



**CUSTOMER PERCEPTION TOWARDS ADOPTION OF
AUTOMATED GUIDED VEHICLES (AGVS) IN THE
MALAYSIAN MANUFACTURING INDUSTRY**

BY

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ABSTRACT

While a vast number of studies have pointed the marketing practices in consumer markets, little attention has been paid to the relationship with the B2B market. The purpose of this research aims to analyse the perception of customers toward the adoption of Automated Guided Vehicle in the Malaysian manufacturing industry. It helps produce some evidence of the association between customer perception and adoption of AGVs. The inferences drawn from the research would contribute in evaluating the brand and how best future brand can be modified to meet the needs and expectations of consumers. The proposed hypotheses are tested in the case of the manufacturing industry, where long term relationship is needed. The research involved collecting data from Manufacturing companies in Malaysia. Primary data for the study was collected using questionnaires, about 200 individuals participated with the questionnaire and the data gathered was evaluated using Structural Equation Modelling (SEM) analysis. SEM analysis, which associates relationship between adoption and customer perception. Study is made upon the variables that relate to AGV's and it's adoption in the Malaysian manufacturing Industry. The variables being, Attention, Perceptual Interpretation, Information Retention, Customer Perception and AGV Adoption. The study adopted a quantitative research approach to examine the theme. First descriptive statistical analyses were conducted, followed by factor analyses and hypotheses testing. In this study, the hypotheses are identified to have direct and indirect relationship between the constructs. It can be summarized from the findings, that attention, perceptual interpretation and information retention and customer perception have a higher significant relationship with customer perception and the adoption of AGVs. Therefore all the hypotheses are highly accepted.

ملخص البحث

رغم أن ممارسات التسويق في الأسواق الاستهلاكية قد حظيت بالكثير من الاهتمام والدراسة، إلا أن تسويق الأعمال للأعمال لم يلق اهتماماً كبيراً. تهدف هذه الدراسة إلى تحليل رؤية العملاء بخصوص اعتماد العربات الموجهة آلياً في مجال التصنيع في ماليزيا. كما تساعد هذه الدراسة في إثبات العلاقة بين رؤية العميل وتصوراتهِ وبين تبني اعتماد استخدام العربات الموجهة آلياً. تسهم نتائج هذه الدراسة في تقييم المنتج والاسم التجاري وكيفية تطوير ذلك وتحسينه مستقبلاً بحيث تفي بتطلعات العميل وتلبي توقعاته. تم اختبار الفرضيات المطروحة بما يتعلق بمجال التصنيع، حيث يتطلب وجود علاقات طويلة الأمد مع العملاء. تشمل هذه الدراسة تجميع البيانات من شركات مصنعة في ماليزيا. كما تم جمع البيانات الأولية باستخدام استبيانات، حيث شارك حوالي ٢٠٠ شخص، وتم تجميع البيانات وتقييمها وتحليلها باستخدام تطبيق . يقوم تطبيق بربط وبيان العلاقة ما بين الاعتماد والتبني وبين توقعات العميل. تقوم الدراسة على المتغيرات المتعلقة بالعربات الموجهة آلياً وتبنيها واعتماد استخدامها في سوق التصنيع الماليزي. وهذه المتغيرات هي: الاهتمام، التطبيق الإدراكي، حفظ المعلومات، توقعات العميل، واعتماد استخدام العربات الموجهة آلياً. اعتمدت الدراسة على المنهج الكمي في التحليل. تم إجراء تحليل وصفي احصائي، ثم تبعه تحليل العوامل واختبار الفرضيات. الفرضيات المطروحة في هذه الدراسة لها علاقات مباشرة وغير مباشرة مع المكونات. توصل الباحث إلى أن كلاً من الاهتمام، والتطبيق الإدراكي، وحفظ المعلومات، وتوقعات العميل لها علاقة قوية بتوقعات العميل واستخدام العربات الموجهة آلياً. وعليه فكل الفرضيات المطروحة هي فرضيات صحيحة ومقبولة.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Master of Science in Marketing.

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DECLARATION

I hereby declare that this dissertation is the result of my own investigation, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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**THE PERCEPTION OF CUSTOMERS TOWARDS THE
ADOPTION OF AUTOMATED GUIDED VEHICLE (AGVS): A
STUDY OF MALAYSIAN MANUFACTURING INDUSTRY**

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

1.1.1 Customer Perception

One of the few things that drives a customer's purchase decisions, is Customer Perception, this theory explains the behaviour by studying what motivates them to buy or not to buy. This is a sensory stimuli, which is sensed via a person's five senses Muyeed (2011). The success of AGV in the Malaysian manufacturing industry depends on a number of factors, which influence both customer perception and customer satisfaction about a brand (Manning and Reece, 2007). It is quite significant to ascertain the perception of consumers on adoption of AGV in the Malaysian manufacturing industry. Perception of consumers is very important in any given industry since it determines the behaviour of consumers. Jyostna (2012) have ascertained that customer satisfaction is one of the greatest achievements that entities can use to ensure prosperity in their organizations. Satisfied customers have been found to be very important assets to entities in the sense that they will enhance sales in the company and at the same time such customers play a very important role in winning new customers for the entities at no cost. In the manufacturing industry, word of mouth as well as market perception is the key to ensuring success of companies with respect to their performances (Viardot, 2004).

