

THE INTENTION TO USE OF NATURAL GAS BY SMALL-MEDIUM ENTERPRISES IN SABAH: LESSON TO TOURISM INDUSTRY

Stephen Laison Sondoh Jr.

Universiti Malaysia Sabah, Faculty of Business, Economics and Accountancy

Julian Paul Sidin

Universiti Malaysia Sabah, Faculty of Business, Economics and Accountancy

Hassan Mudin

Sabah Energy Corporation Sdn. Bhd.

Geoffrey Harvey Tanakinjal

Universiti Malaysia Sabah, Labuan Faculty of International Finance

E-mail: jpsidin@ums.edu.my

ABSTRACT

This study aims to investigate the relationship between Natural Gas (NG) product attributes and intention to use NG by Small Medium Enterprises (SMEs) in Kota Kinabalu. Data from 213 SMEs senior staff and management level were used for the statistical data analysis. The multiple regression analysis results indicated that three dimensions of NG attributes namely; environmental friendly, reliability, and price had significant influence on intention to use NG. Conversely, the remaining three of the dimensions of NG attributes i.e., price value for money, production efficient and safety had no significant influence on intention to use NG. This study concluded that there were three key factors contributing SMEs intention to use NG in Kota Kinabalu, Sabah. The SMEs are more likely to use NG due to environmental friendly, followed by reliability and price. By knowing these key factors, it provides guidance for marketers to develop business strategies to attract SMEs in Kota Kinabalu to use NG as an energy option in the future.

Keywords: Product attributes, intention to use, natural gas, small medium enterprises (SMEs)

2.0 INTRODUCTION

The use of Natural Gas (NG) has continued to grow and it will become the fuel of choice to increase energy efficiency by users in the future. The proportions of world NG usage were likely to reach 35 percent by 2020, particularly in European Union, North America, Middle East, Africa and Asia (BP Statistical Review of World Energy, 2010). In Malaysia, about 95 percent of the energy demands are met by fossil fuels, which will continue to be the main source of energy for decades to come (Noriyah, 2010). It is also noted that Malaysian NG usage demand has increased about 12 percent from year 2007 to 2010 (Oil and Gas Journal, 2011). This trend indicates that NG can become an alternative source of energy in the future for industries by providing secure and stable supply of NG to meet the rapid industrialization in Malaysia.

The Economic Planning Unit of Malaysia states that the Malaysian Government has allocated more than RM20 billion to build NG infrastructures to encourage industries like Small Medium Enterprise (SMEs) to use NG as fuel of choice throughout the country. In Sabah alone, Government has allocated approximately RM8.5 billion for NG infrastructures development.

For example, the RM1.2 billion project for Sabah Oil and Gas Terminal (SOGT) in Kimanis, RM1.8 billion for Sabah Sarawak Gas Pipeline (SSGP), RM1.2 billion for 300 MW Kimanis Gas Fired Power Plant, RM3 billion for Sipitang Ammonia and Urea (SAMUR) Plant and RM1.3 billion for Regasification Terminal in Lahad Datu (RGT). Hence, the usage of NG is expected to increase from 20 percent in 2004 to 56 percent in 2012 (ETP, 2011). Commonly, SMEs are using Diesel and Liquefied Petroleum Gas (LPG) as fuels of choices, which are relatively more expensive, unreliable source, inconvenience, and non-environmental friendly fuels. Nurhafizah and Wendy (2012) stated that SMEs should seriously consider using NG which can enhance SMEs competitiveness due to NG attributes such as cheap, reliable, convenience, safe to use, and environmental friendly when compared to other existing fuels.

In recognizing and adopting of NG by SMEs, NG becomes the key factor element in transforming Malaysia's economic structure to achieve nation high income target by 2020 (SMEs Master Plan, 2011-2020). It is because approximately 90 percent of 600,000 business establishments in Malaysia are SMEs which provided about 4 million employments annually (Normah, 2006) and this is a very crucial contribution to the nation's economy. Moreover, strategic energy policy and planning by government will directly attract investors and local SMEs to consider NG as a new source of fuel. For example, the Economic Planning Unit of Malaysia states that the strategic long term planning by government is to integrate economic, social and hydrocarbon development goals. It means that the use of NG will benefit the nation in reducing and possibly eliminating fuel subsidies. This is also favouring the use of NG for SMEs development in the domestic market.

In Sabah context, even though there is strong support from government on promoting the benefit of using NG, there are still lack of acceptance on NG utilization in Kota Kinabalu Sabah. Therefore, it is important to understand and examine the SMEs' intention to use NG and their perception towards NG attributes. Based on Sabah Energy Corporation Sdn. Bhd. (SEC) 2010 Corporate Plan, NG supply attributes such as price, reliability, convenience, safe to use, and environmental friendly are among the NG attributes that may attract consumers to consider NG as their fuel of choice. According to Meyers and Taybout (1989), product attributes can contribute to the success of product marketing. As such, understanding the relationship between product attributes and intention to use may help marketers to develop the marketing strategies in order to fulfil the consumers' needs and wants. Meanwhile, other researchers have found that product attributes not only attract the consumers' intention to use but it could also lead to increase revenue and profit (Hallowell, 1996). For example, the perception of energy supply at a reasonable price or value relationship should attract the intention to purchase, increase satisfaction and indirectly loyalty (Gelling, 1998; Thumann, 1998).

As previous researchers are more focused on renewable energy, there is a lack in the study to understand the perception and intention to use NG in the context of SMEs in Malaysia. In addition to this, understanding the factors affecting SMEs intention to use NG will help the company marketers especially SEC to strategize the marketing plan. Therefore, this present study aims to investigate the effect of NG product attributes on SMEs' intention to use NG supplied by SEC in Kota Kinabalu.

2.0 LITERATURE REVIEW

Natural gas is hydrocarbon fuel which is mainly consists of Methane (CH₄) and other component of gases. NG is an odourless, colourless, non-toxic, lighter than air, and a highly flammable gas. NG can be utilized as fuel and as well as feedstock. Examples of NG products

includes Methanol, polyethylene and NGV. NG can be supplied via underground pipelines or by trucks. NG receives from PETRONAS and SEC are distributed to SMEs in Kota Kinabalu. NG is metered at gas station for customers' usage record.

