

**AN EXPLORATORY STUDY OF FACTORS AFFECTING THE ACQUISITION
METHOD OF CONSTRUCTION EQUIPMENTS AND MACHINERIES AMONG G7
CONTRACTORS**

By

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Thesis submitted to
College of Business Graduate School of Business Management, College of Business,
Universiti Utara Malaysia,
in partial fulfillment of the requirements for the degree of Master of Science (Management)

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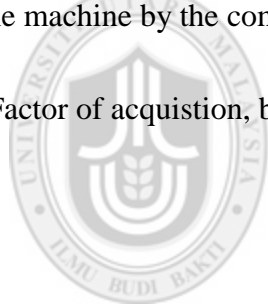
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ABSTRACT

Today contractors confront more than create, buying and construct in project construction. Contractors participate in various factors during dealing in buying or renting the equipment. As contractor, they must know how to budgeting with the capital they have with choosing the best to acquisition the equipment they want to have .This study examines the factors affecting the acquisition method of construction equipment and machinery among G7 contractors with the barriers and the problem solving for the barrier. Through 15 in-depth interviews and utilizing the constant comparative method of analysis, themes were identified including factor affecting the acquisition ,barrier and also the problem solving. Price of machine as a reason for contractor to rent only emerged as a theme that was echoed by many of those interviewed. Whether it was the brand name of the machine or where the machines have much functionality made it become more expensive. Varieties of methodology are used to achieve the objectives, such as the literature review that give explanation of construction equipment and factor of acquisition. Participants' share all their experiences including give some advice and strategy to new start-up contractor during the interview. These situation need the intelligence of project manager to determine the most appropriate construction equipment used in the project. In addition, themes that emerged in the data included: how can contractor accept and reject offered the price of the machine by the company.

Keywords : Factor of acquisition, barrier, recommendation, cost and machine



ACKNOWLEDGEMENT

Praise and gratitude be given to ALLAH the Almighty for putting forward me such a great strength, patience, courage, and ability to complete this project. I would like to express my sincere gratitude to my supervisor, Sr.Dr.Mohd Nasrun B Mohd Nawawi for his intelligent guidance and helpful advice during the whole process. I am truly grateful to his continual support and cooperation, as being prepared to assist me all along the completion of the project. I would like to express deeply and sincerely with a very humble smile, this research is highly fanatical to my beloved parents, Wahid Bin Rakob and Fauziah Binti Ali their love, affection, trust, and support they have extended me every step of my life, thank you a lot because always giving me support in order for me to stand till the end of this research, giving me money, spent time and help me with your energy without any complaints. In addition, I would like to present my sincere and profound gratitude to my lovely wife and my daughter, Norraihan Binti Mohd Zani and Amani Batrisyia Binti Azizul Ridhuan for their love, support and encouragements throughout all my life. Finally, I would like to thank everybody who was important to the successful realization of my project paper especially Darwina Binti Abdul Rahman, Shahrizor Shah, and Luqman Syaher, as well as expressing my apology that I could not mention personally one by one. Thank you.



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CHAPTER 1

1.0 Introduction

The words 'construction' and 'development' are commonly associated with construction activities and development of physical; involve several parties such as clients, contractors, architects, engineers and developers. The use of machinery and engines in the construction industry is encouraged to increase productivity hence, can reduce the number of foreign workers. There are a lot of heavy machineries and high-tech machines in the market, but the ownership of the equipment and machines is little because of the highly cost-effective purchase. Malaysia, as a developing country requires strength and competence in the field of construction industry as the provision of physical challenges in line with the National Development Program. Although the construction industry only contributes 4 % to the Malaysian Gross Domestic Product (GDP) in 2014, this industry is important for the country wealth creation as it acts as a catalyst, and has a multiplier effect on the economy; also allows other industrial, manufacturing, professional services, financial services, education and others to grow (CIMP, 2014).

