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The Role of National Culture in the Strategic Use of and Investment in ICT: A Comparative Study of Japanese and Australian Organisations

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Abstract

Japanese ICT investment trailed the developed world for many decades, contributing to low productivity growth. A potential root cause is the influence of Japanese culture on the strategic use of and investment in ICT (SUIICT). Empirical research on cultural aspects of SUIICT in Japan is lacking. This study will examine national culture and its association with SUIICT in organisations in Japan compared to Australia. A quantitative survey of ICT decision makers in Japanese and Australian organisations will be fielded based on questions synthesized from McFarlan, McKenney and Pyburn (The Strategic Grid), and Hofstede and Minkov (Cultural Dimensions Model). A contribution to theory will be the development and testing of an empirical model and practical instrument to determine the association between national culture and SUIICT. A practical contribution will be an increase in understanding of both markets allowing for more effective market segmentation and development of ICT offerings for both countries.

Keywords

Cross-cultural study, IS investment, ICT strategy, Japan, Australia, Small & Medium Enterprise

1   Introduction

Japanese ICT investment trailed the developed world for many decades, contributing to low productivity growth. A potential root cause is the influence of Japanese culture on the strategic use of and investment in ICT (SUIICT).

At the national level, there is a positive and statistically significant relationship between productivity, economic growth rates, and Information and Communications Technology (ICT) investment and subsequent use (Eskenazi 1998). A continued investment in ICT contributes to economic growth in general through increasing productivity across all sectors (Bubou 2011). Analysis conducted by the Massachusetts Institute of Technology (MIT) (Eskenazi 1998) found that for the period 1987 to 1991 the return on investment (ROI) for Information Technology (IT) in US firms was 81.1 percent compared to an ROI of less than 10 percent for non IT investments.

In 1980 Japan and other developed nations had similar levels of national ICT investment (Fukukawa 2001), however by 2001 Japan's national ICT investment level had noticeably lagged behind that of the US and other western countries (Fukukawa 2001) and continued to deteriorate. Matsubara and Katayama (2007) reported that in Japan the use of technology by business and government significantly trailed the rest of the developed world including Australia in terms of ICT investment as a percentage of GDP for the period 1991 to 2010. This finding ran counter to Japan's national reputation for high technology leadership (Desruelle & Stančík 2014). More recently Fukao (2013) published a detailed analysis of ICT Investment vs Gross Domestic Product (GDP) ratios in major developed economies including Japan. One finding was that at the national level the US invested four times more than Japan on ICT as a percentage of GDP during the peak ICT investment bubble years of 1991 to 2010 and that national culture was a potential root cause. Japanese small to medium sized enterprises (SMEs) were particularly deficient in terms of their lack of investment in ICT during this period, also potentially due to cultural influences, resulting in a significant negative impact on productivity (Fukao 2013).

Ishida (2015) noted that during the 15 years from 1999, ICT investment in Japan had been one of the fastest growing components of total investment, almost doubling in that time. However in spite of this catch-up in investment in ICT, the average annual growth rate of ICT investment in Japan is still relatively low when compared with the US or many developed countries and culture was cited as potentially one of the influential variables but this was not explored further (Ishida, 2015)

1.1   Research Problem and Question

Empirical research on cultural aspects of SUIICT in Japan is lacking. This research seeks to fill the literature gap by focussing specifically on the research problem of identifying how national culture influences the strategic use of and investment in ICT by Japanese organisations when compared to Australian organisations. As a result of the initial literature review the following research question was developed: *To what extent is national culture associated with the strategic use of and investment in ICT in Japanese organisations compared to Australian organisations*?