For the purpose of this study, the perception of product attributes of NG consists of price, price value for money, reliability, safety, and environmental concern. Figure 1 is the proposed research framework for this study. From the marketing perspective, product attributes are related to the physical composition of the product (Keller, 1993; Zeithaml, 1988). Consumers use product attributes information in order to evaluate a particular brand of product (Puth *et al.*, 1999; McCarthy and Norris, 1999) to determine the quality of the product (Zeithaml, 1988; Fandos and Flavian, 2006) and to make a purchase decision (Puth *et al.*, 1999; Zeithaml, 1988). Attention now turns to discussion of each of the dimensions representing the natural gas product attributes.

2.1 Environmental Friendly

Nakarado (1996) stated the growing public concern for environment towards supply of energy has affected the perception on the type of energy use, as energy generation are perceived to have an important impact on the environment concern. For instances, more and more energy entities are seeking ways to improve their perception towards environmental commitment such as implementing specialized green energy, offering renewable energy, and so on. In addition, several studies have shown that consumers nowadays are more susceptible to the environment impact of their energy use where their objectives are to ensure that their money does not support unsustainable energy sources, and to contribute to climate protection by means of becoming more careful on their purchasing decision (Wustenhagen and Bilharz, 2006).

Previous researchers confirmed that consumers' environmental concern influences purchase behaviour (Balderjahn, 1988; Robert and Bacon, 1997) and other researchers also shown that concern for the natural environment plays a significant role in green energy purchase decision (Clark *et al.*; 2003; Ek, 2005; Hansla *et al.*, 2008). This is also supported by theory of reasoned action, where in the case of green energy, attitude towards green energy mediate the effect of environmental concern on purchase intention (Bang *et al.*, 2000). Moreover, Hansla *et al.* (2008) provided evidence that environmental concerns have direct and indirect effects on consumers' willingness to purchase energy at premium price. In general, NG is a very clean fuel that produces less carbon during the combustion process. The awareness on the environmental effect due to pollution by burning energy can influence SMEs decision on the type of energy use.

2.2 Price Value for Money and Price

Perception of price of NG is an important attribute in terms of perceived value of the energy supply to consumers and how consumers respond or perceive towards the price NG supplied by SEC. Several researchers have agreed that price is one of the most significant product information cues (Lichtenstein *et al.*, 1993; Matzler *et al.*, 2006). Lichtenstein *et al.* (1993: p. 234) stated that "price cue is present in all purchase situations and, at a minimum, represents to all consumers the amount of economic outlay that must be sacrificed in order to engage in a given purchase transaction". Researcher have pointed out that consumers use price information to determine the monetary sacrifice associated with its purchase (Suri *et al.*, 2000; Dodds *et al.*, 1991; Monroe, 1990; Ziethaml, 1988). In addition, Monroe (1990) noted that users make a cognitive trade-off between their perception of quality supply and sacrifice associated with the price of the supply to arrive at their judgements of value for supply. Thus,

the perception of supply as reasonable price value relationship should increase customers' intention to use, satisfaction and loyalty (Gellings, 1998; Thumann, 1998).

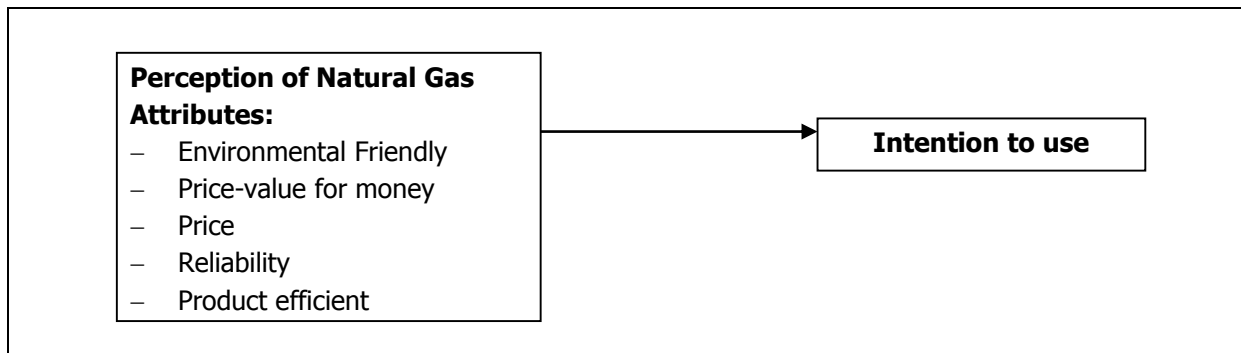


Figure 1: Research Framework

A number of studies have investigated the influence of price (operationalized based on value for money) on customer loyalty in the services industry setting (e.g., Caruana and Fenech, 2005; Pura, 2005). For example, price (operationalized as monetary value) was shown to have a direct and significant impact on the intention in a mobile services context (Pura, 2005) and customer loyalty in a dental services context (Caruana and Fenech, 2005). Several researchers have suggested that consumers use the price cue as an indicator of product quality (Lichtenstein *et al.*, 1993).

Researches also indicated that consumers intend to purchase product with a high quality value is relative to the price. However, a lot of consumers prefer both high value and low price. For instances, if a product with lower price and higher value than what the competitor has offered, the greater increase in number of consumers purchasing (Sivakumar and Raj, 1997). Brown (2001) stated the perception of a significantly higher price increase in energy supply may produce dissatisfaction that leads to decision to switch energy suppliers. However, several researchers stated that the price factor is not necessarily a significant reason to change energy provider or supplier (Simmonds, 2002; Coyles and Gokey, 2002). In other words, the price factor may not necessarily use by energy utilities to attract consumers but only in the case of important savings, users may show a disposition to change because of a price advantage (Lach, 1998).

In conclusion, price will influence the intention to use NG for SMEs as supported by several research. However, in some situation price may not influence the intention to use. Based on SEC's price formula, current NG selling price per unit mm BTU is around RM 30.00 compared to RM 58.00 for diesel and RM 75.00 for LPG in equivalent to similar heat unit. The NG selling price is relatively cheap compared to both existing fuels utilized by SMEs in Kota Kinabalu.

2.3 Reliability and Efficiency

In the perspective of NG supply distribution, supply reliability and efficiency have always been a concern and very crucial to the SMEs industries. Supply reliability is depending on the energy primary supply, processing, conversion and transportation. These include supply reserve condition, system capability, system integrity and delivering process. Previous studies confirmed that technical quality of core services (i.e., source of supply and technical quality of peripheral services such as maintenance) will affect customers' perception towards supply

reliability (Blose and Tankersley, 2004). Other researchers stated that technical service process quality has positive influence on energy supply reliability by utilities (Hayes and Helms, 1999; Reienzer and Testa, 2003). For example, service process qualities influence the electricity supply restoration in term of response time especially if it involves system interruption. The consumers may lose confidence due to unreliable supply that cause lose in production.

