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TITLE: A SOCIO-TECHNICAL ANALYSIS OF AGILE WORKPLACE STRATEGY: A CASE STUDY OF IMPLEMENTING AGILE WORKING IN THE HEADQUARTER OF A CONSTRUCTION COMPANY IN CENTRAL LONDON

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ABSTRACT

The ever-increasing global competition in today's business world has made it critical for organisations to rethink their business practices and value proposition to maintain their competitive advantage. Organisations look for agile strategies to strike an adequate balance between employee satisfaction, wellbeing and productivity in one side and the efficiency and effectiveness of utilising the space on the other side. The fast pace of technology development is considered an enabler for agile working. However, there are very few studies done on analysing the interconnected relationship between the social and technical/technological aspects of agile working.

This case study was undertaken on three floors of the headquarter building of a construction and property development company in Central London. The study involved introducing agile working concept in the workplace, including adding social spaces, flexible open plan workstations monitored by Internet of things (IoT) technology i.e. occupancy sensors, implementing a new system of monitoring and managing meeting spaces to maximise the efficiency of space utilisation, and introducing a new Information technology and cybersecurity strategy to allow for this change. The study will analyse the factors that influenced this workplace change such as limitations of space, technology development, and the need for maximising the efficiency of the workplace. It will also analyse the lessons learned from implementing the agile working concept, regarding the role of technology, the social aspects, the business value of this implementation and the relationship between these factors.

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1.0 Introduction:

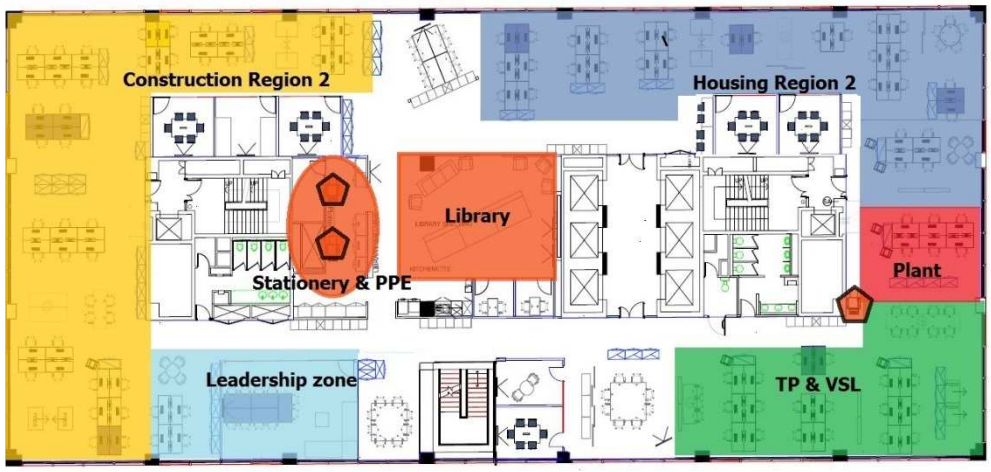
One of the main objectives of any organisation is to maintain its competitive advantage in the market and value proposition for its customers. The accelerating pace of cultural and economic change in today's business environment has made it vital for organisations to adapt and evolve to maintain its market competitiveness (Gherson, 2017) and attract/retain talent. In the context of real estate management, the concept of agile workplace provided an effective strategy for business to optimise its workplace effectiveness, maximise the use of its assets and create more value for the organisation and its customers. The main drivers for adopting agile working strategy in real estate is its inherent flexibility that provides the dynamic and efficient workplace to support the organisation functions and also enrich the customer experience(Joroff et. al, 2003). This advantage encouraged many business organisations to adopt agile working strategies. However, to implement this change towards agile workplace, organisations find it essential to rely on a suite of new technologies such as mobile computing to allow for flexibility for the assignment of workstations, internet of things (Occupancy sensors in this context) to monitor space occupancy, and cybersecurity to allow for secure implementation of these technologies. The change then required by agile working becomes not only a social and cultural change (Wagner & Watch, 2017) but also must be accompanied with a technological change.