2   Literature Review

2.1   Definitions for Strategic Use of and Investment in ICT (SUIICT)

The strategic use of ICT and actual investment in ICT are two sides of the same coin. Regarding strategic use, Peppard and Ward (2016) found that organisations requiring a source of competitive advantage are looking towards the innovative application of technology. Likewise Kyobe (2004) defined the strategic use of IT in terms of the use of IT resources in providing a competitive advantage. Broadbent (2005) maintained that strategic use of IT should contribute to shareholder value. Regarding investment, Broadbent and Weill (1997) reinforced the role of appropriate IT investment as increasingly significant in impacting on the agility of organisations and their ability to respond swiftly to market changes. Decisions around which IT investments are needed for strategic agility were also viewed as critical by Weill, Subramani and Broadbent (2002). From this review the most common use of the word 'strategic' when referring to both investment and subsequent use of IT systems is generally based on *the extent to which IT is purchased and used to assist an enterprise to achieve its business strategy and a competitive advantage.*

2.2 Frameworks for investigating/mapping SUIICT

A number of frameworks and models have used qualitative and quantitative data to measure investment in ICT or strategic use of ICT. Weiss (2006) provided an important extension to business and IT

alignment research that shows three profiles linking IT to different business objectives. His framework was similar to the McFarlan, McKenney and Pyburn (1983) Strategic Grid and plotted an external market engagement axis from low to high against internal IT, and business integration from administration to core production process to research and development. Using a quantitative framework, Kearns and Lederer (2000) examined how and why strategic IT alignment can be used to create competitive advantage with their model differentiating alignment between the business plan and IT plan (BP-ITP alignment) and the reciprocal (ITP-BP alignment). Similarly Ludena, Vasconcellos and Perez-Alcazar (2005) proposed a methodology to support the Strategic Planning of IT (SPIT). Peppard and Ward (2016) also proposed a portfolio management perspective for IS/IT investments based on a slightly modified version of the McFarlan, McKenney and Pyburn (1983) Strategic Grid. Models have also been applied to research on cultural influences on IT strategy in general, including the UTAUT (Unified Theory of Acceptance and Use of Technology) and Technology Acceptance Model (TAM) (Davis 1989). Bandyopadhyay and Fraccastoro (2007) noted that although these models work effectively in the US, they have been less predictive when tested in countries outside the US including Japan, suggesting that national culture may play a significant role in IT usage and adoption, and hence investment.

2.3 The McFarlan Strategic Grid in Relation to Strategic Use of ICT

The McFarlan Strategic Grid (McFarlan, McKenney & Pyburn 1983), as shown in Figure 1, stood out from the rest in terms of its ease of operationalisation and its ability to be applied to analyse and compare the strategic use of ICT within organisations. Based on quantitative survey responses, strategic use in terms of relevance and impact of ICT for an organisation can be positioned on a continuum ranging from 'low current impact and low current relevance' to 'high current impact and high current relevance' along each of these dimensions of the grid (McFarlan, McKenney & Pyburn 1983; Raghunathan et al.(1999).
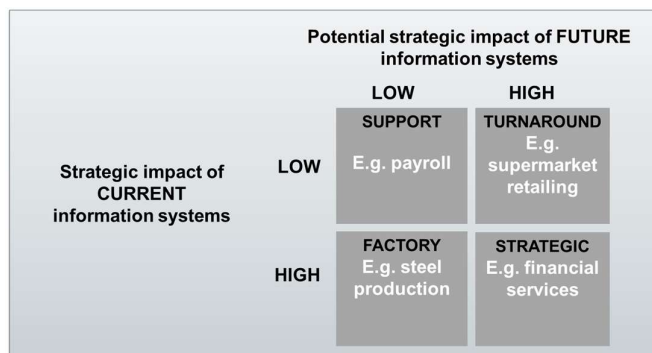

Figure 1. The McFarlan Strategic Grid (McFarlan, McKenney & Pyburn 1983)

2.4 National Cultural Influence on SUIICT

The first element of this research focuses on identifying differences in SUIICT in Japanese and Australian organisations, with a cross section in each country representing those in large enterprises (LEs) and small to medium enterprises (SMEs). The strategic grid (McFarlan, McKenney & Pyburn 1983) as operationalised (Raghunathan, Raghunathan & Tu 1999) will be used as the basis for that component of the study with additional questions synthesized from the literature and minor updates to reflect modern ICT environments. The second element of the research relates to determining any relationship between national culture and SUIICT. This required the development of a suitable framework to identify and classify potential national cultural influences on ICT decision making.