In addition, consumers perceive energy supply reliability in term of two components namely adequacy and security (Billinton and Allan, 1984, 1996). The ability of system to supply customers' needs under normal operating circumstances defined as reliability of adequacy. For example, the NG reserves, extraction, processing and pipeline delivery should be considered prior to selection of energy preferences. Security reliability includes dynamic response of system in case of interruption towards its ability to rectify and endure them. Billinton and Li (1996) stated the security reliability should include reserve margin as this probably relate to supply curtailments or interruptions. In such situation, the NG supply pressure and volume capacity are crucial towards supply reliability. Therefore, supply reliability and efficiency are important influencing factors on SMEs' decision. Supply interruption could affect their production and profit. As such, reliability and efficiency of NG supply by SEC will become a determining factor on influencing the decision to use NG by SMEs in Kota Kinabalu.

2.4 Safety

Numerous researches have examined a wide range of safety perception towards the use of product in respect to safety procedure and practices concerning safety. According to Neal and Griffin (2004), safety attitude reflects an individual's level construct of beliefs and emotions regarding safety policies, procedures, and practices. In NG supply perspective, the suppliers are committed to operating safe NG pipelines that meet all local, state and federal regulations. The NG systems are designed with a very high safety factor in accordance with recognized engineering standards globally (Morgan, 1995). For example, the systems are also required to be tested and certified by relevant authority e.g. Department of Safety and Health. The entire system supply chain is fitted with a shut-off valve and safety burst disc to handle such excess pressure during operations (Hjertager, 1989).

Besides, NG characteristics such as lighter than air, high auto-ignition, and narrow inflammable range makes NG the safest when compared to other existing fuels (Napier, 1993). For example, in case of leaks NG will disperse to the atmosphere and under no circumstances will the combustible mixture be reached during the leakage. These are the parameters that consumers should consider prior to their intention to use NG for their plants. Numerous international safety standards such as IGA, ISO, API, ASME, and so on have been produced and being used as references to ensure safe system designs and system implementations (Bakke *et al.*, 1991).

2.5 Intention to Use

Fishbein and Ajzen (1975) defined intention as the subjective probability to perform a specific behaviour and Morrison (1979) stated that intention to use can be applied for managerial decision. For example, survey results on the intention to use can be utilized by manager in order to decide whether to proceed with the purchase or not. It is also noted by numerous researchers that understanding customers' behavioural intention can predict their actual behaviour (Bai *et al.*, 2008). Other researchers have similar opinion where they found the

intention has positive relationship with purchase behaviour (e.g., Juster, 1996, Ajzen and Fishbein, 1980).

Several researchers also found that intention is an important measure for estimating consumers' behaviour towards purchasing. With a positive intention relationship towards purchasing, this will lead to actual commitment to take an actual purchasing (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). Other researcher stated that intention to purchase represents that most likely consumers are willing to purchase the product in the future and it is also noted that the increase in intention means the higher the possibility of actual purchasing (Dodds *et al.*, 1991).

In the context of energy supply case, consumers are likely to re-utilize the substance if they are satisfied with the products' benefits and after sales services (Cronin *et al.*, 2000). Other researchers found that the intention to use measures loyalty, express preference for energy products, increase purchase units, agree to pay premium price, saying positive about products and services provided (e.g. Zeithaml *et al.*, 1996). This is generally supported by Babakus and Boller (1992), Swanson and Davis (2003) where intention to refer back to the suppliers and word-of-mouth communications are indicators used for measuring the intention to use products or services provided by the suppliers.

2.6 Relationship between Product Attributes and Intention to use NG

Several studies confirmed that information about product attributes received by potential consumers from respective energy suppliers influence energy purchase intention (Roberts and Bacon, 1997; Scholder-Ellen, 1994; Johnson and Frank, 2006). In terms of price, most researchers stated that the price information is a determining factor prior to decision to use product. The decision may involve judgement of supply value, fairness in price, discount price, quality of supply and these parameters are linked to satisfaction and increase profit (Suri *et al.*, 2000; Dodds *et al.*, 1991; Monroe, 1990; Ziethaml, 1998; Gellings, 1998; Thumann, 1998; Brown, 2001; Ailawadi *et al.*, 2001; Heerde *et al.*, 2003, Raghubir *et al.*, 2004; Fraccastoro *et al.*, 1993; Sivakumar and Raj, 1997). However, several researchers found that the price may not be the only factor to attract consumers to use energy but in some cases the availability of price advantage may influence decision for company saving (e.g. Lach, 1998). Collectively, most literature stated that pricing had positive relationship towards intention to use energy supply by suppliers.

With regard to reliability and efficiency, the information such as source of supply, supply system integrity, standby alternative, reserve margin, quality of maintenance services, time response to resume supply in case of shut-down, and emergency are important factors that could influence the decision on intention to use NG (Blose and Tankersley, 2004; Hayes and Helms, 1999; Reienzer and Testa, 2003, Billinton and Li, 1996). Past researchers also found that consumers perceive supply reliability based on adequacy and security (Billinton and Allan, 1996). The issues of reliability and efficiency are important in the context of NG because interruption may cause thousand and even million losses on company's income. Furthermore, unreliable supply will jeopardise the plant operation as well as production thus lead to reduce productivity and profit earn.

In relation to safety, consumers perceive whether it is safe to use NG in the workplace. Thus, organizations should give safety a high priority to reflect the confidence of using NG as combustion fuel. Numerous researches have stated that perceive safety practise by management and perception of priority in safety are very important issues in the workplace (Cox, 2000; Hayes *et al.*, 1998). Furthermore, studies have also attempted to identify the level

of beliefs and emotions towards safety procedures and practices with regards to organizational safety policies in reflect to manager decision making process (Neal and Griffin, 2004). However, sometimes attitude towards safety are influenced by environmental differences such as workplace and individual preferences. Overall, the perceived product safety affects the decision intention to use certain products.

Pertaining to environmental concern, Tanner and Kast (2003) found that personal attitudes and beliefs toward environmental protection strongly influence the purchase of green energy. A study conducted by Chan (2001) also found that environmental protection has a positive effect on the consumers' green energy purchase. Furthermore, Mostafa (2007) also pointed out that consumers are aware of the need to choose green energy due to pollution effect. Similarly, Boardman (2004) noted that many consumers would like to purchase green energy for energy saving and cleaner environment. Roberts and Bacon (1997) suggested that sufficient information about environmentally relevant product attributes influence consumers intention to purchase.

