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FACTORS AFFECTING THE EXTENT OF  
E-PROCUREMENT USE IN SMALL AND MEDIUM  
ENTERPRISES IN NEW ZEALAND

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## ABSTRACT

Organisations practicing e-procurement rely on a range of information technologies to facilitate contracting and purchasing. Even though e-procurement is widely in use, factors shaping the use of e-procurement are poorly understood, because the existing studies relied on limited models of e-procurement practice. In particular, none of the studies took into account both the range of e-procurement functionalities used (breadth of e-procurement use) and the extent to which an organisation relies on e-procurement (depth of e-procurement use). Therefore, the purpose of my study was (a) to extend the existing measures of the extent of e-procurement use to better account for the richness of the existing practice, and (b) to examine the main factors affecting the extent of e-procurement use.

An explanatory model of the extent of e-procurement use was formulated by conceptualising the extent of use as a two-dimensional construct comprising the dimensions of breadth and depth. The factors hypothesised to affect the breadth and the depth of e-procurement use were derived based on technology-organisation-environment (TOE) framework and diffusion of innovation (DOI) theory as well as on prior empirical studies of e-procurement adoption and use within an organisation. The factors from the technological context were relative advantage, compatibility, and complexity; from the organisational context, top management support and employee knowledge; and from the environmental context, partner readiness and external pressure.

The model was tested against quantitative data obtained in a survey of 1,000 small and medium enterprises (SMEs) in the manufacturing industry in New Zealand. The response rate was 15%. Structural equation modelling was used to test the model. Qualitative data obtained in a series of follow-up interviews and in the survey were analysed via constant comparative method. Qualitative results were used to help interpret the quantitative findings.

The model explained 39% of variance in the breadth of e-procurement use and 32% of variance in the depth of e-procurement use. Of the technological factors, relative advantage affected the breadth of e-procurement use ( $\beta = .26$ ) and compatibility affected the depth of e-procurement use ( $\beta = .33$ ). An environmental factor, external pressure, affected the breadth of e-procurement use ( $\beta = .37$ ). None of the factors from the organisational context of TOE framework had effect.

Findings suggest that the breadth and the depth of e-procurement use are affected by different factors and, thus, lend support to conceptualising the extent of e-procurement use as a two-dimensional construct. However, the support for using DOI theory in context of explaining e-procurement use was mixed; of the three factors derived from DOI theory, relative advantage, compatibility, and complexity, only relative advantage and compatibility had effect.

Keywords: *E-Procurement, TOE Framework, DOI Theory, SMEs, New Zealand.*

## **DEDICATION**

I dedicate this thesis to my late father, Hassan Saad, 1932–2010, who gave me his continuous support until his last breath but had no opportunity to see me complete this study.

I dedicate this thesis to my mother, Mariam Ismail, for her support, prayers, patience, and encouragement.

This journey would not have been possible without you both.

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## LIST OF ABBREVIATIONS

|         |   |   |
|---------|---|---|
| AVE     | : | Average variance extracted                    |
| B2B     | : | Business-to-business                          |
| CFA     | : | Confirmatory factor analysis                  |
| CFI     | : | Comparative fit index                         |
| DOI     | : | Diffusion of innovation                       |
| EDI     | : | Electronic data interchange                   |
| EFA     | : | Exploratory factor analysis                   |
| ERP     | : | Enterprise resource planning                  |
| ICT     | : | Information and communication technology      |
| InterOS | : | Inter-organisational information systems      |
| IntraOS | : | Intra-organisational information systems      |
| MIS     | : | Management information systems                |
| MRO     | : | Maintenance, repair, and operating            |
| NAPM    | : | National Association of Purchasing Management |
| PLS     | : | Partial least squares                         |
| RBV     | : | Resource-based view                           |
| RMSEA   | : | Root mean square error of approximation       |
| SEM     | : | Structural equation modelling                 |
| SME     | : | Small and medium enterprise                   |
| SRMR    | : | Standardised root mean square residual        |
| TLI     | : | Tucker-Lewis index                            |
| TOE     | : | Technology-organisation-environment           |
| WWW     | : | World Wide Web                                |

## LIST OF PUBLICATIONS

Conference abstracts and conference proceedings papers published in conjunction with my study.

### *Conference Abstracts*

Hassan, H., Tretiakov, A., & Whiddett, D. (2010). *The extent of e-procurement adoption in New Zealand: An integrated model*. Paper presented at The Inaugural New Zealand Information Systems Doctoral Conference (NZISDC), Auckland, New Zealand.

Hassan, H., Tretiakov, A., & Whiddett, D. (2011). *Extent of e-procurement usage: An empirical study of small and medium sized New Zealand businesses*. Paper presented at the 2011 New Zealand Information Systems Doctoral Conference (NZISDC 2011), Wellington, New Zealand.

Hassan, H., Tretiakov, A., & Whiddett, D. (2012). *The use of e-procurement in small and medium manufacturing companies in New Zealand*. Paper accepted at the International Council for Small Business (ICSB 2012), Wellington, New Zealand.

### *Conference Proceedings Papers*

Hassan, H., Tretiakov, A., & Whiddett, D. (2010). Extent of adoption as opposed to adoption: Case of e-procurement. *Proceedings of the 21st Australasian Conference on Information Systems (ACIS 2010)*, Brisbane, Australia.

Hassan, H., Whiddett, D., & Tretiakov, A. (2010). Public B2B e-marketplaces: Functions, trends, and participation by New Zealand organisations. *Proceedings of the 24th Annual Australian and New Zealand Academy of Management (ANZAM 2010)*, Adelaide, Australia.

Hassan, H., Tretiakov, A., & Whiddett, D. (2011). Extent of e-procurement usage: An empirical study of small and medium sized New Zealand manufacturing businesses. *Proceedings of the 22nd Australasian Conference on Information Systems (ACIS 2011)*, Sydney, Australia.