Much has been written about the impact of national culture on management behaviour, with the bulk of the literature supporting the premise that organisation behaviour, phenomena and practices, and hence management behaviour, cannot be examined in isolation from the cultural influences brought into the organisation by employees, or from the behaviour of the society in which the organisation operates (Schwartz 2011). National cultural background has a significant influence on various organisational phenomena including leadership styles, management practices, group and intergroup behaviours, decision making, management styles, employee evaluation, and planning processes, to name a few, but all of these phenomena are linked to cultural norms.

A number of studies both quantitative and qualitative have been conducted with a specific focus on national cultural influences on IT investment decisions and technology uptake, including cross-cultural contrasts and comparisons (Srite & Karahanna 2006; Leidner & Kayworth 2006; Musambira & Matusitz 2015). Between 1967 and 1973 while employed by IBM, Geert Hofstede conducted a large scale study in

an attempt to classify nations based on broad value differences (Hofstede and Minkov 2010). Data was collected from over 116,000 respondents in 66 countries. Hofstede's study comprised a systematic data collection method, grounded in national culture theory, resulting in a rigorous research design and the development of the empirical definition of six dimensions of culture in the 6D model (Hofstede & Minkov 2013) (Table 1). Table 1 shows that Japan and Australia are quite different on their respective Index scores for each of the six dimensions of culture.

Dimension	Derived from definitions (Hofstede & Minkov 2010)	Australia	Japan
Power Distance (PDI)	*Power distance* – the extent to which the less powerful member of institutions and organisations within a country expect and accept that power is distributed unequally.	38	54
Uncertainty Avoidance (UAI)	*Uncertainty avoidance* - the extent to which members of a culture feel threatened by ambiguous and unknown situations.	51	92
Masculinity (MAS)	*Masculine* - a society where emotional gender roles are clearly distinct: men are supposed to be assertive, tough, and focused on material success, whereas women are supposed to be modest, tender, and concerned with the quality of life. *Feminine* - is when emotional gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life.	61	95
Individualism (IDV)	*Individualism* - the ties between individuals are loose: everyone is expected to look after him/herself and his/her immediate family only. *Collectivism* - people are from birth onward integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty.	90	46
Long Term Orientation (LTO)	*Long term orientation* - is a society which fosters virtues oriented towards future rewards - in particular, perseverance and thrift. *Short term orientation* - fosters virtues related to the past and present, in particular respect for traditions, preservation of "face" and fulfilling social obligations.	21	88
Indulgence versus Restraint (IVR)	*Indulgence* - a society with a tendency to allow relatively free gratification of basic and natural human desires related to enjoying life and having fun. *Restraint* - a conviction that such gratification needs to be curbed and regulated by strict social norms.	71	42

Table 1. Australian vs Japanese Index Scores on Hofstede Cultural Dimensions

Hofstede's work, although not without criticism (Viberg & Grönlund 2013), has been replicated and reviewed by many over the last few decades and has been used in cross cultural research studies across a diverse range of disciplines.

Analysis of each organisation's strategic use of ICT plotted against the Strategic Grid (McFarlan, McKenney & Pyburn 1983) should reveal any differences in approaches to the strategic use of ICT between Japanese and Australian organisations. Dimensions of National Culture Model (Hofstede 2010) will be used as the basis for comparison of these strategic ICT approaches. The cultural dimension index scores shown are from the most recent research conducted by Hofstede (2010). The index is scored from 1-100 with an index of 1 being a low score and 100 being a high score. The further apart the scores for countries being compared, the greater the cultural difference. These indices, although being used as a guide in the creation of the hypotheses, are only generally representative of cultural differences and are not expected to apply exactly to the population of ICT Decision Makers (ITDMs) to be surveyed in this study. As a result, the indices for each country shown in Table 1 will not be used directly. Instead, to ensure valid analysis, the cultural dimensions for Australia and Japan to be used in this specific research will be established by directly surveying all respondents using Hofstede's VSM (Values Survey Module) 2013 methodology (Hofstede & Minkov 2013). The VSM2013 is a freely available standardised set of well researched and validated questions designed to create comparable cross-cultural dimension indices.

