


EFFECTS OF TECHNOLOGICAL REVOLUTION ON HOUSING BUYING BEHAVIOR IN BANGKOK

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 31 January 2023</p> <p>Accepted 26 April 2023</p>	<p>Purpose: To study factors affecting attitudes and house-buying behavior caused by disruption of property technology.</p>
<p>Keywords:</p> <p>A Disruption of Property Technology; Customer House-Buying Behavior; Property Technology (PropTech); Customer Satisfaction; Business Transformation Tool.</p>	<p>Theoretical framework: A study on the disruption of technology affecting house-buying behavior in Bangkok consists of theories and concepts: Consumer Behavior, Decision-making Process, and Technology Acceptance. This study employed conceptual frameworks: components of PropTech)Technology, Consumer Behavior, and Real Estate(and Complementary Relationships.</p>
	<p>Methodology: This study classified property technology into three main groups: Construction Technology, Technology in Property Trading, and Residential Technology. After the data were obtained from the survey through the Google Form, the data were processed and analyzed and the hypothesis was tested through the SPSS and Market Structure Analysis was performed by SWOT Analysis.</p>
	<p>Findings: The findings revealed that disruption of technology affected house-buying behavior and property business development in a supportive form in terms of satisfaction with the use of PropTech and the tendency for technology acceptance was greater among the population due to the changing social structure and lifestyle, resulting in convenience for more efficient time management and the ability to control expenses and costs which is also a key factor driving the trend in the use of more technology in the future.</p>
	<p>Research, Practical & Social Implications: The study pointed out that technology benefited property in a supportive way. On the other hand, it indicated that technology is just one factor that affects buying decisions in Bangkok. It is not the main factor as compared to price since PropTech has still not fully involved in the property industry.</p>
	<p>Originality: The full technological disruption may affect the property business model in the future in terms of production, sales, and after-sales services. Therefore, for property developers, it is necessary to update on whether technology can continue to revolutionize the property industry.</p>
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EFEITOS DA REVOLUÇÃO TECNOLÓGICA NO COMPORTAMENTO DE COMPRA DE IMÓVEIS EM BANGKOK

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RESUMO

Objetivo: Estudar os fatores que afetam as atitudes e o comportamento de compra de imóveis causados pela interrupção da tecnologia imobiliária.

Referencial teórico: Um estudo sobre a disrupção da tecnologia afetando o comportamento de compra de casa em Bangkok consiste em teorias e conceitos: Comportamento do Consumidor, Processo de Tomada de Decisão e Aceitação da Tecnologia. Este estudo empregou quadros conceituais: componentes de PropTech (Tecnologia, Comportamento do Consumidor e Imobiliário) e Relacionamentos Complementares.

Metodologia: Este estudo classificou a tecnologia imobiliária em três grandes grupos: Tecnologia Construtiva, Tecnologia em Comercialização Imobiliária e Tecnologia Residencial. Após a obtenção dos dados da pesquisa por meio do Formulário Google, os dados foram processados e analisados e a hipótese foi testada por meio do SPSS e a Análise de Estrutura de Mercado foi realizada por meio da Análise SWOT.

Resultados: Os resultados revelaram que a disrupção da tecnologia afetou o comportamento de compra de casa e o desenvolvimento de negócios imobiliários de forma favorável em termos de satisfação com o uso de PropTech e a tendência de aceitação da tecnologia foi maior entre a população devido à mudança na estrutura social e no estilo de vida, resultando em conveniência para uma gestão de tempo mais eficiente e na capacidade de controlar despesas e custos, o que também é um fator importante para impulsionar a tendência de uso de mais tecnologia no futuro.

Pesquisa, implicações práticas e sociais: o estudo apontou que a tecnologia beneficiou a propriedade de forma solidária. Por outro lado, indicou que a tecnologia é apenas um fator que afeta as decisões de compra em Bangkok. Não é o principal fator em comparação com o preço, pois a PropTech ainda não está totalmente envolvida no setor imobiliário.

Originalidade: A disrupção tecnológica total pode afetar o modelo de negócios imobiliários no futuro em termos de produção, vendas e serviços pós-venda. Portanto, para os promotores imobiliários, é necessário se atualizar sobre se a tecnologia pode continuar a revolucionar o setor imobiliário.

