

## An investigation of factors influencing online shopping behaviors in the context of China and Australia

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**Abstract.** Online shopping has gained much popularity over the past decade. Indeed, in a post-COVID world, online shopping is the only medium of shopping for many. A great deal of research effort has been devoted to understanding the factors that positively or negatively influence online shopping behavior of consumers. However, most of these influence relationships have been studied individually, and not how such factors interrelate with each other and thus the underlying complex driving and dependence relationships among those factors are unknown. Moreover, these underlying driving and dependence relationships among online shopping behavior factors can be highly dependent on the cultural context of the consumers. In this research we identify the key factors that have been shown to have influence on online shopping behavior from a rigorous review of literature. We then apply an Interpretive Structural Modelling (ISM) technique to find the underlying complex hierarchical relations of factors related to Australian and Chinese culture. We apply MICMAC analysis to find the driving and dependence power of these factors in context of these two cultures. We finally explain the differences and similarities found for Australian and Chinese culture with reference to Hofstede's Cross Culture theory. Prominent findings include timeliness of delivery and order accuracy is considered having high dependence and driving power in the Australian context but has low driving and dependence power in Chinese context. Our findings will be beneficial for including better cultural context factors into future online shopping platform design.

**Keywords:** Online shopping behavior; ISM-MICMAC method; Hofstede's cross-cultural theory

### 1 Introduction

Online shopping has become increasingly accepted [1]. As of 2019, global e-commerce retail sales exceeded 3.5 trillion U.S. dollars and approximately 1.92 billion people were e-commerce customers [2]. More than \$14 of every \$100 in retail merchandise consumption is now done online [3]. Online shopping is more convenient than traditional shopping methods in terms of access, search, evaluation, transaction, and possession [4]. However, although many consumers have already begun using online shopping, there are still many complaints, with about 21% of consumers giving up their shopping cart since they do not understand the complex process [5].

About 75% of customers who abandon their shopping cart do so because of slow loading of the website. Thus, it is necessary for researchers and practitioners to find out what factors influence different customers' online shopping behavior.

Factors that influence customers' online shopping behavior have been well-studied. Wann et al [6] pointed out the website aesthetic, usability, financial security and customization have significant influence on customers' attitude of online shopping. Many other factors influencing online shopping have been studied, however independently. The overall shopping behavior may be a result of the compounding relationships of all those factors. Thus, an understanding of how the factors relate to each other is important to realize the overall influence of those factors.

Different factors influencing online shopping may have inter-relationships due to different cultural environments. As E-commerce companies expand to a global market, different online shopper cultures may become a major challenge. Many companies find that electronic products popular in their home country are not easily accepted by customers in other countries [7]. Pharmacy Online, an Australian E-commerce pharmacy, showed different website designs to its Chinese visitors based on Chinese visual style and content presentation [8]. H&M's website style has a similar look, but in Chinese version promotions are done with Asian models. Thus, an online shopping company needs to understand the different culture-related drivers of online shopping for its global customers.

In this work we study the interrelationship between factors influencing online shopping customers' behavior based on the example scenarios of Australia and China. China and Australia are very different in culture. Australia, with an Anglo-Celtic cultural background and China as the originator of Confucian culture, shapes different social values [9]. The objective of this research is to answer the following critical research questions:

- RQ1: What factors influence customers' online shopping behavior?
- RQ2: How are these factors influencing online shopping behavior related to each other?
- RQ3: How do the interrelationships among different factors differ based on Australian and Chinese culture?

In order to answer the above questions, we summarize what factors influence customers' online shopping behaviors through a review of the existing literature. We apply an Interpretive Structural Modelling (ISM) technique to find the relationships among the factors for Australian and Chinese online shopping contexts [10]. ISM technique is one of the best techniques to find the inter-relationship among different factors [11,12]. We apply Impact Matrix Cross-Reference Multiplication Applied to a Classification (MICMAC) analysis on the factors to identify the dependence and driving power of those factors [13]. We finally compare the Interpretive models for Australia and China and explain with Hofstede' Cross Culture theory [14].

The complex hierarchical model of relations among the factors influencing online shopping behaviors will be helpful in understanding differences in online shopping behavior by consumers of different cultures. It will help e-commerce designers to improve their platforms as well as better expand their existing e-commerce platforms to different markets. The findings also help advance academic research on online shopping behaviors and its influencing factors.