Based on the theoretical framework in Figure 1 and the objective of the study, the research hypotheses are as follows:

- H1:** There is a positive relationship between product attributes of NG and intention to use NG.
- H1a:** There is a positive relationship between environmental friendly and intention to use NG.
- H1b:** There is a positive relationship between price value for money and intention to use NG.
- H1c:** There is a positive relationship between price and intention to use NG.
- H1d:** There is a positive relationship between reliability and intention to use NG.
- H1e:** There is a positive relationship between product efficient and intention to use NG.
- H1f:** There is a positive relationship between safety and intention to use NG.

3.0 METHODOLOGY

The targeted population of this study were the identified potential NG users (SME) in Kota Kinabalu, Sabah and the respondents were mainly SMEs senior staff and at the managerial level. The questionnaires were distributed to the SMEs in Kota Kinabalu, Sabah at the surrounding areas of Kota Kinabalu Industrial Park, Inanam, Lokawi, Tuaran and Telipok. In order to reduce the number of non-response errors, a total of 300 sets of questionnaires were distributed and a total of 251 questionnaires were successfully collected. However, 38 questionnaires were not usable due to incomplete information or showed certain systemic response patterns. The remaining 213 of the survey questionnaires are used for analysis.

The questionnaire in this study was developed based on the established measurement which associated with intention to use (Ajzen and Fishbein 1980) and price value for money (Sweeney and Soutar, 2001). The measurement items for price, reliability, environmental friendly and safety were developed based on interviews with the senior managers that are well-versed on NG product. All of the measurements of the studied constructs are illustrated in Appendix A and Appendix B. Data in this study were analysed using SPSS V21 and statistical tools used are frequencies analysis, factor analysis, reliability analysis, correlation analysis, and regression analysis.

4.0 PROFILE OF THE RESPONDENTS

The majority of the respondents were male (63.8%). Approximately 33.8% of the respondents in the age range of 30 to 35 years old, 22.1% were above 50 years old, 19.7% in the age range of 36 to 40 years old, 16.4% were aged of 41 to 45 years old, and the remaining 8% were 46 to 49 years old. As for employment designation status, about 21.1% of the respondents were director, 14.6% were CEO/DCEO, 12.7% were operation manager, 11.7% were production manager, 9.9% were both senior manager and planning manager, 8.5% were owner, 7% were plant manager, and the remaining 4.7% were process manager. With regard to working experiences, 38% of the respondents have working experience between 11 to 15 years, 28.6% with 5 to 10 years, 25.4% with 20 years and above, and 8% with 16 - 20 years. Based on their education level, most of the respondents possessed qualification of bachelor degree and diploma. For the respondent's role in the company, 38.5% were in decision making committee, 31.5% were decision maker, 0.5% were policy maker, 16.9% were financial controller and the remaining 12.7% were advisors.

4.1 Factor Analysis of the Studied Constructs

Table 1 and Appendix A illustrate the factor analysis for the perception of natural gas attributes variables yield six factors with eigenvalues greater than one, which explained 73.29% of the total variance. The Kaiser-Meyer-Okin (KMO) value is 0.725, and the Bartlett's test of sphericity is significant at 0.00. The communalities of the twenty variables ranged from 0.61 to 0.86 and factor loadings of the variables ranged from 0.57 to 0.89. Appendix A displays the factor loadings of the items measuring each of these factors namely, environmental friendly, price value for money, price, reliability, production efficient and safety.

Table 1: Summary of Factor Analysis, Reliability Analysis, Means and Standard Deviations of the Study Constructs

Constructs	No of Items	KMO	Bartlett's test	Factor Loadings	Eigen - value s	% Variance explained	C'bach' s alpha	Mean	Std. Dev.
Environmental friendly	6	.725	2540.033	.0566-.885	5.684	73.286	.870	4.12	.599
Price value for money	4				2.781		.837	3.70	.768
Price	3				2.378		.841	3.98	.863
Reliability	3				1.564		.704	4.03	.559
Production efficient	2				1.244		.703	4.03	.561
Safety	2				1.006		.723	3.99	.638
Intention to use NG	5	.752	5146.44	.785-.908	3.747	74.936	.916	4.11	.704

Note: All items used a 5-point Likert scale (1= strongly disagree and 5= strongly agree or 1= very unlikely and 5= very likely)

Factor analysis of intention to use NG produced one factor with eigenvalues of 3.75, which explained 74.94% of the total variance (see Table 1 and Appendix B). The KMO value is 0.752 and Bartlett Test of Sphericity is significant at 0.00. The communalities of the five

variables ranged from 0.62 to 0.82 and factor loadings of the variables ranged from 0.79 - 0.91.

4.2 Reliability analysis and Descriptive Analysis

The Cronbach's alpha value for each of the dimensions of perception of NG namely, environmental friendly, price value for money, price, reliability, production efficient and safety are ranged from 0.703 to 0.870, which are deemed to be reliable. The 5 items measuring intention to use NG have a reliability coefficient of 0.92. Results showed that the mean scores for each of the studied constructs varied from 3.70 to 4.12 and the standard deviation for these constructs ranged from 0.559 to 0.863 (see Table 1). All of the items were measured using a five-point Likert scale anchored by 1 (strongly disagree or very unlikely) to 5 (strongly agree or very likely).

4.3 Correlation analysis

Based on Table 2, the results illustrate that only three dimensions of perception towards NG were positively associated with intention to use. More specifically, environmental friendly ($r = 0.432$, $p < 0.01$), reliability ($r = 0.359$, $p < 0.01$) and safety ($r = 0.248$, $p < 0.01$) are moderately and significantly correlated with intention to use. Based on the results (Table 3) there is no multicollinearity exists in this study.