Palavras-chave: Disrupção da Tecnologia Imobiliária, Comportamento de Compra do Cliente, Tecnologia Imobiliária (PropTech), Satisfação do Cliente, Ferramenta de Transformação de Negócios.

EFFECTOS DE LA REVOLUCIÓN TECNOLÓGICA EN EL COMPORTAMIENTO DE COMPRA DE VIVIENDA EN BANGKOK

RESUMEN

Propósito: Estudiar los factores que afectan las actitudes y el comportamiento de compra de vivienda causados por la interrupción de la tecnología inmobiliaria.

Marco teórico: un estudio sobre la disrupción de la tecnología que afecta el comportamiento de compra de viviendas en Bangkok consta de teorías y conceptos: comportamiento del consumidor, proceso de toma de decisiones y aceptación de la tecnología. Este estudio empleó marcos conceptuales: componentes de PropTech (Tecnología, Comportamiento del Consumidor y Bienes Raíces) y Relaciones Complementarias.

Metodología: Este estudio clasificó la tecnología inmobiliaria en tres grupos principales: Tecnología de la Construcción, Tecnología en el Comercio Inmobiliario y Tecnología Residencial. Después de que se obtuvieron los datos de la encuesta a través del formulario de Google, los datos se procesaron y analizaron y se probó la hipótesis a través del SPSS y se realizó el análisis de estructura de mercado mediante el análisis FODA.

Hallazgos: Los hallazgos revelaron que la disrupción de la tecnología afectó el comportamiento de compra de vivienda y el desarrollo del negocio inmobiliario en una forma de apoyo en términos de satisfacción con el uso de PropTech y la tendencia a la aceptación de la tecnología fue mayor entre la población debido a la estructura social y estilo de vida cambiantes. , lo que resulta en la conveniencia de una gestión del tiempo más eficiente y la capacidad de controlar los gastos y costos, que también es un factor clave que impulsa la tendencia en el uso de más tecnología en el futuro.

Implicaciones de investigación, prácticas y sociales: el estudio señaló que la tecnología benefició a la propiedad de manera solidaria. Por otro lado, indicó que la tecnología es solo un factor que afecta las decisiones de compra en Bangkok. No es el factor principal en comparación con el precio, ya que PropTech aún no se ha involucrado completamente en la industria inmobiliaria.

Originalidad: La disrupción tecnológica total puede afectar el modelo de negocio inmobiliario en el futuro en términos de producción, ventas y servicios postventa. Por ello, para los promotores inmobiliarios es necesario actualizarse sobre si la tecnología puede seguir revolucionando el sector inmobiliario.

Palabras clave: Una Disrupción de la Tecnología Inmobiliaria, Comportamiento de Compra de Vivienda del Cliente, Tecnología Inmobiliaria (PropTech), Satisfacción del Cliente, Herramienta de Transformación Empresarial.

INTRODUCTION

In globalization, society has been through many changes, such as the industrial revolution, namely the discovery of steam power, electric power, the birth of computers and the digital revolution, which was the fourth revolution, resulting in a widely used internet. In comparison, 1990-2000 was the first era of the initiative to bring the internet into Thailand. According to the statistics report of Living insider NEXT 2.0 The Estate Commerce Begins, it was found that Thailand had 57 million internet users from 69 million people. GEN Y used the internet up to 10 hours a day and GEN X and BABY Boomer used the internet about 8 hours a day thanks to technological advancements, such as the Internet of Things (IoT) used to develop related devices, such as a smaller but more powerful sensor and the invention of artificial intelligence and machine learning (ML). (Livinginsider.com, 2019)

Regarding the field of property, the advancement in technology has inevitably been a factor in the endless transformation. For the first period in property trading, most buyers seek it through offline media, such as print media, billboards, and a visit to see a house at the project themselves to find what they are pleased with and contact back to the seller, and every step requires a massive time and cost for finding a property. In the modern where the world's economy is driven by technological competition in every aspect, such as new alternatives in online media, namely, Search Engines or social media as an advertising space to present information to customers. In addition, there are software development and various applications to support after-sales service as well as the use of technology to help in construction and home technology to enhance safety, comfort, environment, hygiene, and a better quality of life to meet the needs of customers and lifestyles of the new generation. Consequently, the property technology revolution was born to respond to the needs of buyers and sellers in most efficiently and effectively. Therefore, the term "Proptech" or "Property Technology" has become widespread. However, it is still arguable whether technological advancement can alter consumers' buying behavior and causes major changes in the property industry in the future.