The rest of the paper is organized as follows: Section 2 presents our research methodology, section 3 presents the results, section 4 lists some threats to the validity of the research Section 5 elaborates on the findings and finally Section 6 concludes the article.

## 2 Research Methodology

Our first step was to identify key factors that influence online shopping behavior from existing studies. We then found the interrelationships between the factors using ISM-MICMAC approach. ISM-MICMAC is widely used to analyze the interrelationship among factors. We develop one model for each of the interrelationships for Australian and Chinese online shoppers. We then explain the similarities and differences between these models with the help of Hofstede's Cross culture theory. We detail our approach in the following subsections.

### 2.1 Interpretive Structural Modeling (ISM)

The Interpretive Structural Modeling Method (ISM) was developed by Warfield in 1974 [10]. It is commonly used to analyze the direct and indirect relationships among different influencing factors and helps to describe complex relationships by use of a directed graph. An ambiguous problem can be transformed to a hierarchical format based on ISM [15]. Recently, the method has been adopted by various fields. For example, Bashir [16] built the hierarchical model to help designers understand the interrelationship among engineering factors; Singh et al [17] applied the ISM in the manufacturing field. Janssen et al [55] researched on the challenges of adopting the Internet of things (IoT) in smart cities based on ISM method.

### 2.2 Impact Matrix Cross-Reference Multiplication Applied to a Classification (MICMAC)

Impact Matrix Cross-Reference Multiplication Applied to a Classification (MICMAC) is a structural analysis method proposed by Duperrin and Godet. It is used to classify factors into four categories based on their *driving power* and *dependence power* [13]. According to driving power and dependence power, a *four-quadrant figure* (autonomous factor, dependent factor, linkage factor and independent factor) can be constructed [18].

### 2.3 Hofstede's Cross-Culture theory

Geert Hofstede conducted extensive research on how values are influenced by culture. Based on data from 70 countries, he summarized six dimensions which can be used to distinguish the features of each culture [14]. The six dimensions include (1) Power Distance: how the degree a person with less power can accept inequality; (2) Individualism or Collectivism: the degree of people integration into the group, as well as the responsibility undertaken by the society and dependence on groups; (3) Uncertainty Avoidance refers to how the degree social members are willing to tolerate risks. (4) Masculinity vs. Femininity: masculinity society which means the social value tends to be assertive, tough, and focused on material success, on the other hand feminine society tends to modesty and consensus oriented. (5) Long Term Orientation vs Short Term Orientation: a long-term orientation is willing to delay short-term material or social success to prepare for the future but short-term orientation is more focused on the current event. (6) Indulgence vs Restraint: indulgent society tends to enjoy life and free gratification of human desires while restraint society tends to restrain one's desire to abide by social norms [19].

## 2.4 The Phases of ISM-MICMAC

According to the ISM method, a group of domain experts are requested to review and identify the relationships. Since our final model is based on this group of domain experts' judgement, it is called Interpretive Structural modelling. We present the factors that we have identified to get feedback from experts in the domain.

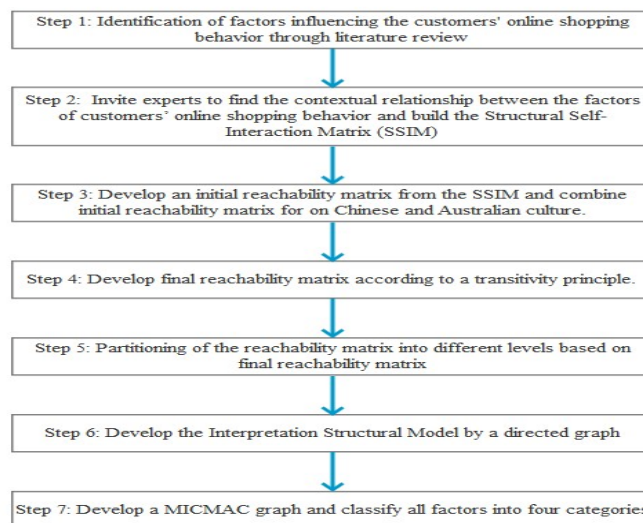
**Review of literature.** We conduct an exploratory literature review on consumer online shopping behavior. We use two keywords "customer online shopping behavior" and "culture influence online shopping" to search in three databases including the Google Scholar, the ACM Digital Library and the IEEE Xplore. We screen the returned articles by reading title and abstracts. We select a subset of the articles for full text analysis based on our title and abstract screening. While reading the full text if we find any factors that has been shown to influence online shopping behavior, we capture the data in a spreadsheet.