It has been ascertained that human beings are quite complex since it is not easy to predict their behaviour as well as to understand their minds especially with respect to their needs (Young and Holland, 2009). The behaviour of consumers cannot be generalized especially when it comes to purchasing decision. Consumers are therefore,

known to be products of their experiences, environment and heredity. Therefore, trying to predict human behaviour, which is a product of environment, heredity and experience, is almost an impossible task due to complications that are attributed to it (Kotler, 2003). The difficulties are due to uncertainties in human behaviour as well as risks and surprises that characterize human behaviour. Otherwise making false prediction of human behaviour have been found out to be quite costly to an entity. It is significant for stakeholders to first obtain first-hand information about perception of customers towards the adoption of AGV in the Malaysian manufacturing industry (Kapferer, 2008). Therefore, before introducing a product to any given market, the entity introducing or developing the product needs to obtain the behaviour of consumers with respect to such product (Chidambaram and Alfreed, 2007). In case buying behaviour of consumers of such product is falsely predicted, then the organization would base their operations on unrealistic basis, which can lead to no or little sales leading to loss of revenue thereby impacting negatively both productivity and profitability (Doyle, 2002). Consequently, it is imperative that consumer behaviour towards any given product be properly understood in order to develop strategies that can enable entities to maximize return by developing products and services that meet the needs of consumers (Kottler and Keller, 2006).

Consumers have found to dictate the market. Therefore, products and services that are market driven have been found to find acceptance among consumers (Havaladar, 2010). It is for such reasons that companies and organizations have resorted to spending adequate resources in conducting research to ascertain the needs and expectation of consumers. When entities are well informed about the needs and expectations of consumers in the market niche where they operate, they have a high possibility of gaining competitive advantage in the market by developing or designing

their products and services in accordance to the needs and expectations of consumers (Subadra et al.,2010). Such development is likely to enhance both sales and profitability in the entity. In addition, market strategists have a role to play in ensuring satisfaction of consumers of their product, which they can achieve by first understanding the needs of the consumers and put in place measures to meet the needs prior to brand launching (Kumar, 2009). Satisfaction of consumers is ensured when the needs and expectations of consumers are either met or surpassed.

In the modern market, management of entities are expected to focus on consumers as the primary stakeholders (Kumar, 2007). This is so because it is consumers that drive the market whether local or global market. In this age of information, consumers have become very much informed leading to constant change in their needs and expectations (Kurtuldu et al.,2011). It is therefore required of management of different entities to understand the needs and expectations of consumers, which they can do by conducting surveys to ascertain the actual feelings and needs of the consumers (Gunneemann, 2008). Market share can only be attained by those entities that are relevant in the market. Every entity needs customers in order to survive. This implies that it is significant to attract and retain customers in order to enhance productivity in firms. Understanding consumer behaviour is very important to all entities across all industries (Lee, Kim and Pelton, 2008). Once marketers understand the behaviour of consumers then they can use such vital information to develop their operations as well as products and services to ensure customer satisfaction as well as customer loyalty (Govindarajan, 2007).

The factors that impact customer behaviour and consumer brand perception include cultural factors, personal factors, psychological factors and social factors (Pride and Ferrell, 2012). Cultural factors include culture of the sample population,

their social culture and social class, while social factors include reference group, family, roles and status. Personal factors that have been ascertained to influence consumer behaviour include age, lifestyle, personality, economic position and occupation of the consumers while psychological factors include motivation, learning, beliefs, attitudes and perception (Harrell, 2008). Consumers have however become quite sensitive and take into consideration several factors before making informed buying decision. A consumer can be described as a person who has desires and needs, which requires the market to provide and in turn in their capacity they act as buyers (Matzick, 2010). It has been widely said that human beings are complex creatures who changes their minds instantly about things they want to buy or do. It is quite difficult to characterize the human behaviour in connection to their market, environment or reaction towards certain products (Durmaz et al., 2011).