3 Hypotheses

3.1 National Cultural Dimensions Association with SUIICT: Japan vs Australia

3.1.1 Power Distance (PDI)

Research into the association of the PDI cultural dimension on ICT strategy and use shows that a high PDI score indicates a greater preference for hierarchical use and the restriction of flow of information to lower levels of staff (Kambayashi 2004). A high PDI also has a negative impact on the acceptance of and implementation of new systems (Hasan & Ditsa 1999; Matheson & Tarjan 1998) and poor use of information for decision making (Galliers, Madon & Rashid 1998). Countries with high PDI scores were found to be less trusting of technology, less open to new ideas and less likely to innovate via the implementation of ICT (Srite 2000; Erumban & de Jong 2006). Therefore the following hypotheses are proposed:

> *H1a: PDI score will be inversely associated with the level of strategic use of ICT.*
> *H2a: PDI score will be inversely associated with the level of investment in ICT.*

3.1.2 Uncertainty Avoidance (UAI)

Research into the association of the UAI cultural dimension with SUIICT indicates that a high UAI score creates cultural barriers to the implementation and acceptance of ICT (Jarvenpaa & Leidner 1998) and leads to a greater concern over the risk of implementing and using ICT projects compared to cultures with a low UAI score and may hamper ICT adoption (Johns, Smith & Strand 2003). Low ICT adoption was also found to be associated with higher UAI scores since technology is viewed as inherently risky (Hasan & Ditsa 1999; Png & Tan 2001; Erumban & de Jong 2006). Therefore, the following hypotheses are proposed:

> *H1b: UAI score will be inversely associated with the level of strategic use of ICT.*
> *H2b: UAI score will be inversely associated with the level of investment in ICT.*

3.1.3 Individualism (IDV)

Research into the association of the IDV cultural dimension with SUIICT indicates that a lower IDV score creates cultural barriers to the implementation and acceptance of ICT (Jarvenpaa & Leidner 1998). A high IDV score leads to a higher likelihood of distributing bad news whereas cultures with a low IDV score are less likely to share bad news, and thus restrict the flow of information to individuals (Matheson & Tarjan 1998). Therefore systems that encourage direct communication and information flow with staff, are less likely to be implemented. As ICT tools link individuals they are more likely to be adopted by societies with a higher IDV score (Hofstede et al. 2010). A high IDV score results in a positive association between individualism and communications technology (Erumban & de Jong 2006; Musambira & Matusitz 2015). Therefore the following hypotheses are proposed:

> *H1c: IDV score will be directly associated with the level of strategic use of ICT.*
> *H2c: IDV score will be directly associated with the level of investment in ICT.*

3.1.4 Masculinity (MAS)

Research into the association of the MAS cultural dimension with SUIICT indicates that patterns of IT adoption may vary according to the level of MAS score (Hasan & Ditsa 1999). The research on Japan indicates that although the country is highest on the MAS index, the focus on technology (masculine) is heavily moderated by the more feminine focus on people and end-users (Hasan & Ditsa 1999), so there was no association between ICT and national culture for the MAS index. Another study also found no association between communications technology and the MAS score (Musambira & Matusitz 2015). The MAS index for this study is also not expected to show any association with SUIICT, therefore the following hypotheses are proposed:

> *H1d: MAS score will not have an association with the level of strategic use of ICT.*
> *H2d: MAS score will not have an association with the level of investment in ICT.*

3.1.5 Long Term Orientation (LTO)

Research into the association of the LTO cultural dimension with SUIICT indicates that a high LTO score has a negative influence on innovative product adoption (Eskenazi 1998) including implementation and acceptance of ICT. In countries with a low LTO score the perceived usefulness of ICT in the near term has a significant influence on usage intentions, compared to long-term usefulness and will therefore

encourage ICT investment and higher rate of adoption of ICT investment (Eskenazi 1998) Therefore the following hypotheses are proposed:

> *H1e: LTO score will be inversely associated with the level of strategic use of ICT.*
> *H2e: LTO score will be inversely associated with the level of investment in ICT.*

3.1.6 Indulgence (IVR)

No studies on the association between this cultural dimension and SUIICT have been found. As there is little literature or other evidence from which to derive a hypothesis, one is not proposed.