**Recruitment.** We apply convenience and snowball sampling to find our domain experts. As part of the convenience sampling we contacted friends and colleagues of the researchers who have e-commerce experience and advertised through LinkedIn. As part of our snowball sampling we asked participants and others to communicate our invitation in their networks.

**Interviews.** We collected the data through structured one-on-one interviews. The interviews consisted of three parts: demographic information collection, explaining 17 factors and identifying the contextual relationships between each pair of factors and indicate those with four predefined symbols in the structural self-interaction matrix (SSIM).

**Analysis.** Based on the SSIM matrixes we then develop a reachability matrix. A reachability matrix indicates if a factor can be reached from another factor through contextual relationships. A reachability matrix is transferred to a conical representation and partitioned into different levels according to the formula proposed by the ISM method. Figure 1 explains the steps of integrated ISM-MICMAC approach that we followed.

Figure1: The phase of the ISM-MICMAC method



## 3 Results

### 3.1 Factors Influencing Online Shopping

After reviewing literature, the identified 17 factors that directly or indirectly influence online shopping behavior. We will denote the factors as F1...F17.

**Risk Perception (F1).** There are 2 factors from the risk dimension, risk perception and privacy. Risk perception refers to "the consumer's perceptions of the uncertainty and adverse result of buying a product or service" [20]. Risk perception is a significant influencing factor when customers make online shopping decisions. [21]. Ko et al [22] noted that there is a negative relationship between perceived risk and the frequency of online shopping. Wang et al [23] investigated the four types of perceived risk: psychological, financial, time and functional.

**Privacy Risk (F2).** Privacy risk refers to the degree to which customers envisage the loss of control over personal information such as leakage of credit card information, personal information [17, 18] [24,25]. CNNIC [26] reported that compared with other risk factors, privacy risk has less impact on Chinese online shopping. However, Lee et al [27] proposed that privacy issues are one of the most important factors affecting consumer attitude to online shopping.

**Website Quality (F3).** Web quality refers to the overall performance of the shopping website, and it can be measured by clarity of information, smoothness of the processes, and reliability of the product [28]. Wen-Kuo [29] proposed that there are 4 aspects that can assess the quality of the websites - security, visual design, web navigation and download delay.

**Website Aesthetics (F4).** Website aesthetics refers to use of colors, fonts, graphics, images to convey a clear and unique image [30]. Cai et al [31] found that website aesthetics can improve people's mood since it can bring pleasure to customers. Other research has found that when customers visit a website, they quickly make a judgment on the attractiveness of the website and shape the first impression that influence their views of a website's trust and usability [32].

**System Availability (F5).** System availability refers to the technical support required to ensure the stable operation of the website [33]. If the system cannot be kept stable or is down, the situation is equivalent to hanging a sign to close at the door of the store [34]. Chiu et al [35] argued that system availability has a strong relationship with customer trust for an online shop.

**Demographic Characteristics (F6).** Many studies have found that demographic characteristics (such as age, culture, gender, income, education, and marital status [36]) have a strong relationship with customers' online purchasing decisions. Zhou et al [37] found that people from individualistic backgrounds do more online shopping than people from a collectivist background. Guo [38] built the hierarchical model of the factors affecting online customers' behaviors.

**Price (F7).** Price is an important considerate factor for most customers' purchasing decisions [39]. Customers have a positive attitude towards online shopping because it not only saves transaction costs but also gives cheaper prices [40]. Baubonienė and Gulevičiūtė [41] found that female customers are more attracted to low prices.

**Sales Promotion (F8).** Sales Promotion refers to an activity which can encourage customer by a various form of discount [42]. Darko [43] mentioned that discount plays an important role in

customers' purchase decision. There are three common promotion strategies of the online shop including coupons, discounts, and free delivery [44].