Thus, the research team was interested in examining how disruption of property technology has an impact on consumer house-buying behavior in Bangkok to offer useful guidelines for entrepreneurs in terms of actual consumer house-buying behavior. Since the property industry is crucial to the macroeconomy with highly competitive conditions and if entrepreneurs are aware of consumers' demands together with the predicted economic trends, it can be used to plan strategies to create a competitive advantage as well as to develop the property to meet the needs of consumers in effectively changing conditions. Objectives of this

paper was to study factors affecting attitudes and house-buying behavior caused by disruption of property technology. Research Hypothesis were disruption of technology affects house-buying behavior and property business development in a supportive form, and the exploitation of property technology tends to increase according to the new generation.

LITERATURE REVIEW

A literature review for a study on the disruption of technology affecting house-buying behavior in Bangkok consisted of the following key theories and concepts:

Theories, Concepts and Related Studies

A study on the disruption of technology affecting house-buying behavior in Bangkok consisted of theories and concepts as follows:

- 2.1 Consumer Behavior
- 2.2 Decision-making Process
- 2.3 Technology Acceptance

2.1 Definitions of Consumer Behavior

Loudon and Betta (1988, p. 4) defined consumer behavior as the decision-making process and physical activities with individual involvement when evaluating the acquisition, use, or purchase of goods and services.

Engle, Blackwell and Miniard (1993, p. 5) defined consumer behavior as the decision-making process and individual activity characteristics to assess, procure, use and spend on goods and services for consumption.

Hoyer and MacInnis (1997, p. 3) defined consumer behavior as a reflection of all consumer purchasing decisions related to the acquisition, consumption, and limitation of goods, services, time, and thoughts based on purchasing decision unit (person) at any given time.

Based on Paul and Jerry (1990, p. 5), the American Marketing Association defined consumer behavior as acts affecting each other all the time between knowledge, behavior and events under the human-made environment in exchange for human living.

Mowen and Minor (1998, p. 5) defined consumer behavior as a study of purchasing units and exchange processes related to consumption acquisition and restrictions on goods, services, experiences and thoughts.

Schiffman and Kanuk (1994, p. 7) defined consumer behavior as the behavior in which consumers seek needs related to assessment and spending on products and services which are expected to meet their needs.

Solomon (1996, p. 7) defined consumer behavior as a study of the processes in which an individual or a group of people is involved to make a selection, purchase, use, or consumption related to products, services, thoughts, or experiences to meet the needs and various desires.

Based on the above definitions, consumer behavior refers to the individual behavior to seek, purchase, use, evaluate or manipulate goods and services which are expected to meet their own needs (Schiffman and Kanuk, 1994). The reason why consumer behavior was studied since it affects business progress.

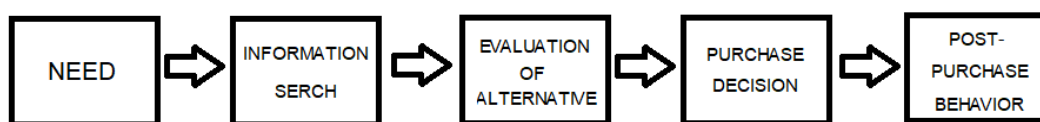
Therefore, a study of consumer behavior would enable the ability to create a marketing strategy that creates consumer satisfaction and the ability to find solutions to consumer decision-making behavior in society more accurately based on the ability to respond to the business. Importantly, it constantly helps to effectively improve the market and products. (Prin Laksitanon. 2001)

Theories related to consumer behavior tracking include 6 Ws and 1 H in analyzing consumer behavior as research on consumer purchasing and consumer behavior to obtain the characteristics of needs. For behavior analysis, 6 Ws and 1 H questions included Who, What, Why, When, Where, and How, to identify 7 characteristics related to consumer behavior, or 7 O's, consisting of Occupants, Objects, Objectives, Organization, Occasions, Outlet and Operations (Siriwan Sereerat et al., 1998, p. 126) with the following questions:

1. Who is in the target market? It's a question to obtain characteristics of occupants in terms of the demographic, geography, psychology, and behavioral sciences.
2. Why does the consumer buy? It is a question about objects the consumer wants to buy, including features, composition, and differentiation that is superior to competitors.
3. Why does the consumer buy? It is a question to know the objectives that the consumer buys a product through any distribution channel to meet their physical and psychological needs based on the factors affecting purchasing behavior, i.e., external, sociocultural, and individual factors.
4. Who participates in the buying? It is a question to know the roles of organizations affecting purchasing decisions, consisting of initiator to buy, influencers in purchasing decisions, buyers with decision to buy, buyers, and users.