3.2 Organisational Size (SME vs LE)

Economic research shows that SMEs in Japan suffer from low productivity and weak profitability with less than one third reporting a profit in 2012 (OECD 2015). Compared to LEs, Japanese SMEs are heavily subsidised by the government making the motivation to increase productivity very low, particularly if by expanding their business, they end up losing their subsidies (OECD 2015). In addition to the lack of financial motivation, Japanese SMEs are strongly influenced by the structure of Japanese business society and culture, which does not readily embrace ICT for the delivery of productivity gains. Therefore pressure on larger organisations to be productive and survive, due to less government support, will moderate any association between national culture and SUIICT, leading to the following hypotheses:

> *H3a: Organisation size moderates association between national culture and level of strategic use of ICT.*
> *H3b: Organisation size moderates association between national culture and level of investment in ICT.*

3.3 Domestic Vs Export Focus

In Japan, 99.7 percent of companies are SMEs (METI 2016). Approximately 15 percent of Japan's economy is export related with the majority of Japanese organisations focussed domestically (Lloyd 2017). Businesses in Japan are heavily subsidised, especially SMEs (OECD 2015) so there is no real incentive to increase productivity via the adoption of ICT (OECD 2015). The next hypothesis is based on the logic that as most Japanese organisations are SMEs, funded and subsidised extensively by the Japanese government and not competing globally, it is expected that their proportion of revenue spent on the strategic use of ICT to improve competitive advantage will be lower than organisations that compete in export markets where external competition is present. Therefore, pressure on export focussed organisations to compete, should moderate any correlation between national culture and SUIICT. Therefore these hypotheses are proposed:

> *H4a: An organisation's ratio of domestic to export revenue moderates an association between national culture and level of strategic use of ICT.*
> *H4b: An organisation's ratio of domestic to export revenue moderates an association between national culture and the level of investment in ICT.*

3.4 Strategic Use of and Investment in ICT (SUIICT)

As discussed in the literature review the most common use of the word 'strategic' when referring to both investment and subsequent use of IT systems is generally based on the extent to which IT is purchased and used to assist an enterprise to achieve its business strategy and a competitive advantage. As a result there should be a direct correlation between an organisation's level of strategic use of ICT and its relative level of investment. Based on this reasoning, the following hypothesis is proposed:

> *H5: The level of strategic use of ICT is positively associated with the level of investment in ICT.*

4 Research Framework

The research framework (Figure 2) models the proposed research by incorporating the major constructs from the research questions stated above, and the five major hypothesis groups. An online survey of ITDMs has been designed based on existing frameworks and models, and adapted in support of each of the components of the conceptual framework. The Strategic Grid (McFarlan, McKenney & Pyburn 1983) can be readily adapted for use in the analysis of the strategic investment in ICT in Australian organisations compared with Japanese organisations. The Dimensions of National Culture Model (Hofstede and Minkov 2013) will be applied to identify any cultural association with the organisations' SUIICT. These differences will be measured by comparing the results of the cultural dimensions part of the survey with the organisations' approaches and perceptions of SUIICT derived from the same survey.
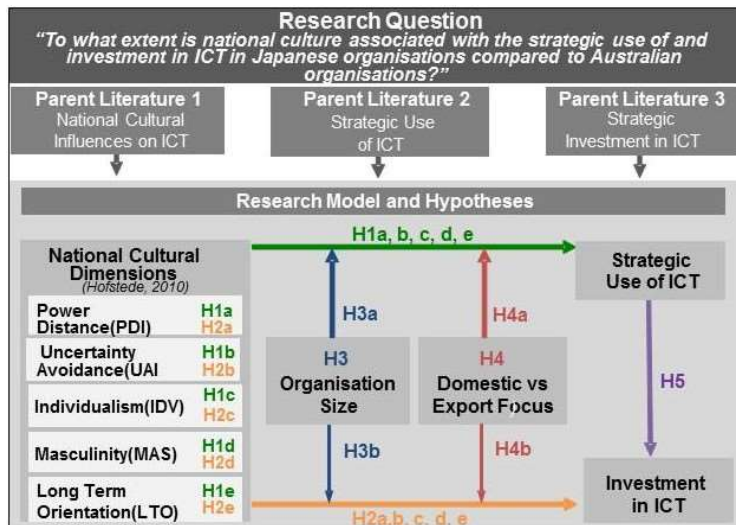
Figure 2. Research Conceptual Framework and Hypotheses