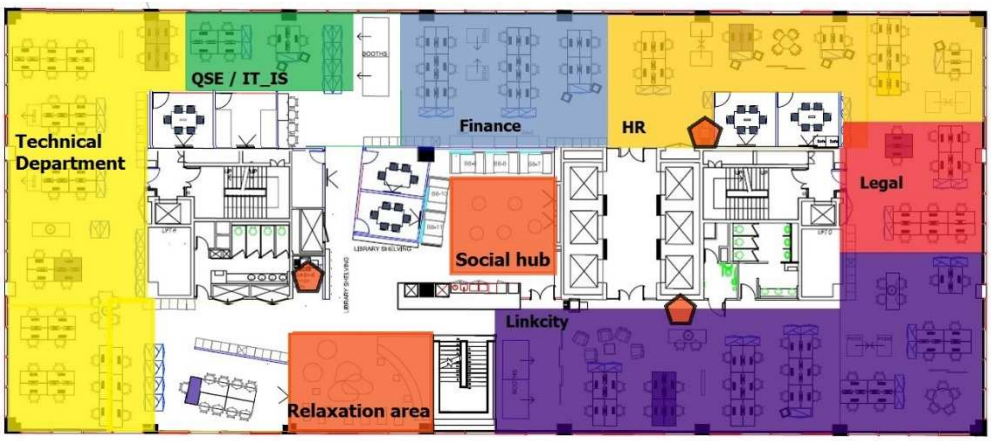
Technology is a vital aspect of achieving and maintaining competitive advantage for organisations (Damanpour & Gopalakrishnan, 1998). That is why the field of investigating technology uptake in organisations has attracted a lot of attention by academics from both perspectives i.e. organisational

behaviour and technology development (Orlikowski, & Barley, 2001) to establish theories and models to better understand the role and influence of technology in organisations. There is an important distinction to be made here about two different ways of studying technology; first is technology as an artefact. This means "the innovative product" part of technology such as a new software, hardware that is created by technology developers to achieve a perceived benefit for the users. The second part is how this innovation diffuses among user networks (Hekkert, & Negro, 2009). This paper will discuss the change associated with technology as well as the cultural/social factors, and the impact of the interaction between these elements in the overall success of the agile working strategy.

2.0 The case study:

The case study was undertaken at the headquarter building of Bouygues UK in Central London namely Becket House. Bouygues UK is one of the leading construction companies in the UK. It has two main branches in the UK, the property development branch i.e. "LinkCity" and the facility management branch is called Bouygues Energy and Services (BYES). Bouygues UK is behind some of the most significant construction projects spread across the UK in many sectors such as education, healthcare, residential buildings, and hotels. While BYES provides total facility management services to tens of buildings across the UK and inetrnationally.





This case study of the agile working project is conducted in the context of a partnership contract between UCL and Bouygues UK in which Bouygues partially funds a UCL PhD project in asset management, and it will use the research findings to develop and improve their asset management strategies and further its research and development (R&D) agenda. The agile working project was conducted in floors 6, 7, 8 and 10 of Becket House with the aim to transfer traditional fixed workstations, remodel the space of these floors into agile open plan workstations in floors 6, 7 and 8, and save the space of floor 10 to be leased to a client. This open plan work area aimed to accommodate all the employees of an old building used by BYES i.e. *"Elizabeth House"* and the four mentioned floors in only three floors (Six, Seven and eight).
The space remodelling strategy also aimed to add the following facilities/amenities:

- Collaborative work areas: meeting rooms, project work areas, and booths.
- Social / relaxation areas: library, social hub, and a relaxation zone.
- An area for storage of personal laptops and Personal Protective Equipment (PPE).

The space plan is designed to provide about 200 open plan individual workstations and about 225 collaborative workstations between meeting rooms, and project work areas with total available workstations of 425. Compared to a total number of employees, which is 327 staff.

The data collection for this case study took place by the PhD researcher with supervision from a UCL professor. The PhD researcher collected data through observation by attending at Bouygues UK building throughout the period of implementing this project from November 2016 to December 2017. The researcher has been attending the planning meetings with several teams involved in the project and had formal and informal discussions with the implementation team as well as the company employees through the period of project planning and implementation. The outcome of the case study was recorded by using two extensive surveys one before and one after the project, and the results section will presented in the results section i.e. section 5.0 of this paper.

