive power. According to several studies conducted "values above 0.5, approximately between 0.3 – 0.5, and values lower than 0.19 are deemed substantial, average and weak, respectively" [38]. The tested model in this study achieved an R2 of 0.398 as average predictive power (see Table 2). The R^2 for the WLB and information system quality of previous studies that used various IS and philosophical models ranged from 0.3 to 0.6 [39].

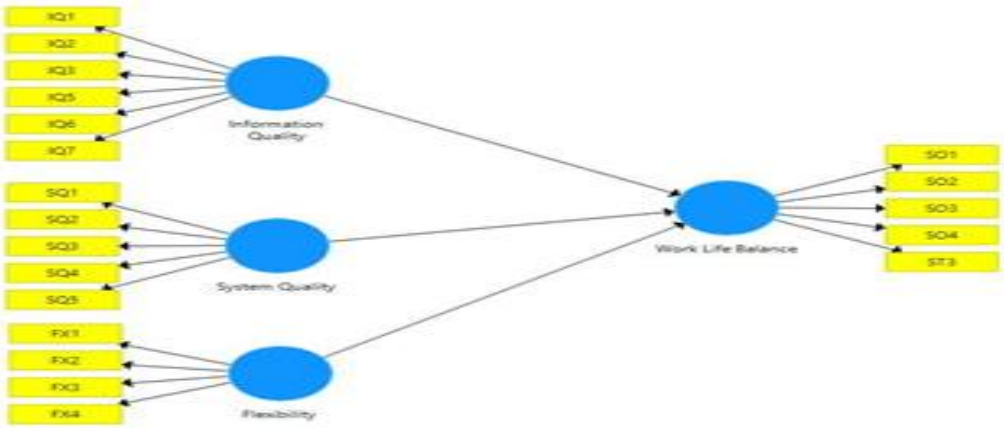


Figure 2: Measurement Model

Table 2: Assessment of Measurement Model

	Cronbach Alpha	Composite Reliability	Average Variance Extracted (AVE)	VIF	R-Squared
Information Quality	0.773	0.855	0.599	1.946	
System Quality	0.832	0.881	0.598	2.098	
Service Quality	0.864	0.899	0.642	1.773	
Work-Life Balance	0.870	0.898	0.526		0.398

Table 3: Discriminant Validity (Fornell-Lacker criteria) [12]

	IQ	SQ	SvQ
System Quality	0.826		
Service Quality	0.702	0.718	
Work-Life Balance	0.513	0.689	0.569

Table 4: Discriminant Validity (HTMT criteria)

	IQ	SQ	SvQ	WLB
Information Quality	0.774			
System Quality	0.663	0.773		
Service Quality	0.580	0.620	0.802	
Work-Life Balance	0.427	0.597	0.530	0.725

Bootstrapping technique with a re-sampling of 5000 was used to obtain the path estimates and t-statistics were calculated for the hypothesized relationships. Table 5 shows the structural model analysis and decision made on hypothesized relationships. It was found from the analysis, that the relationship between information quality and WLB was not supported. However, the relationship between system quality to WLB and service quality to WLB are supported.

CONCLUSIONS AND RECOMMENDATIONS

There is a positive significance on the role of system quality and service quality towards WLB. The role of information systems and technology within an organization especially relating to people in the ICT service industry has been altered tremendously over the last couple of years. Human resources (HR) and people empowerment by technology has been evident. There has been such an unequivocal consensus about its destiny in the future. Human capital development has practiced drastic transformation on the implementations of imperative WLB policies and initiatives during these computing evolvement processes. Thus, new tools have advanced and more upcoming tools such as the

digitally controlled work tools and gadgets will take pride in transforming the way business is done. In the recent years to come people may even resort to working from their bedrooms with sophisticated tools, like in the western countries. This situation according to Clark [40] and Guest [9] may tend to blur the boundaries between work and life, whereby ICT workforce around the globe are already moving towards this trend and lifestyle. Demands from technology raise the question of the symbiotic co-evolution of information system quality (ISQ) in supporting employee's WLB.

Table 5: Hypothesis Testing

Hypothesis	Relationship	Original Sample Mean	Sample Mean	T-Statistics	Decision
H1	Information Quality -> Work-Life Balance	-0.024	-0.012	0.133	Not Supported
H2	System Quality -> Work-Life Balance	0.447	0.451	3.539**	**Supported**
H3	Service Quality -> Work-Life Balance	0.267	0.283	1.973**	**Supported**

This study proves there are positive roles played by elements of information system quality (ISQ) in supporting the WLB of ICT workforce in Malaysia. The major issue addressed is the symbiotic co-evolution of ISQ in determining a good WLB. It is an important issue as the present style of living has many challenges and limitations and information technology (IT) is seen as a "savior" particularly in creating a well-balanced and healthy society towards a more effective WLB. Furthermore, with the millennial dominating the present ICT workforce has provoked employers to offer a conducive and technically sophisticated environment for them to work. The millennial being able to quickly adapt to the changing ICT environment have contributed a great deal to incorporate and empower remote working in order to balance their profession and social life. These digital natives seem very comfortable when given flexibility and sophisticated equipment to perform their daily task. This is one of the driving forces for the future as these millennial workforces will dominate the workforce in years to come.

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