A FUNDAMENTAL REVIEW ON MOBILE INFORMATION SYSTEM FOR SUSTAINABLE PROJECT MANAGEMENT

N. M. Rawai[1], M. S. Fathi[2], M. Abedi[3], C. M. L. Khalid[4]

[1,2] Civil Enginnering Department, UTM Razak School of Engineering & Advanced Technology, Universiti Teknologi Malaysia *international campus*, Jalan Semarak, 54100 Kuala Lumpur, Malaysia.

Email[1,2] :norshakila3@live.utm.my, syazli@ic.utm.my.

[3,4] Civil Enginnering Department, UTM Razak School of Engineering & Advanced Technology, Universiti Teknologi Malaysia *international campus*, Jalan Semarak, 54100 Kuala Lumpur, Malaysia.

Email[3,4]: amohammad22@live.utm.my, cmlukman2@live.utm.my.

Known as an information-based industry, to manage a project in construction industry requires the most effective and efficient tools in project management, more specifically in managing the information transfer between project parties. To deal with the complexity and changing needs in the construction industries, these tools become essential to a project management team. Advances in information and communication technologies with cloud technologies, especially mobile phones, offer an alternative solution to overcome the issues on effective collaboration and information flow in construction projects. A review of previous research, case studies and technology reports shows how mobile information technology has the potential to provide an improved system for construction communication, information sharing and collaboration. This review paper will closely discuss the implications of mobile information systems in sustainable project management. The result proved that there is a great potential for this mobile information system to be implement in project management, especially in sustainability projects. The findings from this paper also show the effects on construction resources and the potential impact of improving sustainable project management in construction industries.

Keywords : *Project management, information system, sustainable project management, mobile information system,Construction management*

Introduction

Project Management has evolved in so many aspects, the skill needed in project manager have changed in current years in that project themselves become much more complex. Managing a multiple project concurrently has become normal (Richardson et al., 2006). Maximizing the efficiency of their limited resources added another layer of complexity in managing the project, additional to that, multiple concurrent projects were reliable on these valuable resources as well.A good project management team is when they were able to control all their resources. To become a competitive, organization has to be more effectively and economically increasing their productivity and the quality of their products. In managing a construction project, only careful planning, controlling of the resources throughout a project life cycle, and the ability to accommodate change can help to avoid disaster. Therefore, the increasing and advancing of technology in project management tools should be taken as advantages in improving the integration and collaboration in managing a project.

The construction industry has greatly benefited from the advances in mobile communication technologies, which include wireless technologies (Egan, 1998), mobile computing and mobile devices. These technologies have also increased the speed of information flow and collaboration (Fathi, 2009), enhanced the efficiency and effectiveness of information communication (Gumn, 2005) and reduced the cost of information transfer. The research efforts of Abdullah and Thai (Abdullah, 2006)on the use of mobile applications in Malaysian constructionhave suggested that such applications will standardize the ways of managing defects, improve quality and increased productivity of inspectors and help to produce accurate photographic records.

This paper is organised in four main sections. Section one introduces the paper. Section two is an introduction to project management and sustainability. Section three discusses mobile information systems and their role in project management. The final section sets out the efficiencies that a mobile project management information system can bring to sustainable project management.

Project Management and Sustainability

In modern practice of construction managementtoday, most of large construction organizations are dealing with large numbers of project, tens and sometimes more of concurrent projects. Because of that, the management techniques need to be effective to deal with such a complicated and volumes of work. These Techniques must not just allow for accurate cost and time management, but also allow for multiple critical decision to be made within a given projects and facilitate the effectiveness and efficiencies of organizations resources usage across multiple projects. This is beyond complex project management.Companies, governments, and non-profit organizations were taking an advancing in information technologies as their answer. With minimal training and qualification needed, information technology tools were the life line to the project managers.They need to be conversant with and the use of modern and efficient project management techniques. We would strongly suggest that to remain competitive, they need to have a good project management team with highly skills and technology know-how.

Current issues requiring serious consideration in the construction industry are not only the efficiency and effectiveness of project management, but those surrounding environmental sustainability. In today’s environmentally conscious world, project management teams with a full understanding of sustainability and its critical role in planning and developing a project are

required. Problems often occur regarding physical resources when project members do not fully understand the application of sustainable practices in the process of manufacturing and construction (Luce, 2003).

To incorporate sustainability as one of the major objective into the decisionmaking process increased a pressure in the construction industry. Hence, managing a project becomes more complex. The critical factors in managing a project need to be more focused on sustaining and protecting natural and human resources. Therefore, the opportunity given by the rapid development in advanced technology should be taken as an advantage. Mobile information systems and cloud computing offer solutions to the delivery of fast and real-time information and services in project management. They will increase the effectiveness of collaboration and the reliability of the information whilst reducing information delays.

Mobile Information Systems in Project Management

In project management, mobility supports the project team members and helps in building their professional, and social, communications. In these new situations concerning work, new and advanced technology making working does not bind by specific time or place. This gives a direct access to their task, typically involving retrieving information, contacting colleagues, participating in meetings and managing documents.The adoption of mobile phones with computing technology made new ways of working possible in many project management teams.
Table 1 show the selected web-based project management software and application that support mobility. These software and application is an extra tool and technology that make managing a project become easier and much more effective especially in managing the project resources and collaboration within project team.