3.0 Literature review:

This section will review the main advantages and drivers of agile workplace strategy, and will provide a brief review of the socio-technical systems theory that will then be used to analyse the case study in section 6.0 of this paper.

3.1 Main drivers of agile working strategy:

The decision to adopt the agile working strategy in an organisation usually comes from the leadership team. The business case of implementing agile working should include its strategic objectives and the reasons why the agile working is achieving value for the business (Gherson, 2017). The literature includes many advantages of implementing an agile working strategy, following is a review of these advantages on the context of Bouygues UK case study.

Collaborative work environment:

The business of BYUK and BYES involves a lot of collaborative working between architects, surveyors, construction engineers, building services engineers, and cost estimators. The agile working strategy was thought to be a perfect match to enhance these teams to work collaboratively and enhance communication between different teams (Walsh, 2015). The dynamic nature of an open plan workplace creates better opportunities for sharing ideas (Crocitto & Youssef, 2003) and fosters multidisciplinary discussions between teams.

Modern and attractive workplace for employees:

The leadership team believed that to achieve a positive change in work culture in the company, there is a need to develop the facilities and workplace to enable and enhance this change (Wagner & Watch, 2017). This includes areas creating more areas for socializing, relaxing, and informal discussions between individuals and teams as opposed to the rigid workstation based structure in the workplace

that was traditionally dominant in the company. This change would potentially improve employee wellbeing and morale, which has an impact on the overall productivity.

Efficiency in space utilisation:

One of the main strategic objectives for this project was to improve space utilisation within the company. Traditionally the workplace was designed as a segregated department was allocated areas for each department, and allocated workstations for each employee. This design was thought to decrease efficiency in space utilisation because it was found that sometimes an allocated space in a certain department remains not occupied for long times because the employee assigned to this space is on leave or the space is assigned to a vacant position under recruitment. The open plan workplace strategy that is a part of the agile working strategy provided a much better opportunity to utilise the space to its full capacity (Wagner & Watch, 2017) because any employee can use any unoccupied space. In addition, improving the utilisation of meeting spaces by redesigning the meeting spaces and implementing a new system of monitoring and controlling meeting rooms.

3.2 Sociotechnical Systems Theory (STS):

There are many theories and models of innovation and technological change in literature such as Sectoral systems of innovation (SSI) (Coenen & López, 2010), Technological Innovation Systems (TIS) (Carlsson and Stankiewicz, 1991) and Socio-Technical Systems theory (STS). This paper will use sociotechnical system theory as a conceptual framework to study agile working in organisations for two main reasons. First, the theory is the most widely used theory in the context of technology adoption in organisations (Geels, 2004), which suits the purpose of this study. Second, the theory puts more emphasis on the social implications of technology compared to other frameworks (Coenen & López, 2010).

Eric Trist at the Tavistock Institute in London developed the pioneer work for this theory of Human Relations back in 1949 (Cloakes, 2003). The main problem that Trist tackled was the paradox situation where the introduction of a new technology in a coal-mining field have resulted in a decline in productivity. Analysing this problem, Trist came up with the conclusion that the decline in productivity was caused by the introduction of technology without considering its social context and its effect on people. This conclusion then became one of the main principles of STS theory that is in use until today. Building in this principle, Sociotechnical system theory divided the work system into two subsystems:

1- The social subsystem: This includes two dimensions of analysis: First: People, their behaviour, cultural beliefs, skills and expertise, how work teams are forming and interacting in the work system. Second dimension is the organisational context that affects the work individuals and teams. It includes the organisational leadership, strategy, structure, policy and procedures. Arguably, the relationship between the two dimensions is bidirectional, i.e. both dimensions have mutual influence (Bolton & Foxon, 2015) which adds a level of coordination that needs to be considered in the analysis of the two dimensions of the social subsystem.
2- The technical subsystem: This includes two additional dimensions of analysis of the work system. First is the technology artefacts such as machines, software, and information systems. Second is technical processes that are used to coordinate work functions of teams in the organisation context. Similar to the social subsystem, the two dimensions of the technical subsystem have a dynamic relationship because the development of technology should be shaped considering the aim of improving work functions and processes (Chang & Lu, 2017), and similarly, the introduction of new technology has an effect of automating some of the work processes.