5. When does the consumer buy? It is a question to know occasions in buying, such as which month of the year or any season of the year, which day of the month, what time of day, special occasions, etc.
6. Where does the consumer buy? It is a question to know channels or outlets the consumer buys a product, such as department stores, supermarkets, grocery stores, etc.
7. How does the consumer buy? It is a question to know the operations, including problem recognition, information search, evaluation, choice, purchase decision, and feeling after purchase.

Figure 1. 5 Steps of Consumer Buying Decision Model



(Source: Kotler and Keller, 2012)

2.2 Decision-Making Process

5 Steps of Consumer Buying Decision Model

1. Problem Recognition: Consumers are aware of problems through the difference between the present state and the state of desire. With enough motivation for consumers to try to get into the state of desire, consumers will struggle to find a solution.
2. Information Search: After consumers are motivated to recognize the problem, they will seek information for use in decision making by searching for information from internal search first, and if there is not enough information, they will pursue from external search which is used by a study on the marketing mix in purchasing decision in clothes of working age groups in Bang Pakong Subdistrict Municipality, Bang Pakong District, Chachoengsao Province. Consumers seek information from external search which is not from memory.
3. Alternative Evaluation: When consumers receive various information about the products they are interested in, they will evaluate which brand is better by considering the benefits and satisfaction that are expected to be received. Therefore, the product must highlight the strengths that are clear and satisfying so that consumers can use them in making a purchase decision. Nowadays, access to various information can be simply

done by the internet or a smartphone. Therefore, property businesses introduced Big Data to provide ease for consumers.

4. Purchase: For this stage, the consumers decide to pay for the product that they think is best for them. Sometimes, even if the consumer has made a decision, there may be some factors causing the delay or hesitation, such as fear that there will not be enough money left until the end of the month after the payment, uncertainty about if the product is as good as advertised, and friends or close friends recommending them to rethink. Therefore, advertisers should find ways in advertisement to accelerate their purchasing decisions.

5. Post-purchase behavior: when the purchase has occurred, what determines the consumer's repeat purchases is customer satisfaction. If the customer is satisfied, they will come back to buy again, causing word of the mouth which will increase the customer base in another way. In case of dissatisfaction, apart from not returning to buy again, they may be able to review the product in a negative way that will ruin the reputation.

Nowadays, sales patterns have changed and there are many different types of products. But most consumers' buying behavior remains the same. Therefore, any decision-making study will always be based on the 5 Steps of Consumer Buying Decision Model, as in Lee-Anant's research on tourism (2022, p. 7-11) use process Decision-making Process by determining Decision-making factors to visit pop-culture destinations in Lanna tourism cluster of the Chinese tourists such as: place, social origin, cultural origin, personality, plot and performance, press and push factor in research or in terms of accounting of Al-Refiay ., et al., (2022, p. 9-11) they're research contributes to understanding the relationship between the financial information and decision making.

2.3 Theories Related to Technology Acceptance

Kawarin (2016) and Roger and Shoemaker's technology acceptance (1978) included five characteristics as follows:

1. Relative advantage is the perception that better technology is more practical than old notions or traditional practices, such as being more convenient and faster. This comparison does not only consider the tangible benefits, but also the emotional impact. If a person recognizes the benefits, the chances of technology being accepted increase.

2. Compatibility is how the technology recipient feels or thinks they are compatible with existing values, experiences, and needs. If any technology is consistent. It will increase the probability of technology acceptance.

3. Complexity is how complex technologies are applied. This has the opposite relationship with technology acceptance. Individuals felt that the technology adopted is incomprehensible and difficult to use, resulting in a longer adoption time and lower levels of acceptance as well as resistance.

4. Trial ability brings a small piece of technology for consumers to try out. If it is successful as it informs the benefits to consumers in a short period of time, it will give the opportunity for consumers to be more accepting of that technology.