Table 2: Pearson Correlations Matrix of Study Variables Results (N=213)

Variables	1	2	3	4	5	6	7
1 Environmental friendly	1						
2 Price value for money	.192**	1					
3 Price	.314**	.205**	1				
4 Reliability	.419**	.357**	.245**	1			
5 Production efficient	.155*	.250**	.276**	.115	1		
6 Safety	.343**	.439**	.007	.360**	.232**	1	
7 Intention to use NG	.432**	-.099	.031	.359**	.068	.248**	1

** Correlation is significant at the 0.01 level (2-tailed)

** Correlation is significant at the 0.05 level (2-tailed)

4.4 Hypotheses Testing

Multi regression analysis was employed to test all the hypotheses proposed in this study. Results in Table 3 showed that 35.50% variances in intention to use NG can be explained by perception towards NG attributes ($R^2 = .355$, p -value < 0.01). More specifically, the results of the study indicated that three dimensions of perception towards NG i.e. environmental friendly ($\beta = 0.334$, t -value = 4.547, $p > 0.01$), price ($\beta = 0.183$, t -value = 2.546, $p > 0.01$) and reliability ($\beta = 0.229$, t -value = 3.090, $p > 0.01$) have significant impact on intention to use NG. However, the remaining three of the dimensions of NG attributes namely; price value for money, production efficient and safety are not significantly related to intention to use NG. Based on the results, H1a, H1c and H1d are supported. However, H1b, H1e and H1f are not supported. Therefore, H1 is partially accepted.

Table 3: Regression Analysis of Perception of Natural Gas Attributes with Intention to Use Natural Gas

Dependent Variable	Independent Variable	Std. Coefficient Beta (β)	t-value
Intention to use NG	Environmental friendly	.334**	4.547
	Price value for money	.016	.223
	Price	.183**	2.546
	Reliability	.229**	3.090
	Production efficient	-.048	-.715
	Safety	.089	1.252
	R ²	.355	
	Adjust R ²	.334	
	Sig.F	16.363**	

Note: Significant levels: **p < 0.01; t-value = 2.333, *p < 0.05; t-value = 1.645

5.0 DISCUSSION

The results from this study indicated that there is a significant relationship between NG product attributes with intention to use NG. Based on the multiple regression analysis results, three out of six dimensions of NG attributes (i.e. price, reliability and environmental friendly) have positive impact on intention to use NG. This finding is supported by Roberts and Bacon (1997), Scholder-Ellen (1994), Johnson and Frank (2006) in their previous studies have stated that information of product attributes has influenced the intention to purchase energy. Hence, the sufficient information explaining the key benefits and advantages of the products are very important factor to attract the potential users to consider and use NG.

The relationship between price value for money and intention to use NG is not statistically supported. In this case, it means that price value does not appear as a significant predictor for intention to use NG. In fact, such result is in line with findings by several researchers stated the price factor is not necessarily a significant reason to change the energy provider or supplier (Coyles and Gokey, 2002; Simmonds, 2002). This is also supported by Lach (1998) findings that the price factor may not necessarily use by energy utilities to attract the users but only in case of important saving, users may show a disposition to change because of price advantage. Most of users are using other existing fuels, although the price is slightly higher than proposed NG but they are looking at other factors such as safety, reliability of supply and environmental friendly as most critical criteria for their operation. In addition, switching over to new energy source may increase cost in term of equipment modification and operational training for staff involved.

There is a significant positive relationship between price important and intention to use. In the plant operation, the energy usage may contribute up to 30 percent of operational costs. This means that the reasonable price of energy should be considered before buying the type of energy available for long term costs saving to company. In this case, the price discount may influence customers saving (Fraccastoro *et al.*, 1993). It was supported by Raghubir *et al.* (2004), Heerde *et al.*, (2003) and Ailawadi *et al.*, (2001) confirmed price discounts influence positive feelings and emotion as well as increase consumers' intention to use. In other words, the price is the most important factor in selecting energy for the plant operation, they will be looking for the cheapest or lower price of energy that could meet their energy need as prefers choice. In case of NG, the users will purchase for both high value and

low price energy. A lower price product with higher value than the competitor offered, the greater increase in number of consumers purchasing (Sivakumar and Raj, 1997).

The findings of the current study also showed that there is a positive relationship between reliability and intention to use NG. The result is supported by several researchers which stated that NG supply reliability is very crucial to the industries and technical quality peripheral maintenance services affect the perception towards NG supply reliability (Blose and Tankersley, 2004). Similarly, Reienzer and Testa (2003) and Hayes and Helms (1999) stated that technical service quality or back up has positive influenced to energy supply by utilities. In the other words, users are very particular in response time to restore the supply in case of supply curtailment and interruption. This includes the dynamic response of system in case of interruption towards its ability to rectify the failures. Late response to rectify or resume the supply after interruption occurred will lead to reduce profit earn of companies.

The relationship between product efficient and intention to use NG was not statistically supported. In this study, it means that reliability operation does not appear to contribute to the formation of behavioural intention to use NG within the context of SMEs in Sabah. This also can be explained by the arguments of Billinton and Li (1994), who stated that the supply reserve margin is important to minimize or avoid operational interruption. However, in common plant operation this issue is within their control as normally plant has backup supply called alternative energy option. In other words, although supply reliability is important to operation but due to readiness of supply backup this issue is no longer or less critical for the plant operation. Therefore, the reliability operation is not an issue as the company normally prepares contingency plan for such unexpected possible interruptions.

The relationship between safety and intention to use NG was not statistically supported. Although Morgan (1995) explained that the energy suppliers are committed to comply by local, state and federal safety regulation. This means that the systems are also required to be tested and certified by relevant authority e.g. Department of Safety and Health. The entire system supply chain is fitted with a shut-off valve and safety burst disc to handle such excess pressure during operations (Hjertager, 1989). However, most of the users lack knowledge and information about NG safety characteristics. They also lack understanding on relevant acts imposed by the government and relevant authorities. It becomes a norm for factories in Kota Kinabalu to operate without certificates of fitness by the relevant authorities especially for new and small scales business operations. This is because the application to obtain approval or permission to operate usually involves time and costs. This is also subjected to frequent safety assessment by relevant authorities to ensure continuous system integrity. In the other words, users are focusing in revenue instead of safety matters especially for small plants operators.

Based on the result of this study, there is a positive relationship between environmental friendly and intention to use NG. Previous study by Hansla *et al.* (2008) provides evidence that environmental friendly has direct and indirect effects on consumers' willingness to purchase energy at premium price. This also supported by Clark *et al.* (2003) and Ek (2005) by stating that concern for the natural environment plays a significant role in green energy purchase decision. In addition, several studies have shown that consumers nowadays are susceptible to the environment impact of their energy use where their objectives are to ensure that their money does not support unsustainable energy sources, to contribute to climate protection by means of becoming more careful on their purchasing decision (Wustenhagen and Bilharz, 2006). The significant result by respondents in Kota Kinabalu shows that the environmental awareness is very high among the factories workers. This is mainly due to effective and efficient campaigns by government to educate people on importance of protecting and conserving our environment from pollutions. Hence, the

environmental protection definitely influence energy purchases decision by SMEs in Kota Kinabalu.