Traditionally for analysis purpose, the system and its behaviour are broken down into separate components and events respectively. Each component and event is then analysed as a separate entity

to understand its effect on the overall system. Arguably, this methodology fails to explain system behaviour especially in complex systems because it does not recognise the mutual effect between the components and events that is called the "emergent" events in the literature of complex systems theory. These emergent events play key role in determining the overall performance/behaviour of the complex system. One of the greatest advantages of sociotechnical systems theory is to solve this problem by recognising the effects of and optimising the dynamic relationship between the social and technical subsystems of the work system. This principle is known in the STS literature as the principle of "joint optimisation". Furthermore, STS is also concerned with the relationship between the work system as a whole and its work environment (Hendrick & Kleiner 2001) (Hancock 2009).

This holistic view of the system components provides a much better and more realistic understanding of the overall behaviour of the system (Jacobsson, S., Bergek, 2011). However, on the other hand, it adds complexity to the analysis and in complex systems or "system of systems", it becomes almost impossible to analyse the relationship between each variable and its mutual relationship with all the other variables in the system. That is why the analysis should focus on the most important variables of the work system in order to get a reasonable level of understanding of the system behaviour without opening infinite possibilities of analysis for the relationships between variables (Appelbaum, 1997). This is because some of the variables have less or negligible effect on the system behaviour which is similar to the "complexity optimisation" principle that is usually used in system design and computer science literature. That being said, one should be very careful in their decision to consider a certain element of the system to be "negligible". This is because a bad decision about that may result in a completely flawed analysis of the sociotechnical system behaviour i.e. the system analyst must have an expert knowledge and detailed consideration of the variables that they decide to consider or neglect as a part of the sociotechnical system investigation.

Sociotechnical systems theory provides meaningful insights about the dynamics and interaction between different work system components and human aspects. However, these insights must be implemented within an overall strategic direction in organisations that considers the organisational resources, the people skills and strategic objectives (Rindova, & Antoaneta, 2007). For example, STS considers issues like boundary management (Appelbaum, 1997). This principle is concerned with how organisations can design their work system to achieve optimum interaction with external environmental factors i.e. policies, rules, relationship with other organisations, and at the same time maximize collaboration and sharing of resources and information between teams inside the organisation (Bolton & Foxon, 2015). Such principle sounds generally applicable, but to apply it in work design in a certain organisation, it has to be accompanied with a change management process that equips people with the right skills, and knowledge about technology to achieve effective information sharing.

Another principle of STS is the "responsible autonomy" which calls for a reasonable structure of teams and their leadership to allow for more flexibility in performing tasks (Barley, 1986) among a single team and between different teams. This principle could be very effective for organisations and specifically in the context of facility management organisations. For example, the information systems team in FM organisations as a work group is responsible of the installation and management of computer aided facility management (CAFM) systems. They continuously work with the asset management team to accommodate the asset data requirements and solve issues in data exchange. Therefore, having a reasonable structure and close collaboration between the two teams (Asset management team and information systems team) creates an environment that supports exchanging information and mutual learning (Love & Cooper, 2015). With time and continuous interaction between teams, the overall team would gain more experience about the work of other teams. Eventually this will result in improved adaptability and resilience for the overall FM team.