5. Observability

If the result of technology is concrete or can be seen by the general public in society, it will make the technology more acceptable. Considering the features mentioned above either in all respects at the same time or in any way would lead to the process of consumer acceptance of technology, resulting in a decision to fully execute the technology as a result of the consideration that technology is good and has more beneficial with simple use with a clear result. Such as Sundberg (2019, p. 22-32. cited in Fernández, L. Álex V., et al., 2023, p. 6) proposed, based on a review of the literature, that the risk situations perceived in electronic government contemplate more aspects such as: incorporation of users into the system, through the implementation of Technology Acceptance Models (TAM) based on statistical analysis to understand and predict the etiology of citizens regarding government services. Another research, Mastana (2023, p. 5,14) use Technology Acceptance Model (TAM) in his research to imply that these three variables, perceived ease of use, online accessibility, and shipment services, may provide a means to optimize the TAM variable's perceived utility in a discretionary situation, including e-commerce. The theory of technology acceptance above is consistent with the theory of the Technology Acceptance Model (TAM) developed to describe every user's computer usage behavior by considering the linkage of the following factors:

1. Perceived Usefulness
2. Perceived Ease of Use
3. User's Attitude
4. Behavioral Intentions
5. Actual Computer Usage Behavior

Perceived usefulness and perceived ease of use are the main variables of technology acceptance model theory. This is in line with the technology acceptance theory to study house-buying behavior influenced by technological advancements.

MATERIAL AND METHODOLOGY

After the data were obtained from the survey through the Google Form, the data were processed and analyzed and the hypothesis was tested through the SPSS with the following steps:

Data Analysis

After the data were obtained from the survey through the Google Form, the data were processed and analyzed and the hypothesis was tested through the SPSS with the following steps. (Sirichai Kanchanawasee, 1992)

Data Analysis Methods

Data Analysis by Descriptive Statistics

Descriptive statistics were employed to describe the basic information of the sample, such as demographics, gender, education, occupation, and income in the form of a table of frequency distribution, percentage, mean and standard deviation. For comparison of data, raw scores were converted to standard scores in the form of images, graphs and charts via SPSS.(Nongnuch Phattrakon, 1995). The research team studied in detail to describe the demographic characteristics of the sample with Proptech affecting house-buying behavior in Bangkok and grouping according to criteria, such as satisfaction based on types of Proptech which are divided into 3 categories: Type 1 (technology related to property trading), Type 2 (in-home technology), and Type 3 (after-sales service technology). In addition, the research team, therefore, divided generations or income levels that are most influenced by technology to bring the data for further analysis which uses analytical thinking to discriminate the components of data or problems into sub-issues in many respects from statistical data, such as mean or percentage to find the relationship between those elements. Then, it was analyzed to systematically find the actual cause of what happened.

Market Structure Analysis by SWOT Analysis

The analysis was done to analyze internal and external factors, such as weaknesses, strengths, opportunities, and threats of the property industry and analyze factors affecting purchasing decisions on various types of products, and study strategies used in the competition among property developers of each brand to provide information in testing hypothesis and analyzing factors affecting the purchasing decision of the consumer from the questionnaire.

Types of Property Technology

We can categorize property technology into three main groups as follows:

Construction Technology

This type of technology promotes property operators in terms of cost and construction time management, resulting in better construction work, and reduced time and labor. Therefore, products can be delivered with revenue recognition faster and reduced the burden of interest. In addition, it also results in consumers to receive quality products within a shorter time period, such as prefabricated bathroom systems, 3D printer construction system, and automatic parking.

Technology in Property Trading

Moreover, property project developers and sales representatives apply new technology to help promote sales and online advertising. This includes the introduction of technology to assist in the analysis of behavioral data and customer demand to offer products that meet the needs of customers and increase the likelihood of more sales. Customers also benefit from convenience, searching for information, and completion of trading, such as online house reservation system, rent via online system, opening for loan submission via online system,