**Trust (F9).** Trust is a significant factor which can determine whether customers buy service or product on the website [45]. Al-Debei et al [28] introduced that word of mouth and perceived web quality can affect on trust, and trust as a mediating variable influences customers' attitude towards online shopping. Similarly, Chiu et al [35] also agree that trust is an intermediate variable which can impact on customers' online reorder.

**Payment Method of Credit Card (F10).** Credit card has become the main settlement method for online shopping. Hayhoe et al [46] found that young people prefer to use credit cards because of the convenience and efficiency. Akram et al [47] found that website quality, sales promotion and credit card have a positive influence on online impulsive purchase behavior.

**Shopping Experience (F11).** Shopping experiences have a potential influence on consumer's behavior. Zhang et al [48] studied that shopping experience can make customers control the situation of online shopping, and more experience can improve the risk perception.

**Subjective Norms (F12).** Subjective norms refer to the extent a person's behavior is affected by the perceived social pressure [48]. Clemes et al [40] proposed that there are 2 aspects in subjective norms: friends and family's influence and external effects. Thaichon [49] found most children prefer to discuss with their friends when they buy something. Su [50] found that WeChat-shoppers tend to buy things recommended by their friends or by celebrities.

**Perceived Behavioral Control (F13).** Perceived behavioral control refers to peoples' perceived difficulty when they execute a behavior, which is related to internal factors such as confidence, trust, and external factors such as time, money [48]. Perceived behavior control impacts purchase activities - if customers think they have enough resources, then they will actively participate in online shopping [51].

**Perceived Benefit (F14).** Perceived benefit is a belief that customers feel that they can get a greater benefit. For example, people believe they can purchase a cheaper product online than offline [48]. Im et al [52] pointed out that perceived benefit has a strong influence on customers' online purchase decisions.

**Computer Skills (F15).** Online shopping requires customers with some computer skills such as searching products, adding products to their shopping cart, and settling accounts [53]. Higher computer skills can also reduce risk perception and promote customers' buying behavior [54].

**Timeliness of Delivery (F16).** Timeliness of delivery refers to customers who can receive the product within the promised timeframe. Delivery on time can improve responsiveness and product satisfaction. Fast delivery can encourage online shopping [41].

**Order Accuracy (F17).** Order accuracy refers to an online store that can ensure the accuracy of products for quality and quantity. Rita [25] pointed out order accuracy is an important factor in service quality and satisfaction, which can improve customer's shopping experience.

### 3.2 Structural Self-interaction Matrix

We interviewed 5 experts in each of the Australian and Chinese context. There were 6 male and 4 female participants with age ranges from 20-60. They have 1-10 years of experience in e-commerce presented in Table 3-1. The interviews were conducted from May to July 2021.

Table 3-1: Demographic information of the participants

No.	Gender	Age Range	Experience	Type of involvement	Cultural background	ISM matrix in context of
1	Female	20 - 30	3 to 5 years	Academic	European	Australia
2	Male	20 - 30	Less than a year	Practitioner	Chinese	Australia
3	Female	20 - 30	1 to 3 years	Practitioner	Chinese	Australia
4	Male	31 - 40	3 to 5 years	Practitioner	Middle East	Australia
5	Female	51-60	1 to 3 years	Academic	Australian	Australia
6	Male	20 - 30	3 to 5 years	Practitioner	Chinese	China
7	Male	20 - 30	Less than a year	Practitioner	Chinese	China
8	Male	51-60	More than 10 years	Practitioner	Chinese	China
9	Female	20 - 30	Less than a year	Practitioner	Chinese	China
10	Male	20 - 30	3 to 5 years	Practitioner	Chinese	China

The participants completed the Structural self-interaction matrix (SSIM) for the 17 factors we identified from our review of literature. SSIM is used to find what kind of influence relationship exists between factors. There are four symbols to represent different influence relationships [11]. A (factor j impacts on factor i. however factor i does not impact on factor j), V (factor i impacts on factor j. however factor j does not impact on factor i), X (factor i and factor j can influence each other) and O (There is no relationship between factor i and j)

### 3.3 Reachability Matrix

**Initial Reachability Matrix.** In this step, the SSIM needs to be transferred into a binary matrix called an initial reachability matrix by changing the symbols A, V, O, X into 1 or 0 [18]. We collected a total of 10 SSIM matrices, (5 -Australian and 5 - Chinese context). We transferred each matrix to an initial reachability matrix and merged those together for each cultural context. The principle we followed for merging is that, if all the participants indicate that there is an influential relationship between a pair of factors we put 1, otherwise we use 0.