STS is also concerned with the design of work tasks that keeps employees motivated and productive. STS suggests that tasks that are reasonably challenging mentally and physically and tasks that give

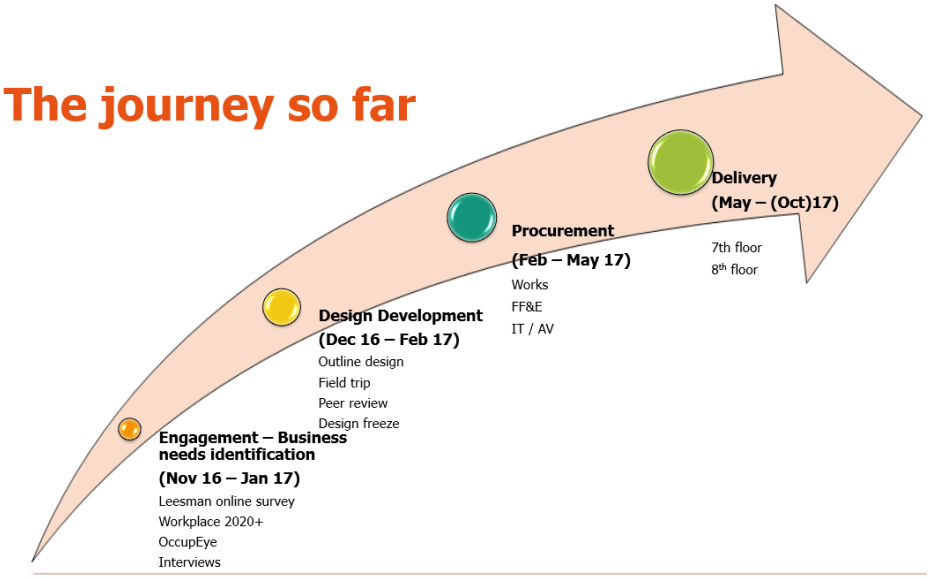
workers a good opportunity to make decisions in a supportive environment are more appealing than tasks performed in a mechanised structure (Repenning & Sterman, 2002) under close supervision and less power to make changes.

4.0 Managing the agile working project:

The management of the project was done collaboratively between a leadership team, an operations team, and a change management team. After the approvals of the business case, the BYUK chief executive has formed a leadership committee with four senior executives to sponsor and provide guidance and support to the project team and an operation team of eight managers to plan and supervise the implementation of the agile working strategy. The operations team included individuals from both Bouygues UK, and Bouygues Energy and services companies with specialists in information technology/systems, interior design, facility management, communication and human resources and led by a project director with a board level responsibility in the company. This team undertook the following responsibilities:

- Collaborate with the company leadership in creating the new agile working policy.
  The policy was coordinated with the company chief executive, and included the main strategic direction, and a guideline of the agile working mechanism within the organisation including working from home policy that is coordinated with the company HR team.
- Conducting interviews, presentations, and surveys with BYUK employees to better understand their space needs, and inform the planning accordingly.
  In order to better understand the space needs of employees and align with the company strategic objectives, the communication team has received input from employees through many ways:
  - Created an online survey to understand the challenges that the employees are facing in the current workplace and their expectations from the agile workplace strategy. The survey received responses from 256 respondents.
  - Conducted a presentation about the strategy to explain the strategic direction and create a buy in from company employees. Attended by 140 employees.
  - Undertook 48 one to one interviews with a sample of employees from different departments.

  The data collected from these surveys, presentation feedback, interviews is analysed, and informed the design and implementation plan.
- Create the implementation plan of the agile workplace strategy including the revised space design, timeline of the project, budget, procurement plan, and change management plan.
  The team used the data collected from employees to formulate the plans for the project. Figure 1 shows a screen shot of the planned timeline:



- Maintain continuous communication and information dissemination about the progress of the project and the next steps to all employees.
  The team appointed 18 change ambassadors from all departments and business units to communicate with their teams and answer any questions about the project and the associated changes in the workplace in relation to it.
- Plan and manage the implementation of the project logistics and the migration process (Storage, packing, move process).
  The team prepared detailed guidelines about the packing and logistics of moving to the new floors, and the guidelines were disseminated to all employees with an email address dedicated to receive and answer any questions regarding the move.