5   Proposed Research Methodology and Design

The literature review supports the assertion that national culture influences Japanese business behaviour and SUIICT in a way that differs from most western cultures. Extending the existing literature, quantitative research methods will be used to design and field a structured online survey of key ITDMs in Japanese and Australian organisations with the aim of empirically establishing the association between national cultural dimensions and SUIICT, and the differences between the two countries. Australia was chosen as the comparison country for two main reasons. Firstly, Australia's national culture is quite different from the national culture of Japanese when the national scores of VSM cultural dimensions model are considered (see Table 1). Secondly, Australia is considered to be an advanced country in terms of its adoption and utilisation of ICT. The cultural measurement will use the questions included in the VSM cultural dimensions model (Hofstede and Minkov 2013). In the same survey, questions synthesised from the Raghunathan et al. (1999) operationalisation of the Strategic Grid (McFarlan, McKenney & Pyburn 1983) will be applied to measure the SUIICT aspect. Actual investment in ICT, determination of organisation size (LE or SME) and the ratio of domestic vs export revenue within each organisation will be derived from specific questions in the survey.

In both countries the target respondent will be the ITDM, normally the Chief Information Officer (CIO), or other C-level executive responsible for IT Strategy and decision making. PLS SEM will be used for analysis and the method also works with relatively small datasets. As a rule of thumb, the minimum sample size for PLS analysis should be 10 times the number of items present in the most complex construct, or 10 times the largest number of independent variables impacting on the dependent variable. National Culture has 24 items measuring different dimensions, so on that basis 240 valid survey responses are required per country. For CFA and SEM, a rule of thumb is to have at least 300 cases for factor analysis (Tabachnick 2006). Therefore the target number of completed responses has been set at 300 ITDMs from Australian organisations and 300 ITDMs from Japanese organisations to satisfy the PLS SEM requirements.

As access to publicly available contact information for ITDMs in Japan is not available, an independent specialist third party survey organisation will be used to source and survey respondents. The use of third-party specialist firms for initial recruiting of respondents and fielding of surveys is becoming increasingly commonplace for Doctoral level research, especially in the area of social science and is recommended for the VSM Module (Hofstede et al 2010). Data will be provided in CSV (Comma Separated Values) and SPSS (Statistical Package for the Social Sciences) format. This will be analysed via SPSS AMOS (Analysis of Moment Structures) or PLS3.0 (Partial Least Squares) software. SEM Confirmatory Factor Analysis (CFA) will provide reliability and validity testing of the measurement model. In addition, the Cronbach's alpha statistical measurement will be used to test the reliability of each factor. Analysis using the Structural Equation Modelling (SEM) method will be used to test the relationships described in the hypotheses. As there are two data sets (Australia and Japan), two CFAs and two path models using SEM will be used to test for association between national cultural dimensions and SUIICT comparatively between Japanese organisations and Australian organisations. -Organisation

size, and the ratio of domestic versus export revenue will be assessed in these path models as moderating variables on these associations.

6   Expected Contribution

Specifically, this research will contribute to theory by modifying and testing selected existing frameworks to add to the body of knowledge about national cultural dimensions and their association with business behaviour, especially in relation to SUIICT. This study will result in the development and testing of an empirical model and practical instrument for determining any association between SUIICT and national culture and add significantly to the body of empirical knowledge about culture in information systems research across two quite different cultures (Japan versus Australia). Another contribution will be in the area of identifying the differences between large enterprises and SMEs, and their domestic versus export revenue association in relation to SUIICT in both countries. Contributions to business, social science, ICT strategy, marketing and management practice may provide input to decision makers regarding strategies for effective market segmentation and development of products and services that may increase domestic investment and use of ICT in Japan. Providing comparisons of Japanese organisations' SUIICT compared to Australian organisations will increase understanding of both markets and may allow for more effective development of products and services for sale by Japan into Australia and Australia into Japan.

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