Recently, a decrease in the performance of the construction industry has increased the need for Malaysian construction industry to determine the direction towards strengthening the foundations to face current and future challenges (Coker, 2007). When commercial distributor of heavy construction equipment begins, the absolute

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REFERENCES

- (CIDB), C. I. (2007). Construction Industry Development Board (CIDB). Retrieved June 05, 2010, from Construction Industry Development Board
- (CIDB):http://www.constructionportal.com.my/index.php?option=com_content&view=article&id=83&Itemid=565
- Abukhzam, M.F. (2011) The Development of a Framework to Aid the Identification of Factors Inhibiting Bank Staff's Attitude towards E-Banking Adoption in Libya, PhD Thesis, University of Salford, UK.
- Alan C. Elliott, W. A. (2007). Statistical analysis quick reference guidebook.61
- Alba-Juez, L (2009) Perspectives on Discourse Analysis: Theory and Practice, Cambridge School Publication.
- Alwood, R.J., (1989). Techniques and Applications of Expert System in the Construction Industry. Horwood, England.
- Amirkhanian, S.,& Baker, N., Expert system for equipment selection for earthmoving operations. Journal of Construction Engineering and Management , 118 (2). (1992). 318-331.
- Avetisyan, H., Miller-Hooks, E., Melanta, S., Decision model to support greenhouse gas emissions reduction from transportation construction projects. Construction Engineering and Management 138 (5), (2012). 631-641.
- Bascetin, A., A decision support system for optimal equipment selection in open pit mining: Analytical hierarchy process. Istanbul YerbilimleriDergisi 16 (2), (2003).1-11.
- Bell, J. (1991) Doing Your Research Project.3th ed. Buckingham, Open University Press.
- Blismas, N.G. (2001) Multi-project environments of construction clients. PhD Thesis, Loughborough University, UK.
- Blismas, N. and Ron Wakefield (2008) Drivers, constraints and the future of offsite manufacture in Australia, Construction Innovation, 9(1):72-83.
- Bradley,A (1997) Understanding the Machinery Directive.Rockwell Automation Publications
- Burns, R. (2000) Research Introduction to Research Methods. London: Sage Publications Ltd.
- Catterall, M. and Maclaran, P. (1997) Focus Group Data and Qualitative Analysis Programs: Coding the Moving Picture as Well as the Snapshots. Available at: <http://www.socresonline.org.uk/2/1/6.html> [Accessed: 26 April 2011]

- Chamzini, A.Y., Yakhchali, S.H., Tunnel Boring Machine (TBM) selection using fuzzy multicriteria decision making methods. *Tunn.Undergr. Sp. Technol.* 30 (2012), 194–204.
- Chan, F.T.S., Ip, R.W.L., Lau, H., Integration of expert system with analytic hierarchy process for the design of material handling equipment selection system. *J. Mater. Process.Technol.*, (2001).137–145.
- Chan, C.M.R., Harris, F.C., A database/spreadsheet application for equipment selection. *Constr. Manage. Econ.*7 (3), (1989).235–247.
- Charmaz K. (2006) *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis* London Sage Publications.
- Churchill, G. A. (1999) *Marketing Research: Methodological Foundations*, 7th ed, Fort Worth, TX: Dryden Press.
- Clappa, D., Shulera, S., Nobeia, M. D., DeMirandaa, M., & Nobeia, M. E. Capital Equipment Acquisition in Heavy Construction .*International Journal of Construction Education and Research* .2007.
- Coker, C. (2007). *Equipment purchasing and leasing*.The JG Press, Inc.
- Crabtree, B.F. and Miller, W.L. (1999) Using codes and code manuals: a template organizing style of interpretation, in Crabtree, B.F. and Miller, W.L. (Eds.) *Doing Qualitative Research* 2nd Edition, Thousand Oaks, Ca.: Sage Publications
- Creswell, J.W. (2003) *Research Design – Qualitative, Quantitative, and Mixed Method Approaches*, 2nd Edition. London: Sage Publications
- Creswell, John W. (2007) *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. 2nd ed. California: Sage.
- Dennis R. Schmidt, K. L. Post-acquisition financial performance and executive compensation. *Strategic Management Journal*.
- Easterby-Smith M., Thorpe, R. and Jackson, P., (2008) *Management Research: Theory and Research*, Sage, London.
- Finch, E. (2010) Focus Group, Postgraduate research workshop on 2 June 2009. University of Salford, UK.
- Ghazi, A. A. *Construction Equipment Management Practices of Major Contractors in Saudi Arabia*.King Fahd University of Petroleum & Minerals.