6.0 IMPLICATIONS OF STUDY

The implications of this study are significant in term of academic contribution, managerial application and to support the government policy in conserving energy for future. The findings of this study provide several managerial implications for marketing managers especially those involved with marketing strategy to attract the potential NG users within Kota Kinabalu area. This study provides evidence that could help marketing managers to gain a better understanding of the behaviour of SMEs attitude and intention to use NG as fuel for their factories. Indeed, the identification of the significant factors that determine intention to use and attitude towards intention to use product allows managers to focus on developing better marketing strategies for the company.

In addition, the identification of these factors should provide managers with valuable insights in terms of understanding how to accommodate the customers' needs and wants. Therefore, marketing managers should understand factors that contribute to intention to use and by knowing these factors should help managers to carefully design appropriate marketing programs and strategies to increase perceptions of NG benefits by SMEs in Kota Kinabalu. Thus, the information gathered can be used as a guideline to managers in order to create awareness and promoting NG to respective potential NG users. Therefore, the findings of this study should be useful and helpful to marketing managers, especially those involved in marketing and promotion of NG as new alternative fuel for SMEs in Kota Kinabalu.

The information gathered and the findings from this study will be useful as a reference for government agencies in understanding the situation of SMEs energy requirement in the state. This is in line with government's ETP by encouraging implementation of green energy in order to minimize fuel subsidy, which burdens the government nowadays. In fact, the study revealed most of the SMEs were environmentally conscious as environmental concern is the most significant factor towards intention to use NG by SMEs in Kota Kinabalu. This present study will be used as a guidance for the state government to look into new applications of NG by SMEs in Kota Kinabalu. The utilization of NG can be extended to vehicle, air-conditioning system, power generation instead of fuel for SMEs plant operation. The utilization of NG not only reduces the government subsidy but at the same time provides clean energy environment protection. This is strongly supported by the government effort in developing gas sector in Sabah. Under the government ETP 2012, Sabah will be a major gas producer in Malaysia apart from Sarawak and Terengganu.

7.0 LIMITATIONS OF THE STUDY

There were two main limitations in this study. The first limitation refers to the non-probability sampling technique used in selecting the SMEs in Kota Kinabalu area. This is due to the no available of sampling frame of SMEs in Kota Kinabalu, Sabah. The sample of study is based on a total of 80 selected SMEs within Kota Kinabalu. In addition, some of SMEs do not wish to participate in this study due to time constraint to fill in the questionnaire. In this study, only respondents consented to participate were included in this study. In other case, non-response questionnaires were problematic but this is a common limitation face by most of the research data collection. Therefore, the selection of sample was biased and result generated might not represent the actual SMEs population in Kota Kinabalu.

The second limitation was related to the SMEs type of business. The samples were collected from mixed types of SMEs business ranging from food and drink, plastic, metal, R&D, bricks, ceramic, aluminium manufacturing, and so on. Due to inconsistent data, there are possibilities of samples being dominated by certain manufacturing sectors. Therefore, samples taken were biased and the result might not represent the entire SMEs manufacturing companies within the Kota Kinabalu study area.

8.0 RECOMMENDATION FOR FUTURE RESEARCH

The study suggests that for future research the other variable such as NG infrastructure and knowledge which have not been included in this study framework. As such, more studies have to be carried out in future to enable a better understanding on intention to use NG by using new research frameworks. This present study also suggests that for future research, researcher should focus on only one manufacturing sector instead of mixed type samples from various types of manufacturing industries. This is to ensure the generated results are fully represented by specific sectors only.

In addition, future research should examine other NG attributes such as product quality, product innovation, product technology advancement and product utilization in order to get better understanding on product benefits and advantages. Hence, further research should explore other important product benefits that were not included in this study such as NG for vehicle, NG for air-conditioning system, NG for district cooling and NG for electric generations. These product categories applications appear to be a potential market in Malaysia in the future. This is in line with government policy under government ETP by encouraging green technology application for nation future plans. Finally, this study suggests researchers should investigate other potential moderator variables through new research frameworks.

9.0 CONCLUSION

The current study is carried out to gain a better understanding of the relationships between NG attributes and intention to use NG in the context of SMEs in Kota Kinabalu area. The factors that influence the intention to use NG are price, reliability and environmental friendly. Based on the regression analysis, the results demonstrate that environmental friendly makes the largest contribution in explaining SMEs intention to use NG. This could be explained by the main reason of SMEs have been aware on the importance of environmental protection while operating the plant. This is not only for current operation benefits such as efficient and clean process but it is also beneficial to future generation in term of reducing the pollution. In addition, they are aware of the government enforcement of law and the requirement to comply with rules and regulations i.e. plant shall not release any unsafe discharge, failing which the penalty will be imposed to SMEs. In certain serious cases, the plant has been directed to stop operation due to pollution and contamination issues. Most of existing SMEs in Kota Kinabalu were using diesel which were categorized as non-environmental friendly fuel. Spillage and smoke from diesel contributed to bad environmental pollution.

The second most important factor is reliability, which shows a significant relationship with intention to use NG. For plant operation, reliable supply of NG is very crucial. In the other words, users are very particular in response time to restore the supply in case of supply curtailment and interruption. This includes the dynamic response of system in case of

interruption towards its ability to rectify the failures. Late response to rectify or resume the supply after interruption occurred will lead to reduce profit earn of SMEs companies.

Another important factor that influences SMEs intention to use NG is price. In Malaysia, the price of fuel especially liquid hydrocarbon fuels fluctuates due to world market price. SMEs realized that about 30 percent of their operating costs came from energy i.e. keep changing price at upward trending will influence the profit. NG is produced locally (Sabah Offshore), so NG is priced 25 percent lower than any available fuels such as Diesel and LPG in Kota Kinabalu. In the long term, it will be beneficial to SMEs in term of cost saving. Therefore, NG is ideal to SMEs energy solution for now and future.

In conclusion, the findings of this study suggest that the Marketing Manager of SEC should focus on these three significant dimensions of product attributes of natural gas to formulate the proper marketing plan and perhaps improve the effects upon those factors that were previously unaffected such as price value for money, product efficient and safety issues. By considering and improving these factors through effective awareness talks and seminar, efficient promotion and advertising, educating potential users on laws and standard compliance requirement, benefits of NG for future environment and cost saving energy could increase SMEs intention to use NG in the future. This will support the government policy and effort in line with green energy application for better future environment as well as in reducing the government burden on highly nation subsidized fuels. Lastly, considering the use of NG by SMEs in Kota Kinabalu will give more benefits and advantages not only for SMEs but to the nation.