**Final Reachability Matrix.** The final reachability matrix is generated based on the transitive principle, that is, if factor A influences factor B, and factor B influences factor C, then factor A influences factor C [55]. 1\* is used to indicate the transitive relationship between the factors. The final reachability matrix in context of Australia is given in Table 3-2.

Table 3-2 Final reachability matrix for Australia culture

No	Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17
F1	Privacy Risk	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1*	1*
F2	Risk Perception	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F3	System Availability	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
F4	Web Quality	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
F5	Website Aesthetics	1*	1*	0	0	1	0	0	0	0	1*	1	0	0	0	0	1*	1*
F6	Demographic Characteristics	1*	1*	0	0	0	1	0	0	0	1*	1	1	0	0	1	1*	1*
F7	Price	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
F8	Sales Promotion	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
F9	Trust	1	1	0	0	0	0	0	0	1	1*	1*	0	1*	1	0	1*	1*
F10	Payment Method of Credit Card	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
F11	Shopping Experience	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
F12	Subjective Norms	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
F13	Perceived Behavioral Control	1*	1*	0	0	0	0	0	0	1	1*	1*	0	1	1*	0	1*	1*
F14	Perceived Benefit	1*	1*	0	0	0	0	0	0	1	1*	1*	0	1	1	0	1*	1*
F15	Computer Skills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
F16	Timeliness of Delivery	1*	1*	0	0	0	0	0	0	0	1	1*	0	0	0	0	1	1*
F17	Order Accuracy	1*	1*	0	0	0	0	0	0	0	1*	1*	0	0	0	0	1	1

**Partitions of level.** In this phase, the reachability matrix is broken down three sets- reachability set  $R(F_i)$ , antecedent set  $A(F_i)$ , and intersection set  $R(F_i) \cap A(F_i)$ . The reachability set is the set of factors containing 1 in the row. The antecedent set is the set of factors containing 1 in the column. The overlapping factor between the antecedent set and the reachability set is the intersection. When the  $R(F_i) = R(F_i) \cap A(F_i)$ , then factor in R is considered at the top level and is removed from the table. The same process is iterated until the factors of each level can be obtained. The table 3-3 show the iterations for level partitioning Australian culture.

Table 3-3 Iteration of level partitioning in Australia context

Iteration No	Factor	Reachability Set	Antecedent Set	Intersection Set	Level
Iteration 1	2	2	1, 2, 5, 6, 7, 8, 9, 11, 12, 13, 14, 16, 17	2	I
	3	3, 4	3, 4	3, 4	I
	4	3, 4	3, 4	3, 4	I
	10	10	1, 5, 6, 9, 10, 11, 13, 14, 16, 17	10	I
	15	15	6, 15	15	I
Iteration 2	1	1, 11, 16, 17	1, 5, 6, 9, 11, 13, 14, 16, 17	1, 11, 16, 17	II
	7	7	7, 8	7	II
	12	12	6, 12	12	II
	16	1, 11, 16, 17	1, 5, 6, 9, 11, 13, 14, 16, 17	1, 11, 16, 17	II
	17	1, 11, 16, 17	1, 5, 6, 9, 11, 13, 14, 16, 17	1, 11, 16, 17	II
Iteration 3	8	8	8	8	III
	11	11	5, 6, 9, 11, 13, 14	11	III
Iteration 4	5	5	5	5	IV
	6	6	6	6	IV
	9	9, 13, 14	9, 13, 14	9, 13, 14	IV
	13	9, 13, 14	9, 13, 14	9, 13, 14	IV
	14	9, 13, 14	9, 13, 14	9, 13, 14	IV

**ISM-Based Hierarchical Model.** Based on the partitions of levels we create the ISM hierarchical model. Figure 2 and 3 show the ISM hierarchical model for Chinese and Australian context, respectively. The factor at the top level has the highest influence and the factor at bottom level has the lowest influence. The factors at the lower levels are influenced by other factors. The blue lines indicate that there is an influence relationship between the factors, and the arrow indicates the direction of the influence.