- Goss, J.D., Leinbach T.R. (1996) Focus groups as alternative research practice. *Area* 28 (2):115-23.
- Gill, J. and Johnson, P. (2002) *Research methods for managers*. 3rd ed. London: SAGE publications.
- Gibbs, A. (1997) Focus Groups. Social research update, Issue 19 © University of Surrey, UK.
- Gransberg, D., Popescu, C., & Ryan, R., (2006). Construction equipment management for engineers, estimators, and owners. Boca Raton, FL: Taylor & Francis Group.
- Gransberg, D. D., Popescu, C. M., & Ryan, R. C. Construction Equipment Management for Engineers, Estimators and Owners. CRC Press is an imprint of Taylor & Francis Group. 2006
- Grix, J. (2010) *The Foundations of Research*, 2nd Ed. Palgrave Macmillan, London.
- Griffin, A. (1997) PDMA research on new product development practices: updating trends and benchmarking best practices. *Journal of Product Innovation Management*, 14:429–458.
- Ghuri, N. and Gronhaug, K. (2005) *Research methods in business studies: A practical guide*, fifth Edition, New York, Prentice Hall.
- Haidar, A., Naoum, S., Howes, R., Tah, J., Genetic algorithms application and testing for equipment selection. *J. Constr. Eng. Manage.* 125 (1), (1999).32–38.
- Haron, N.A. Rahman, H.A. Hanid, M. (2009) A Literature Review of the Advantages and Barriers to the Implementation of Industrialised Building System (IBS) in Construction Industry, *Malaysia Construction Research Journal*, Vol. 4 (1):10-14.
- Harris, F., and McCaffer, R., (2001). *Modern construction management*, 5th Ed., Blackwell Science.
- John, M. N. and Herman, S. (2009). *Maintenance Management*, Sixth Edition, Peter Thomas, Sydney.
- Kamar, K. A .M, (2011) *An Investigation into the Critical Success Factors of Industrialised Building System (IBS) Contractors: The Malaysian Case*, PhD Thesis, University of Salford, UK
- Kamar, K. A .M, Alshawi, M., and Hamid, Z. (2010) *The Critical Success Factors (CSFs) to Offsite Construction Companies - a case study analysis*, paper proceedings in CIB World Conference, Salford.
- Kagioglou, M., et al. (1998) *Generic Design and Construction Process Protocol: final report*. In: The University of Salford.