Prediction of human behaviour has never been fruitful according to the studies done on it. It has been said that precise calculation or mistaken calculations can lead to enormous fortunes or immense loss in consumer market (Gitman and McDaniel, 2008). Around the world, many Businesses acknowledge the consumer as the king. The consumer wants and needs can only be satisfied when the marketer understands them. If consumers are considered as the fundamental point of the business, then the market management strategy will be successful. The buyers' mind is a blank box that a seller needs to open in order to help in deciding what to buy (Subadra, Murugesan and Ganapathi, 2010). For a well-organized market, the purchasing decision of a consumer can be influenced by the seller, if the seller redesigns the product that the consumer had refused earlier in a manner that the consumer wants it to be, this will make the consumer behaviour towards the product to change thus, creating an efficient environment for both the marketer and the consumer (Rao, 2004). The know

how and why people consume certain goods, helps the markets to provide an effective environment and products to satisfy the consumer wants and to know what type of products are needed in the market, which in turn helps the marketers attract the consumer to purchase their products (Tatt, 2010). This therefore, makes the examination of perception of customers towards the adoption of AGV in the Malaysian manufacturing industry quite significant to industry players before making crucial decisions.

1.1.2 Definition of key terms

Customer Perception

Customer perception is defined as a marketing concept that entails impression and feelings of customers about a brand or a company.

Automated Guided Vehicle

AGV is an automotive device designed to carry loads and is capable of travelling along a floor without a driver or an operator on-board.

1.1.3 Introduction to AGV

AGV is a vehicle that has been designed to carry loads and it is able to travel along a floor without a driver or an operator on-board (MHI, 2014). The movement of the AGV is directed by a combination of different information and technologies devises that comprise both sensor based guidance system and software. The devises are designed to travel a long a predictable path with controlled deceleration as well as acceleration. Besides, AGV are incorporated with technologies that enable them detect obstacles along their paths automatically (Kollmorgen, 2013). AGVs play an instrumental role of moving loads safely from one location to another. AGVs are used

in different levels in industries to transport among other things raw materials, finished products and transportation of item in the manufacturing process. There are different types of AGVs, which include automated forklift AGV, tugger AGV, unit load AGV and automated AGV (Hitachi, 2014). AGVs are used in different industries to perform among other things, assembly, kitting, transportation, staging, warehousing, order picking, parts/just in time delivery and in transfer/shuttle (MHI, 2014). Some of the benefits associated with adoption and use of AGV include accountability, cost control, flexibility of the devise, reduced product damage, facility maintenance and safety among others. AGVs offer automated movement of items industries such as manufacturing, food, newspaper, automotive, chemical, beverage, hospital, plastic and warehousing and distribution among others.

1.1.4 Malaysian Industry

Malaysia is considered as an industrialized economy and is rated third largest in South East Asia after Thailand and Indonesia. Globally, Indonesia is the 29th largest economy with respect to buyer power. Indonesia has a high GDP of about 492 USD with a gross domestic product per capita being about 14700 USD (Lee, Hyun and Park, 2013). Officials in Malaysian manufacturing industry are exuding confidence that the economy of the country will continue to post strong growth in the future since there exist opportunity of growth. In 2011 the economy of Malaysia expanded by 5.1% (Oxford Business Group, 2014). However, there is fear in the manufacturing industry that the plan to impose minimum wage would hurt the industry and the economy as well. The market of AGV shows a significant growth. The average growth of the industry and the market size of AGV show annual growth of 6.9% from

2008 to 2013 in the United States with a revenue attracting revenue worth 151 million USD (IBISworld, 2013).

Malaysia is one of the countries that are considered to have realized remarkable growth in the past century. The GDP of Malaysia grew at an average of about 6.7% in the period of 1971-1990. In the period of 1990-1991 Malaysia managed a growth rate of 8.1% and in 2001-2005, it realized an average growth rate of 4.5% while in the period of 2000-2013 the annual growth rate was averaged at 4.65% (Chandran, Rasiah and Wad, 2009). The government of Malaysia had in place appropriate strategies aimed at spurring economic growth, which has been achieved quite successfully. One of the successful industries in Malaysia is manufacturing industry, which contributes about 25% to the Gross Domestic Product. With respect to export the manufacturing industry contributes more than 60% (Trading Economic, 2014). The government put in place policies that attracted foreign direct investment thereby attracting a lot of businesses in the country. Malaysia is considered one of the most active countries in the ASEAN countries that successfully liberalized investment in its manufacturing industry in the period of 1980-1990. Investment Act in 1986 played a significant role in making the country what it is today since then the country experienced remarkable influx of foreign direct investment (Desa, et al., 2013). The policy had a lot of incentives to investors, who used the opportunity to invest as well to improve the economy of the country.