REFERENCES

- Ailawadi, K. L., Neslin S. A. & Gedenk K. (2001). Pursuing the value conscious consumer brand promotion. *Journal of Marketing*, 65(1), 71-89.
- Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice Hall.
- Babakus, E. & Boller, G. W. (1992). An empirical assessment of the SERVQUAL scale. *Journal of Business Research*, 24(3), 253-268.
- Bai, B., Law, R. & Wen, I. (2008). The impact of quality on customer satisfaction and purchase intentions. *International Journal of Hospitality Management*, 27(3), 391-402.
- Bakke, J. R., Bjerketvedt, D. & Bjorkhaug, M. (1991). A tool for safe design against accidental gas explosion. *Chemical Engineering Research & Design*, 122, 141-152.
- Balderjahn, I. (1988). Personality variables and environment attitudes as predictors of ecologically responsible consumption pattern. *Journal of Business Research*, 17(1), 51-6.
- Bang, H., Kim, Y. & Kim, D. (2000) TREK-2, a new member of the mechanosensitive tandem-pore K^{*} channel family. *Journal of Biological Chemistry*, 275, 17412-17419.
- Billinton, R. & Allan, R.N. (1984). Power-System reliability in perspective, in: Billington, R., Allan, R. N. & Salvaderi, L. (Eds.), 1991. *Applied Reliability Assessment in Electric Power Systems*. Institute of Electrical and Electronics Engineers, Inc., NY, New York.
- Billinton, R. & Allan, R.N. (1996). *Reliability Evaluation of Power System*, 2nd ed., Plenum Press, New York.
- Billinton, R. & Li, W. (1994). *Reliability Assessment of Electric Power System using Monte Carlo Method*. Plenum Press, New York.
- Blose, J. E. & Tankersley, W. B. (2004). Linking dimensions of service quality to organization outcomes. *Research in Managing Service Quality*, 14(1), 75-89.
- Boardman, B. (2004). New directions for household energy efficiency: evidence from the UK. *Energy Policy*, 32(17), 1921-1933.

- BP Statistical Review of World Energy, 2010.
- Brown, K. (2001). *Consumer research for the electric and natural gas utility industry*. www.retailenergy.com/articles/gas.htm, April 2003.
- Caruana, A., & Fenech, N. (2005). The effect of perceived value and overall satisfaction on loyalty: A study among dental patients. *Journal of Medical Marketing*, 5(3), 245-255.
- Chan, R. Y. K. (2001). Determinants of consumers' of green purchase behaviour. *Research in Psychology and Marketing*, 18(4), 389-143.
- Clark, C. F., Kotchen, M. J. & Moore, M. R. (2003). Internal and external influences on pro-environmental behaviour: participation in a green electricity program. *Journal of Environmental Psychology*, 23(3), 25-49.
- Cox, S. J. & Cheyne, A. J. T. (2000). Assessing safety culture in offshore environments. *Research in Safety Science*, 34(3), 111-129.
- Coyles, S. & Gokey, T. C. (2002). *Customer retention is not enough*. *The McKinsey Quarterly* 2, <http://www.mckinseyquarterly.com/article>.
- Cronin, Jr., J. J., Brady, M. K. & Hult, G. T. (2000). Assessing the effects of quality, value and customer satisfaction on consumer behavioural intentions in service environment. *Journal of Retailing*, 76(2), 193-212.
- Dodds, W. B., Monroe, K. & Grewal, D. (1991). Effects of price and brand information on buyers' product evaluations. *Journal of Marketing Research*, 28(6), 307-319
- Ek, K. (2005). Public and private attitudes towards "green" electricity: the case of Swedish wind power. *Energy Policy*, 33(13), 1677-89.
- ETP Annual Report 2011.
- Fandos, C., & Flavian, C. (2006). Intrinsic and extrinsic quality attributes, loyalty and buying intention: an analysis for a PDO product. *British Food Journal*, 108(8), 646-662.
- Fishben, M. & Ajzen, I. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fraccastoro, K., Burton, S. & Biswas, A. (1993). Effective use of promoting sale prices. *Journal of Marketing*. 10(1), 61-70.
- Gellings, C. W. (1998). *Utility marketing strategies: competition and the economy*. Fairmont Press, Lilburn, GA.
- Hallowell, R. (1996). The relationships of customer satisfaction loyalty, and profitability: An empirical study. *International Journal of Service Industry Management*, 7(4), 27-42.
- Hansla, A, Gamble, A., Juliusson, A, & Garling, T. (2008). The relationships between awareness of consequences, environmental concern, and value orientations. *Journal of Environmental Psychology*, 28(1), 1-9.
- Hayes, B. E., Perandan, J., Smecko, T., & Trask, J. (1998). Measuring perceptions of workplace safety: development and validation of the work safety scale. *Journal of Safety Research*, 29(2), 145-161.
- Hayes, T. & Helms, M. (1999). Process improvement in a utility company. *Business Process Management Journal*, 5(4), 297-310.
- Heerde, H. J., Gupta, S. & Wittink, D. R. (2003). Is 75% of the sales promotion bump due to brand switching? *Journal of Consumer*, 40(4), 481-91.
- Hjertager, B. H. (1989). Simulation of gas explosions. *Modelling, Identification and Control*, 10(5), 227-247.
- Johnson, B. B. & Frank, P. G. (2006). Public understanding of environmental impacts of electricity deregulation. *Energy Policy*, 34(12), 1332-1343.
- Juster, F. T. (1966). Consumer buying intentions and purchase probability: an experiment in survey design. *Journal of the American Statistical Association*, 61(9), 658-696.
- Keller, K. L. (1993). Conceptualizing, measuring, and managing customer-based brand equity. *Journal of Marketing*, 57(1), 1-22.
- Lach, J. (1998). Focusing the lens energy users. *Research in American Demographics*, 20(12), 42-45.