- Keraminiyage, K.P. (2009) Achieving high process capability maturity in construction organisations, PhD Thesis, University of Salford, UK
- Kitzinger, J. (1995) Introducing focus groups, *British Medical Journal*, 311: 299-302.
- King, N. (1998) Template analysis, in G.Symon and C.Cassell (eds.) *Qualitative Methods and Analysis in Organizational Research*. London: Sage.
- King, N (2004) Using Templates in the Thematic Analysis of Text, In C. Cassell and G. Symon (Eds.), *Essential Guide to Qualitative Methods in Organizational Research*. London, U.K.: Sage.
- King, N (2006) Professional identities and innovation: a phenomenological constructivist approach. *British Academy of Management Conference*, Belfast
- King(2011) Available at: http://www2.hud.ac.uk/hhs/research/template_analysis/example1/templa te.htm
- Kinni, T. (1998) Why we work, *Training*, 35 (8), 34-39.
- Kululanga, G., & McCaffer, R. Measuring knowledge management for construction organizations. *Emerald*. 2001
- Larson, K., Grudens-Schuck, N., and Allen, B. (2002) Can You Call It a Focus Group? *Methodology Brief*, Iowa State University, US.
- Lotker Z, B. P.-S. "Rent, Lease Or Buy. Symposium on Theoretical Aspects of Computer Science", (2000).
- Marshall, C., and Rossman, G. B. (1989) *Designing Qualitative Research*, Sage, Houston.
- Marzouk, M., & Moselhi, O., Multiobjective optimization of earthmoving operations. *Journal of Construction Engineering and Management*, 130 (1), (2004). 105-113.
- Mohamad, I. M. (1999) *The Application of Concurrent Engineering Philosophy to the Construction Industry*. Thesis PhD, Loughborough University.
- Mayer, R. H., Jr., and Stark, R. M. "Earthmoving logistics." *J. Constr. Engrg. and Mgmt.*, ASCE, 107, (1981). 297-312
- Mazlan Bin Mohd Hashim.(2005). *Pemilihan Jentera Pembinaan Menggunakan 'Analytic Hierachy Process*.
- Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco: Jossey-Bass.

- Nelson, M.L. (2004) The Applicability of the Integrate to Innovate (i2i) model in Supply Chain Management (SCM) in Facilities Management (FM). PhD Thesis, University of Salford, UK.
- Nichols, H. (1976). Moving the earth, North Castle Books, Greenwich, CT.
- Nilesh D. Chinchore , Prof. Pranay R. Khare, “Planning and Selection of Heavy Construction Equipment in Civil Engineering ”, Journal of Engineering Research and Applications ISSN : 2248-9622, Vol. 4, Issue 12(Part 1), December (2014), pp.29-31
- Norris, G. A., and Marshall, H. E., “Multiattribute decision analysis method for evaluating buildings and building systems.” NISTIR 5663, National Institute of Standards and Technology, Gaithersburg, Md. (1995).
- Nunnally, S. W. (2000). Managing construction equipment, 2nd Ed., Prentice-Hall, UpperSaddle River, N.J.
- O’Brien, J. J., Havers, J. A., and Stubbs, F. W. (1996). Standard book of heavy construction, 3rd Ed., McGraw-Hill, New York.
- Patton, M. Q. (2002). Qualitative research & evaluation methods (3rd ed.). Thousand Oaks, CA: Sage Publications.
- Peurifoy, R. L., Schexnayder, C. J., and Shapira, A., (2006). Construction planning, equipment, and methods, 7th Ed., McGraw-Hill, Boston.
- Phillips, E. M. and D. S. Pugh (2005) How to Get a PhD. London, Open University Press, McGraw-Hill.
- Riessman, Catherine Kohler (2008) Narrative Methods for the Human Sciences, Los Angeles, CA: Sage.
- Robson, C, (2007) How to Do a Research Project; A Guide for Undergraduate Students, Oxford, Blackwell Publishing.
- Rossmann, G. B., & Rallis, S. F. (1998). Learning in the field: An introduction to qualitative research. Thousand Oaks, CA: Sage.
- Rubin, D. and Missokia, E. (2006) Report on the Focus Group Discussions of the Usaid/Tanzania Gender Audit. May 10-12.
- Sarantakos, S. (2005) Social Research, 3rd ed. Palgrave MacMillan Ltd.
- Saunders, M., Lewis, P. and Thornhill, A. (2009) Research methods for business students. 5th ed. Harlow: Pearson Education Ltd.