Today Malaysian economy is considered one best competitive across range of manufactured products. Besides, manufacturing industry in Malaysia has also embraced higher valued added manufacturing products. These developments have made the Malaysian industry to become well instituted (Zubir, et al., 2012). Manufacturing industry in Malaysia is said to have contributed quite considerably to

the country's economy. One of the key drivers that have made manufacturing industry successful and competitive is innovation. Innovation is a tool that countries use to improve their economic growth because the benefits attributed to innovation are far reaching. Recently the country of Malaysia adopted the technology of AGV, which has been quite beneficial in different industries across the country. This study aims to ascertain the perception consumers about the product in the manufacturing industry to find out how they feel about the adoption of AGVs. Adoption of innovation in Malaysian industries is quite impressive and has led to manufacturing and redesigning of products that have attracted consumers from across the world. The market of AGV shows a significant growth. AGV contributes quite significantly to economic growth in the manufacturing industry.

Technological advancement has contributed quite considerably in the increase in the attractiveness of automated guide vehicle systems for consumers (Chidambaram and Alfreed, 2007). Thanks to technology, the systems now ensure safety, standardization, efficient navigation, automation and energy concept. Trends in different markets as well as the development of AGV is a primary concerns for investment customers. It is imperative that the consumers ensure that AGV and the acquired technology will be future oriented and that manufacturers will provide the AGV and related technology in long-term basis.

In this research, the customers were associate companies of Ideaspark Sdn Bhd, in another words, customers of Ideaspark. Ideaspark is a robotic company that manufactures AGVs in Malaysia. Examples of some of Ideaspark's customers were Proton Berhad, Autokeen Sdn Bhd, Khind Industries, Panasonic, BMW Manufacturing, etc. Most of companies had multiple decision makers, they all contributed to making a purchase decision.

1.2 PROBLEM STATEMENT

Perception and behaviour of consumers are affected by a number of factors (Harrell, 2008). This research investigates the perception of consumers in the Malaysian manufacturing industry with respect to the AGVs in the country. Many industries are using technology to rebrand their products and services in a bid to ensure customers satisfaction by meeting their needs and expectations and the manufacturing industry is not an exception (Tatt, 2010). There are many factors that come to play when customers are making decision about products. One of the most important considerations is brand equity where customers tend to gauge the brand quality, brand name, price and store name (Subadra, Murugesan and Ganapathi, 2010). It is believed that before the manufacturers of AGVs came up with the brand, they conducted a research to ascertain the expectations of consumers about what they want modified in the device. Consequently, conducting this research will ascertain whether the resultant product has met the needs and expectations of consumers (Durmaz et al., 2011). Consumer decision-making about brand is a process and it will be interesting to identify specific factors that will influence decision of consumer in the Malaysian market about the AGVs. Research on perception of customers towards the adoption of AGV in the Malaysian manufacturing industry is an exploratory primary research, which examines the feelings and opinion of consumers in the car industry in Malaysia. The results of this study will be quite instrumental in gauging the success of the brand and how best future brand can be modified to meet the needs and expectations of consumers.

1.3 RESEARCH OBJECTIVE

The general objective of this study is to identify and describe the when and how customer perception affects decision making, and it's correlation.

The specific research objective includes:

1. To find out if attention affects customer perception.
2. To find out if perceptual interpretation affects customer perception.
3. To find out if consumer retention affects customer perception.
4. To find if customer perception affects adoption.
5. To find out if customer perception mediates the relationship between attention and adoption.
6. To find out if customer perception mediates the relationship between perceptual interpretation and adoption.
7. To find out if customer perception mediates the relationship between consumer retention and adoption.

1.4 RESEARCH QUESTIONS

1. Does attention affect customer perception?
2. Does perceptual interpretation affect customer perception?
3. Does consumer retention affect customer perception?
4. Does customer perception affect adoption?
5. Does customer perception mediate the relationship between attention and adoption?
6. Does customer perception mediate the relationship between perceptual interpretation and adoption?

7. Does customer perception mediate the relationship between consumer retention and adoption?

1.5 SIGNIFICANCE OF THE STUDY

The research about perception of customers towards the adoption of AGV in the Malaysian manufacturing industry is important not only to the researcher but also to manufacturing industries. Industry players will need this study to better understand perceptions of customers with respect to the new brand of AGV. Such information is very vital in making decisions with far reaching effects in the industry. When wrong decisions are made with respect to the AGVs, then the players might pay a lot of price that might end up crippling the industry. Therefore, it is imperative to understand the market environment parameters with respect to AGVs before making important decisions about the same. This research will also be helpful to other stakeholders such as the general population since they will be able to use the findings of this research to increase their knowledge about AGV. In addition, this research will also contribute to the existing pool of knowledge on perception of customers towards the adoption of AGV in the Malaysian manufacturing industry by providing more information on the very subject of perception of customers towards the adoption of AGV in the Malaysian manufacturing industry. The population will need this information either to enhance their knowledge as well as to empower them to make informed decisions about the AGVs.

Moreover, this research study will not only be beneficial to audiences and stakeholder in Malaysian manufacturing industry, but also to people from across the world who may need information to make informed decisions about AGVs. Students will find this research important since it will act as a step-by-step guide to their future