- Lichtenstein, D. R., Ridgway, N. M., & Netemeyer, R. G. (1993). Price perception and consumer shopping behavior: A field study. *Journal of Marketing Research*, 30(2), 234-245.
- Matzler, K., Wurtele, A., & Renzl, B. (2006). Dimension of price satisfaction: a study in the retail banking industry. *International Journal of Bank Marketing*, 24(4), 216-231.
- McCarthy, M. S., & Norris, D. N. (1999). Improving competitive position using branded ingredients. *Journal Product & Brand Management*, 8(4), 267-285.
- Meyers-Levy, J. & Tybout, A. M. (1989). Schema congruity as a basis for product evaluation. *Journal of Consumers*, 16(1), 39-54.
- Monroe, K. B. (1990). *Pricing: Making Profitable Decisions*. New York: McGraw-Hill.
- Morgan, B. (1995). The importance of realistic representation of design features in the risk assessment of high pressure gas pipeline, *5th International Conference and Exhibition Pipeline Reliability*, Houston. Texas, September.
- Morrison, D. G. (1979). Purchase intentions and purchase behaviour. *Journal of Marketing*, 43(7), 65-74.
- Mostafa, M. M. (2007). A hierarchical analysis of the green consciousness of the Egyptian consumer. *Research in Psychology and Marketing*, 24(5), 445-473.
- Nakarado, G. (1996). A marketing orientation is the key to a sustainable energy future. *Energy Policy*, 24(2), 187-193.
- Napier, D. H. (1993). Review of 'An approach to hazard analysis of LNG spills'. *Safety Science*, 16, 491-499.
- Neal, A. & Griffin, M. A. (2004). *Safety climate and safety at work*. In: Barling, J., Frone, M. (Eds.), *Psychology of Work Place Safety*. American Psychological Association, Washington Press, New York.
- Norriyah Ahmad (2010). *The Malaysia's Energy Sector: In pursuit of Better Future*. Economic Planning Unit of Malaysia.
- Normah Mohd Arjs (2006). *SME building blocks for economic growth*. Paper presented at the National Statistical Conference in Kuala Lumpur.
- Nurhafizah Yusof & Wendy Radin (2012). The voice of Sabahan: Sabah's Great Oil and Gas Expectation. *Insight Sabah*, April 2012.
- Oil and Gas Journal, 2011 Malaysian Natural Gas Downstream Development.
- Pura, M. (2005). Linking perceived value and loyalty in location-based mobile services. *Managing Service Quality*, 15(6), 509-538.
- Puth, G., Mostert, P., & Ewing, M. (1999). Consumer perceptions of mentioned product and brand attributes in magazine advertising. *Journal of Product & Brand Management*, 8(1), 38-49.
- Raghubir, P., Inman J. J. & Grande, H. (2004). The three faces of price promotions, economic, informative and affective. *Management Review*, 46(4), 1-19
- Rienzner, R. & Testa, F. (2003). The captive consumer no longer exists. Creating customer loyalty to compete on the new deregulated markets of public utilities. *Total Quality Management and Business Excellence*, 14(2), 171-187.
- Roberts, J. A. & Bacon, R. (1997). Exploring the subtle relationships between environmental concern and the ecologically conscious consumer behaviour. *Journal of Business Research*, 40(1), 79-89.
- Scholder-Ellen, P. (1994). Do we know what we need to know? Objective and subjective knowledge effects on behaviour. *Journal of Business Research*, 30(1), 43-52.
- Simmonds, J. (2002). *Affinity relationships to boost brand recognition and customers loyalty for European utilities*. April 2002, <http://www.energyforum.net/feature/feat193.shtml>.
- Sivakumar, K. & Raj, S. P. (1997). Quality tier competition: how price change influences brand choice and category choice. *Journal of Marketing*, 61(1), 71-84.

- Suri, R., Manchanda, R. V. & Kohli, C. S. (2000). Brand evaluations: a comparison of fixed price and discounted price offers. *Journal of Product and Brand Management*, 9(3), 193-206.
- Swanson, R. S. & Davis, C. J. (2003). The relationship between perceived quality and behaviour intentions. *Journal of Service Marketing*, 17(2), 202-219.
- Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing*, 77(2), 203-220.
- Tanner, C. & Kast, S. W. (2003). Promoting sustainable consumption: determinants of green purchases by Swiss consumers. *Research in Psychology and Marketing*, 20(10), 883-902.
- Thumann, A. (1998). *Customer choice: purchasing energy in deregulated market*. The Fairmont Press, Inc., Lilburn.
- Wustenhagen, R. & Bilharz, M. (2006). Green energy market development in Germany: Effective public policy and emerging customer demand. *Energy Policy*, 34(13), 1681-1696.
- Zeithaml, V. A. (1998). Consumer perceptions of price, quality, and value. *Journal of Marketing*, 52(3), 2-22.
- Zeithaml, V. A., Berry, L. L. & Parasuraman, A. (1996). The behaviour consequences of service quality. *Journal of Marketing*, 60(2), 31-46.

APPENDIX A

Factor Analysis of Perception of Natural Gas Attributes

Items	F1	F2	F3	F4	F5	F6
Factor 1: Environmental Friendly						
NG is environmental friendly fuel for future	.874					
Using NG will help future generation	.856					
Consider NG benefits to environment	.786					
Choosing NG will support of protecting environment	.743					
NG is clean fuel	.694					
NG is easy to get	.566					
Factor 2: Price Value for Money						
1. NG is priced reasonably		.885				
2. It is worthwhile purchasing NG for the price offered		.757				
3. NG price of RM 30 per mm BTU is acceptable		.752				
4. NG supplied by SEC offers value for the money spent		.752				
Factor 3: Price						
Price is the most important factor in selecting energy			.834			
When buying energy you look for the cheapest			.829			
When comes to buying energy you rely heavily on price			.814			
Factor 4: Reliability						
SEC provides after sales technical backup services				.810		
Using NG is more efficient				.713		
NG is dependable fuel for future				.597		
Factor 5: Production efficient						
NG supply interruption will affect SMEs productivity					.801	
NG supply reliability is crucial for SMEs operation					.763	
Factor 6: Safety						
NG is designed to comply with codes & standards					.772	
NG is odorized for ease leak detection by users					.641	
Eigenvalue	5.684	2.781	2.378	1.564	1.244	1.006
% of Variance	19.39	14.25	12.72	10.70	8.16	8.07
Total Variance Explained	73.286					
Measure of Sampling Adequacy	.725					
Bartlett's test of Sphericity	2540.033					
Significant	0.000					

APPENDIX B

Factor Analysis of Intention to Use Natural Gas

Items	F1
1. Our company will plan to use this NG in the future	.886
2. Our company intends to use NG in the future	.906
3. Our company is more likely to use NG in the future	.908
4. Our company will probably use NG in the future	.838
5. Our company will possibly use NG in the future	.785
Eigenvalue	3.747
Total Variance Explained	74.936
Measure of Sampling Adequacy	.752
Bartlett's test of Sphericity	1234.510
Significant	.000