Table 1: The Web-based Mobile Applications for Construction Management

Mobile software/ Apps	Features						
	Track Goals	Collaboration	Plan	Finance	Equipment	Schedule	Document sharing
Desk Away (a)	x	x	x	x	x	x	x
Microsoft office 365 for Project Management (b)	x	x	x	x	x	x	x
Project Schedule (c)	x	x	x	x		x	x
Outpost (c)		x	x		x	x	
Nozbe (c)	x	x	x			x	x
Cisco WebEx Meeting Centre (c)		x	x	x		x	x
Box.net (c)	x	x	x		x	x	
Documents to Go (c)		x	x	x	x	x	x
Project manager for Blackberry (c)	x	x	x	x		x	

Web based application Mobile application

Mobile Information System for Sustainable Project Management

Sustainability has become increasingly important for many organizations so models and tools that integrate sustainability in project management need to be developed. The Sustainable Project Management Star (Figure 1) developed by (Grevelman, 2010) shows the relationship between sustainability and project management.

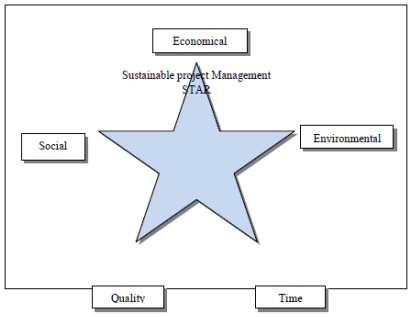

Figure 1: Sustainable project management star

According to (Elkington, 1998) to successfully integrate sustainability into the project management process, all the six factors need to be balanced. Based on the 'triple bottom line' (TBL) concepts (Elkington,1998) the success and health of an organisation can be measured not only by the economic figures but also by the influence of social and environmental factors.
Besides the efficient and fluent flow of information throughout the entire developing process, other main advantages of using this system include the contribution to the healthy environment. In the conventional management process, the project manager has to be in a specific place to obtain the latest information or to attend a meeting with a client, contractor or other colleagues. This requires some form of transportation which contributes to increasing air pollution caused by the vehicle exhaust gases. This system certainly affects the project managers' and organisations' ability to comply with the concept of sustainability.

There is strong evidence from the extensive research conducted worldwide that air pollution has an adverse effect on health. The effects range from mild respiratory irritation to lung cancer and cardiovascular disease. In developing nations, human activities have led to the deteriorations in air quality, where mainly effect from their development projects (Ramli, 2003). The data from The World Bank (Figure 2) shows that the CO_2 emissions are increasing in Malaysia (The World Bank, 2011). Therefore, taking positive action to reduce the use of transportation and therefore to reduce carbon dioxide emissions is critical.

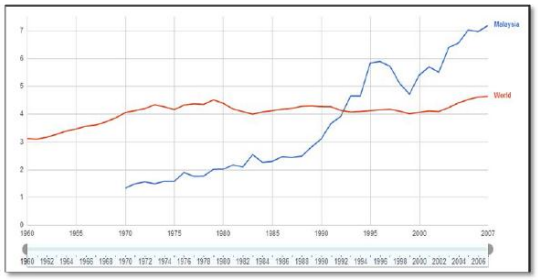

Figure 2: CO_2 Emission

Conclusion

Mobile information systems are able to helps control our environment resources. Mobile information systems provide services and documents storage systems that enable all the team members to locate and retrieve details and documents about the project using their mobile technologies without having to open and search for a bundle of paper in a messy filing system in the conventional way. The idea of adopting mobile information systems in the management strategy should begin in the early stage of the process such as when the concepts of the project are decided. Therefore, throughout the development process, this system will become an essential tool that helps a project team to efficiently manage a construction project. A future study will be conducted in future to calculate the carbon offset from a project team when managing a construction project.

Acknowledgements

This work was financially supported by UTM Razak School of Engineering and Advanced Technology, Universiti Teknologi Malaysia, under research grant 4B012.

References

Richardson G.L., ButlerC.W., (2006).*Readings in Information Technology Project Management,information management,* Course Technology, Pennsylvania State University EganJ., (1998). Rethingking Construction. London, Department of Trade and Industry.

FathiM.S., (2009).*Micro and Macro-Level Context-Aware Information Delivery for Construction Programme Managers*, Civil and Building Engineering Department, Loughborough, Loughborough University.

GumnC., Bannister V., ElyseeM., &PenfoldG., (2005).Global Programme Management Survey – A UK Perspective, London, KPMG International.

AbdullahA., & ThaiO.B., (2006). *Personal Digital Assistants as a Mobile Inspection System at Construction Site*. Proceedings of the 6th Asia-Pacific Structural Engineering & Construction Conference (APSEC), Kuala Lumpur.

LuceZ. R.,(2003).Project Management and Sustainability, Risorgimento Management, session 1.24, USA, information on http://www.docstoc.com/docs/22960197/project-management-and-sustainability, access on 13th February 2012.
(a) Information available athttp://www.deskaway.com/, (acces on 17th February 2012).
(b) Information available at http://www.microsoft.com/en-us/office365/sharepointonline.aspx#fbid=FMp52qm1ozL, (access on 17th February 2012).
(c) Information available at http://projectmanagementblog.pmcampus.com/2011/05/19/mobile app-projectmanager/ , (access on 17th February 2012).

Grevelman L. & KluiwstraM. *Sustainibility in Project Management: A case study on Enexis*, PM World Today, July 2010 ,Vol XII, Issue VII, information on www.pmworldtoday.net, access on 13th February 2012.

ElkingtonJ.*Cannibals with Forks: The Triple Bottom Line of 21st Century Bussines*, (New Society Publisher, Gabriola island, Canada, 1998).

RamliN.A., Wathern P., RazmanM.R., (2003). in : Issues of Air Pollution in Environmental Impact assessment of Development Projects, School of Civil Engineering, Engineering Campus, Universiti Sains Malaysia, Malaysia.

World Development Indicators 2011, The World Bank, part 3.8 pg 154-157, information available athttp://data.worldbank.org/data-catalog/worlddevelopment-indicators?cid=GPD_WDI, (access on 13th February 2012).