5.0 Results:

Figure (Agile working layout for floors 7 and 8 of Becket House)

Survey responses before and after the project		Disagree strongly	Disagree	Disagree slightly	Neutral	Agree slightly	Agree	Agree strongly
The design of my workplace is important to me	Before	0.77	0.77	2.31	11.54	23.08	33.08	28.46
	After	0.00	0.00	0.00	6.41	12.82	37.18	43.59
It supports me sharing ideas/knowledge	Before	6.15	10.77	19.23	2.31	33.08	25.38	3.08
	After	1.28	2.56	11.54	2.56	24.36	37.18	20.51
It enables me to work productively	Before	12.31	14.62	21.54	17.69	16.92	13.85	3.08
	After	3.85	5.13	5.13	10.26	19.23	38.46	17.95
It creates an enjoyable environment to work in	Before	16.92	22.31	20.00	13.08	14.62	10.77	2.31
	After	2.56	2.56	3.85	5.13	17.95	39.74	28.21
It contributes to a sense of community at work	Before	10.77	20.77	26.15	16.15	17.69	6.92	1.54
	After	1.28	1.28	5.13	11.54	17.95	39.74	23.08
It's a place I'm proud to bring visitors to	Before	36.92	23.85	15.38	10.00	6.15	4.62	3.08
	After	0.00	1.28	1.28	5.13	8.97	25.64	57.69

The results of the case study has been measured using two main metrics. The first is the space efficiency metric, which is calculated by the decrease percentage of the required space as a result of this agile working project. The calculations showed that the square meters has decreased by 26%, and the space capacity has increased by 66% and the actual workspaces has increased by 31%. These figures are drawn from the internal report of the agile project at Bouygues Energy and Services Company.

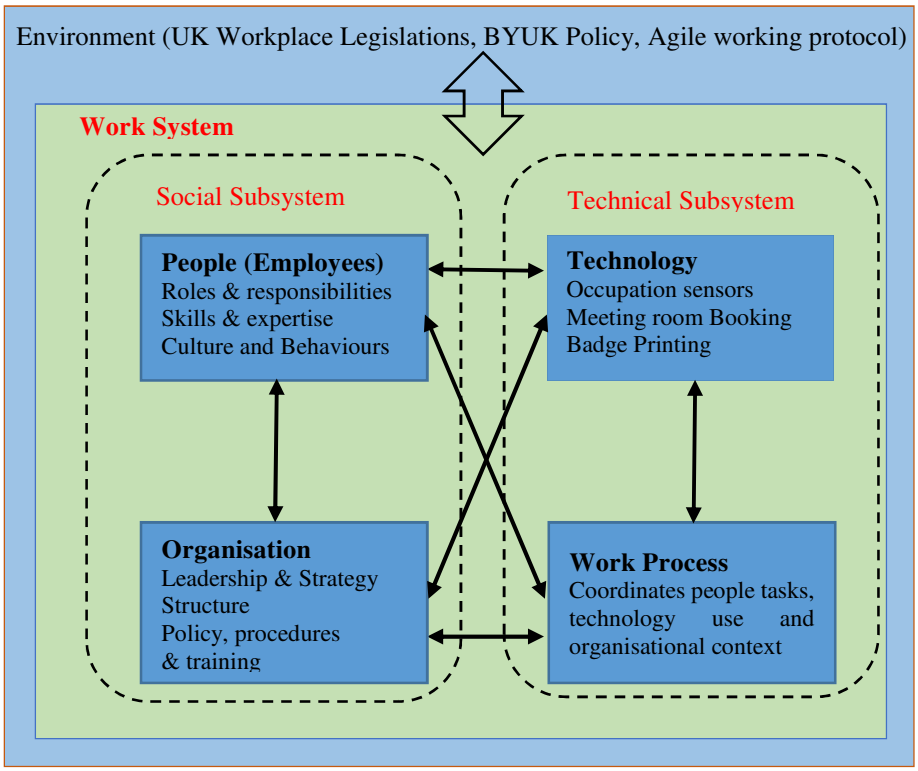
The second metric of measuring the success of the case study was “User experience”. This metric was measured by taking two surveys for the BYUK employees: One prior to implementing the agile working project and one after. Both the surveys were standard *“Leesman”* survey, which is a standard, internationally recognised survey to measure employee satisfaction with the workplace and facility services. Before undertaking the agile working, the working environment in the building scored the lowest of all other building and facility services. While the same metric scored on the top 4% of user satisfaction after the agile redesign project. Other survey results included significant improvement of the employees perceptions of their user experience of the building and the workplace as follows:

A 75.6% improvement in productivity
A 80.8% increase in the teams' 'sense of community'
A 93.6% improvement in corporate image
A 83.3% improvement in culture

Financially, the return of investment (ROI) period of implementing the redesign and information systems in the building was only 7 months with about £1 Million cost saving per annum resulted from this project.