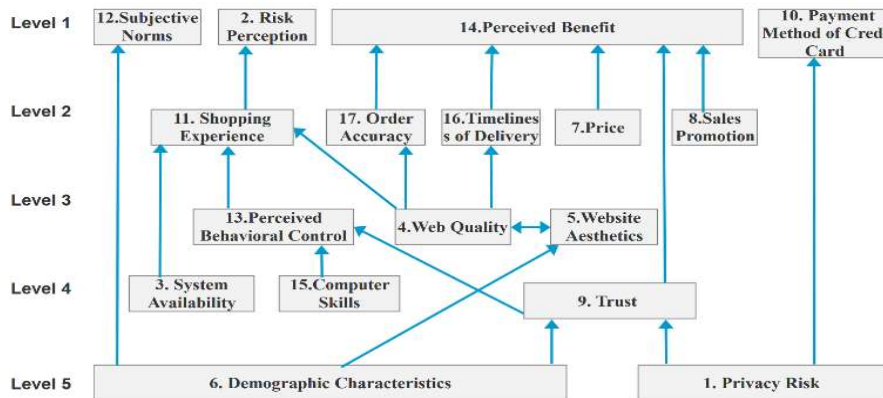


Figure 2 ISM-based hierarchical model for the factor of Chinese customers' online shopping behavior

For Chinese context we identified five levels of factors. For Chinese culture the factors that have the highest influence on online shopping behavior are **demographic characteristics** (F6)



and **privacy risk** (F1) and the factors having lowest level of influence are subjective norms (F12), risk perception (F2), perceived benefit (F14) and payment method of credit card (F10).

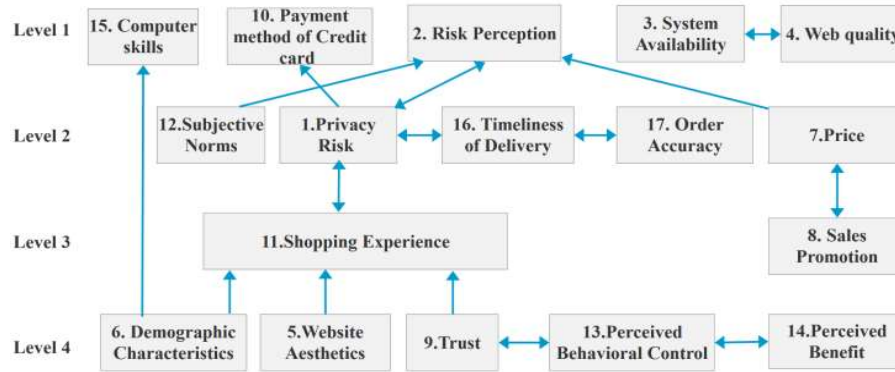


Figure 3 ISM-based hierarchical model for the factor of Australia customers 'online shopping behavior

In the Australian context four levels were identified. Factors having the highest level of influence are **demographic characteristics** (F6), **website aesthetics** (F5), **trust** (F9), **perceived behavioral control** (F13) and **perceived benefits** (F14). Factors with lowest influence are computer skills (F15), payment method of credit card (F10), risk perception (F2), system availability (F3) and web quality (F4).

### 3.4 MICMAC Analysis

The objective of MICMAC analysis is to find the power of influence of the identified factors. The driving power of a factor is the sum of each row from the final reachability matrix and the dependence power of the factor is the sum of each column. Based on these a scatter plot with four clusters (autonomous factors, driving factors, dependent factors, and linkage factor) is constructed. For Chinese context demographic characteristics (F6) has the highest driving power and risk perception (F2) has the highest dependence power.