- Schaufelberger, J. E., (1999). Construction equipment management, Prentice-Hall, Upper Saddle River, N.J.
- Schexnayder, P.E. and Hancher, F. (2009). The True Cost of Equipment Failure. Third Edition, Netta Hook, Germany.
- Schexnayder, P.E., Clifford, J., Scort, A. D. "Future of Construction Equipment", Journal of Construction Engineering and Management, ASCE, 128(4), (2002). pp. 279-286.
- Setiawan, W. and Sutrisna, M. (2010) Investing the Potential of Built environment in Promoting Social Cohesion within an Urban Environment. In EGBU, C. & Lou, E. (eds.) 16th Annual Conference of Association of Researchers in Construction Management (ARCOM). Leeds, Association of researchers in Construction Management (ARCOM).
- Sexton, M. (2003) A Supple Approach to Exposing and Challenging Assumptions and Path Dependencies in Research. In: Keynote speech of the 3rd International Postgraduate Research Conference.
- Shapira, A., and Goldenberg, M., "Development of systematic process and practical model for equipment selection in construction projects.", National Building Research Institute, Technion,
- Smith, Beverly A. & Hesse-Biber, Sharlene (1996) Users Experiences with Qualitative Data Analysis Software: Neither Frankenstein's Monster Nor Muse. Social Science Computer Review, 14(4): 423-432.
- Seidman, I. (1998). Interviewing as qualitative research: A guide for researchers in education and the social sciences. New York: Teachers College Press.
- Strauss A. and Corbin J. (1998) Basic of qualitative research: techniques and procedure for developing ground theory, 2nd ed, Thousand Oaks, Calif; London : SAGE
- Haifa, Israel. (2005). Research Rep. No. 017-730.
- Robson, C. (2002) Real World Research, 2nd ed. Blackwell Publication.
- Shiu-Wan Hung, R.-H. T. Factors affecting the choice of technology acquisition mode: An empirical analysis of the electronic firms of Japan, Korea and Taiwan. Technovation .2007.
- Sutrisna, M. (2007) Research Methodology: An Introduction. In: University of Salford.
- Sutrisna, M (2009) Reserch Methodology in Doctoral Research: Understanding the Meaning of Conducting Qualitative Research ARCOM doctoral workshop at Liverpool John Moores University on 12 May.

- Saunders, M., Lewis, P. and Thornhill, A. (2009) *Research methods for business students*. 5th ed. Harlow: Pearson Education Ltd.
- Tatari, O., Skibniewski, M., Integrated agent-based construction equipment management: Conceptual design. *J. Civil Eng. Manage.* 12 (3), (2006).231–236.
- Tatum, C.B., Gren, G. H., Fett, H. (2006). Construction Equipment and their Uses, *Journal of Construction and Engineering Management*, pp.132-137.
- Tavakoli, A., &Taye, E., Equipment policy of top 400 contractors: a survey. *Journal of Construction Engineering and Management* , 115 (2), (1989). 317-329.
- Tavakoli, A., Productivity analysis of construction operations. *Journal of Construction Engineering and Management* , 111 (1), (1985). 31-39.
- Tobi, S. U.M. (2010) *Social Enterprise Applications in an Urban Facilities Management Setting: A Service Delivery Model*, PhD Thesis, University of Salford, UK.
- Thanoon, W. A. M., Peng, L. W., Kadir, M. R. A., Jaafar, M. S, Salit, M. The Experiences of Malaysia and Other Countries in Industrialized building system. In: *Proceeding of International Conference Industrialized Building Systems*. Kuala Lumpur, Malaysia.; 2003.
- Vorester. “Equipment Finance 101”. Presented at the Symposium Conducted at the CONEXPO-CON/AGG, Las Vegas, NV. (2005).
- Vorster, M.C. and Sears, G.A., “Model for Retiring, Replacing, or Reassigning Construction Equipment”, *Journal of Construction Engineering and Management*, ASCE, Vol. 113(1). (1987). pp.125-137.
- Yeo, K.T., Ning, J.H., Managing uncertainty in major equipment procurement in engineering projects. *Eur. J. Oper. Res.* 17 (1), (2006).123–134.
- Yin, R. K. (2009) *Case Study Research: Design and Methods*, 4th ed, California, London, SAGE.
- Z. Lotker, B. P.-S. *Rent, Lease Or Buy*. Symposium on Theoretical Aspects of Computer Science, 2000.