6.0 A sociotechnical analysis and discussion:

This section will analyse the success factors of the agile working case study in light of sociotechnical systems (STS) theory. As mentioned in the literature review, STS theory suggests that any work system in an organisation consists of two subsystems: technical and social. Following is a detailed analysis of the components of each subsystem, and BYUK approach to managing the relationship between these components in the context of implementing the agile workplace strategy.



6.1 Technical subsystem

Technology: technology played a key enabling role in this case study. Several new systems were introduced and installed such as a new occupation sensing system. This system monitors occupancy of the workstations and provide an easy way to employees to find and locate vacant workstations in the new open plan office. Another system was introduced to book, monitor and manage meeting rooms to ensure the efficiency of meeting space utilization. A personal storage system connected and controlled by the personal ID for each employee. Finally, a system to use shared printing facility known as badge printing. Implementing these new systems has many dimensions in the context of this case study. The information technology department in collaboration with technology partners planned the technology artefacts as systems, hardware, and software. However before implementing these systems there was a clear strategy from the company leadership, a policy update to reflect the new agile working strategy and a communication/ change Management plan that ensured the employees needs are identified and analysed and will be met through technology (Gherson, 2017). Therefore, the technology implementation in this case took into consideration the strategic objectives of the organisation as well as the analysis of the social/people needs from this technology.

Process: Agile working represented a complicated cultural and technological change for the organisation. The company leadership recognized the need of updating work process to reflect these changes. The communication department in coordination with facility management and IT has created a detailed protocol to inform the employees about the changes on their work routine that is resulted from agile working (Wagner & Watch, 2017). The change ambassadors played a key role in responding

to questions and clarifying any ambiguous points to people. This process update played a key role in the success of the case study. It acted as a link between the social subsystem i.e. leadership strategy and employees and the technical subsystem i.e. technology. This link is aligned with the main principle of the STS theory. Because technology optimization in this case if it is not accompanied by clear guidance to people, the company would have faced a lot of resistance to change that would have decreased productivity and in severe cases would have hindered the success of the overall agile working initiative.

6.2 Social subsystem:

People: According to the sociotechnical systems theory, people are the core component of the social subsystem. The role of people, their beliefs and cultural change has been recognised at a very early stage of this project (Gherson, 2017). The company leadership recognised the required cultural change that will result from the technological change as one of the strategic objectives of the project. This recognition contributed significantly to the success of the study because it enabled the leadership and operation team with an opportunity to put more emphasis on understanding employee's need (Walsh, 2015). Continuous communication took place with employees throughout the project through surveys, presentations, interviews, continuous email updates and post occupancy survey. This strong communication resulted in two very important aspects: first, it creates a buy-in for people because they felt that they are not only a passive instruction receiver from leadership but they their role is important in shaping and creating the company future. The second role is that it helped answer questions, clarify ambiguities and ensure employees that the change process is positive for them. This in turn minimized the resistance of adopting the technological change and the change of process because by the time of actually moving, employee's expectations were clear and were managed properly.

7.0 Conclusion and Lessons Learned

The case study and its result has proved that the agile working strategy has achieved many strategic goals to the organization. This includes space efficiency, improved user experience, and significant saving of operation and space costs. The great success of this project is a result of many factors. First is the early involvement and continuous support of the company leadership that helped throughout the project in removing technical, budget, and social barriers. Second is the change management program that recognised the agile working as significant change of the organisation culture, and put in place several communication mechanisms to ensure people's buy-in and clear understanding of the project and its aims. Third factor is creating a capable team that combines business skills with technical skills with people from facility management, HR, communication and IT. This mix of skills in the project team ensured that the planning and implementation considered both the social and technical aspect of agile working.

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