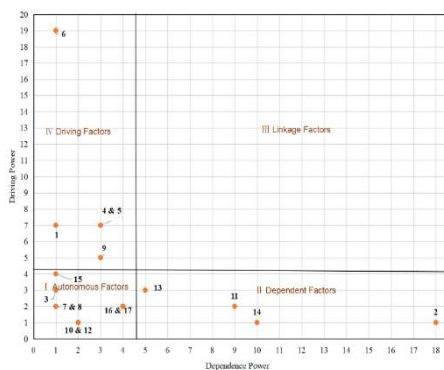


Figure 4 Chinese MICMAC analysis graph

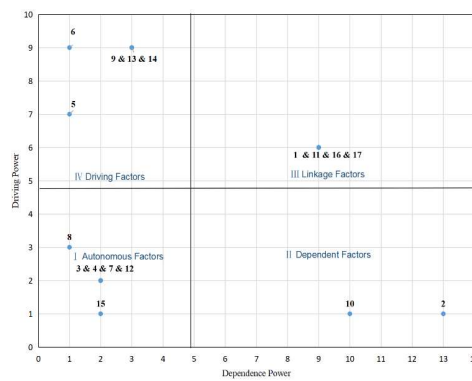


Figure 5 Australian MICMAC analysis graph

Figure 4 shows MICMAC analysis in context of Chinese culture. The factor in the autonomous set has low driving power and low dependence power. There are eight factors in the category: System Availability (F3), Price (F7), Sales Promotion (F8), Payment Method of Credit Card (F10), Subjective Norms (F12), Computer Skills (F15), Timeliness of Delivery (F16) and, Order Accuracy(F17). The dependent set has low driving power and high dependence power. Thus, the factors belonging to this set are easy to be affected by other factors. There are four factors in the category: Risk Perception (F2), Shopping Experience (F11), Perceived Behavioural Control (F13) and Perceived Benefit (F14). The linkage set has high driving power and high dependence power as such the factors in this set change easily. For the context of China, there is no factor in this category. The driving set has high driving power and low dependence power. If the factor falls into the set, the factor easily influences other factors. There are four factors in this category: Privacy Risk (F1), Web Quality (F4), Website Aesthetics (F5), Demographic Characteristics (F6), Trust (F9).

Figure 5 shows MICMAC analysis in context of Australian culture. There are six autonomous factors: System Availability (F3), Web Quality (F4), Price (F7), Sales Promotion (F8), Subjective Norms (F12), Computer Skills (F15). There are two dependent factors: Risk Perception (F2), Payment Method of Credit Card (F10). There are four linkage factors: Privacy Risk (F1), Shopping Experience (F11), Timeliness of Delivery (F16), Order Accuracy (F17). There are five driving factors: Website Aesthetics (F5), Demographic Characteristics (F6), Trust (F9), Perceived Behavioral Control (F13), Perceived Benefit (F14).

## 4 Discussion

### 4.1 RQ1: What factors influence customers' online shopping behavior?

From the review of the literature we identified 17 factors that studies have shown to have some influence on online shopping behavior of customers. A closer look at how the factors are defined in the literature helped us to group those into some broad dimensions. We identified six broad dimensions based on the definitions of 17 factors. Those are Risk (F1, F2), Website Design (F3, F4, F5), Demographic Characteristics (F6), Product (F7, F8), Personal perception (F9-F15) and Fulfillments (F16, F17).

### 4.2 RQ2: How are these factors influencing online shopping behavior related to each other?

In both Australian and Chinese cultural contexts, demographic characteristics (F6) was found to be the highest level of influence. In the Chinese context, Demographic characteristics influence Trust (F9), Subjective norms (F12) and Website Aesthetics (F5). In Australian context demographic characteristics influence shopping experience (F11) and computer skills (F15). In Chinese context privacy risk (F1) is also considered at the top level of influence. In the Australian context, website aesthetics (F5), trust (F9), perceived behavioral control (F13) and perceived benefits (F14) are also at the highest level of influence. These are important information that

needs to be taken in to consideration by companies designing new e-commerce platform or expanding existing platforms to Australian and Chinese market.

Another interesting finding is risk perception is at the lowest level of influence in both cultural contexts. In Chinese context risk perception (F2) is influenced by shopping experience (F11) only. Shopping experience is influenced by system availability, perceived behavioral control and web quality. In Australian context risk perception is influenced by a number of other factors, such as subjective norms (F12), privacy risks (F1) and price (F7) of the product. Shopping experience (F11) in Australian context is influenced by demographic characteristics (F6), website aesthetics (F5) and trust (F9).

#### **4.3 RQ3: How do the interrelationships among different factors differ based on Australian and Chinese culture?**

In the Chinese cultural context, there is no factor that has high dependence and driving power. However, in Australian context, Privacy Risk (F1), Shopping Experience (F11), Timeliness of Delivery (F16), Order Accuracy (F17) all have high dependence and driving power. Privacy risk (F1) is a linkage factor in Australian context, it is driven by shopping experience, and it drives payment method of credit card. In Chinese context this factor is found to be a driving factor, it drives trust and payment method of credit card, however it is not driven by any other factor. According to Hofstede's cross culture theory both Australia and China are similar on uncertainty avoidance, this supports our finding of privacy risk impacting payment method of credit card for both cultural contexts. In the Australian context, demographic characteristics, website aesthetics and trust impact shopping Experience (F11) and shopping experience impacts privacy risk. In Chinese context, Shopping Experience (F11) is a dependent on system availability, web quality and perceived behavioral control. Ecommerce developers who wants to improve shopping experience of their consumers will be greatly helped by this finding.

Timeliness of Delivery (F16) and Order Accuracy (F17) have high driving and dependence power in Australian context. However, both factors have low dependence and driving power in Chinese context. In Australian context both factors impact each other, besides timeliness of delivery impacts privacy risk. This difference can be explained with short Vs long term orientation in Hofstede's cross culture theory. Chinese culture is very high on long term orientation, so they may overlook timeliness of delivery and order accuracy that are more obvious factors and pay more attention to some other factors. This finding can help ecommerce business model designers to understand varying importance given to these factors by users of different cultures,

Payment method of credit card (F10) is found to have low dependent and driving power in Chinese context, however, is a dependent factor in Australian context and is impacted by privacy risk (F1). Web quality (F4) on the other hand is an autonomous factor in Australian context however is a driving power in Chinese context.

Perceived Behavioral Control (F13), Perceived Benefit (F14) are driving factors in Australian contexts and impacts each other as well as Perceived Behavioral Control (F13) impacts trust. On the other hand, Perceived Behavioral Control (F13), Perceived Benefit (F14) are dependent factor in Chinese context, Trust (F9) and computer skills (F15) impact Perceived Behavioural Control (F13), and price (F7), trust (F9), sales promotion (F8), order accuracy (F17) and timeliness of delivery (F16) all impact perceived benefit.

Website Aesthetics (F5), Trust (F9), Demographic Characteristics (F6) are all considered driving factor for both the cultures. Website aesthetics impact on shopping experience in Australian context and impact on web quality in Chinese context. Trust impacts of perceived benefit in Chinese context and impacts on shopping experience in Australian context. For Chinese consumers their demographic characteristics impact on trust, subjective norms and website aesthetics and for Australian consumers their demographic characteristics impact on computer skill and shopping experience. Factors such as System availability (F3), Price (F7), sales promotion (F8), subjective norms (F12) and computer skills (F15) are found to have low driving and dependent power for both Australian and Chinese culture.

All the above findings are a significant step towards understanding how cultural aspects impacts different degree of influence of the factors influencing online shopping behavior.

## 5 Threats to Validity

The key factors that influence online shopping behavior were found from a review of the literature. It is possible that there are some other factors that have not been identified in our review. The possibility of this happening is very low as we have included three databases Google Scholar, the ACM Digital Library and the IEEE Xplore.

We have interviewed 5 participants for each cultural context. A higher number of participants may have resulted in identifying other influential relationships. Since ISM is based on judgements of domain experts, most of the analysis performed with ISM usually is difficult to be done with a large number of participants. In any domain, finding a large number of experts is in any case a difficult task.

In our interviews the experts described each of the factors before they started identifying the influential relationships. There is a possibility that the factors were interpreted differently by the participants. However, while merging the five initial reachability matrices for each culture into one reachability matrix we found a limited number of disagreements. We have discarded the relationships from analysis where any disagreement was found.

## 6 Summary

We identified key factors that influence online shopping behavior and applied the ISM-MICMAC approach to build structural matrices to link different factors. We then used MICMAC to determine key influences in each cultural context. Key findings include- in both contexts demographic characteristics are a key influencing factor but influence different other factors; The findings give a deeper view of the factors and different influence relations. This is going to be helpful for developers who want to develop ecommerce platform in China and Australia. This is also going to be helpful for existing ecommerce platforms that want to extend their business to these two cultures. In future work we plan to conduct the study for other different cultures and compare with Australian and Chinese culture, to develop a global understanding of influence relations among factors influencing online shopping behavior in general.

## Acknowledgement

Kanij and Grundy are supported by ARC Laureate Fellowship FL190100035. We sincerely thank the study participants.

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