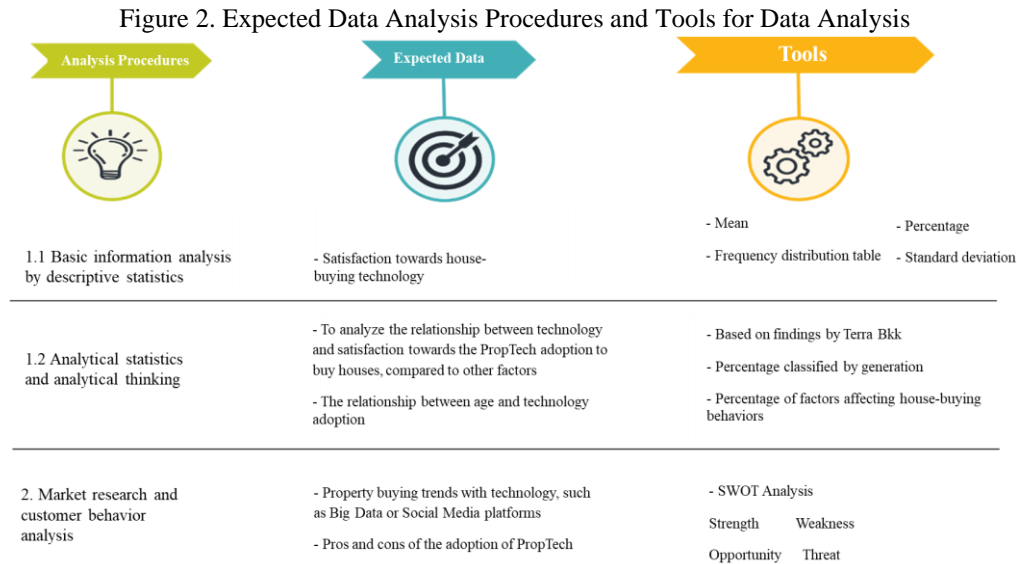
AR system, and VR to simulate a virtual reality project to serve as sales aids and Big Data collection.

Residential Technology

Technologies related to convenience, safety, and residents' health promotion, including the contact channel system of the juristic person for after-sales service, such as smart home system, smart door lock, smart security, smart locker, IoT, and voice control system for home

devices, contact channels for juristic persons, maintenance technicians, housewives, car reservations, including booking services via online channels.

Diagram Summary of Data Analysis Procedures



Source: This figure was developed by researchers.

RESULTS AND DISCUSSIONS

Figure 3. Technologies Related to Steps in Property Purchase Process



Source: <https://blog.sansiri.com/prop-tech-technology/>

Figure 4. Technologies Related to Internal-external Residential Property



Source: <https://blog.sansiri.com/prop-tech-technology/>

Based on the data collection and study, PropTech affecting decision-making behavior in the purchase of residential property can be divided into 2 major groups:

1. Technologies related to property trading (Shown in Figure 5)

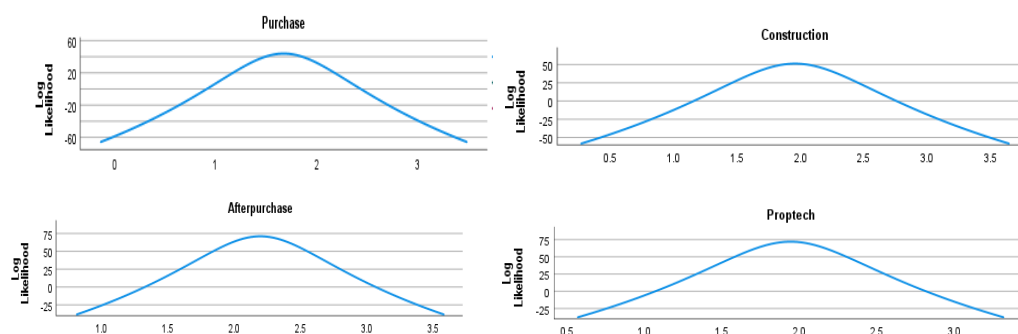
- The time used in making a decision to buy a property due to obtaining enough information to make decision to buy a property
- Success for technology adoption for targeted advertising to increase the success rate of closing a sale
- Access to property buyers from around the world to increase the success rate of closing a sale

2. Home and services technologies (shown in Figure 6) affect purchasing behavior in terms of increasing purchase confidence, which may be used as a factor in comparison with other brands and the incremental change in value that property buyers are willing to pay for that technology.

The study results based on the questionnaire found that 100 respondents gave their opinions about PropTech according to the sample group. The research team aimed to study the satisfaction with technology in residential buying with 0 = unknown/no influence, 1 = little need with influence, 2 = helpfulness, 3 = very useful. The raw data was analyzed using SPSS.

Figure 5 Satisfaction with PropTech

	Report			
	Purchase	Construction	Afterpurchase	Proptech
Mean	1.6740	1.9588	2.1986	1.9438
N	100	100	100	100
Std. Deviation	.64739	.60164	.49337	.48938



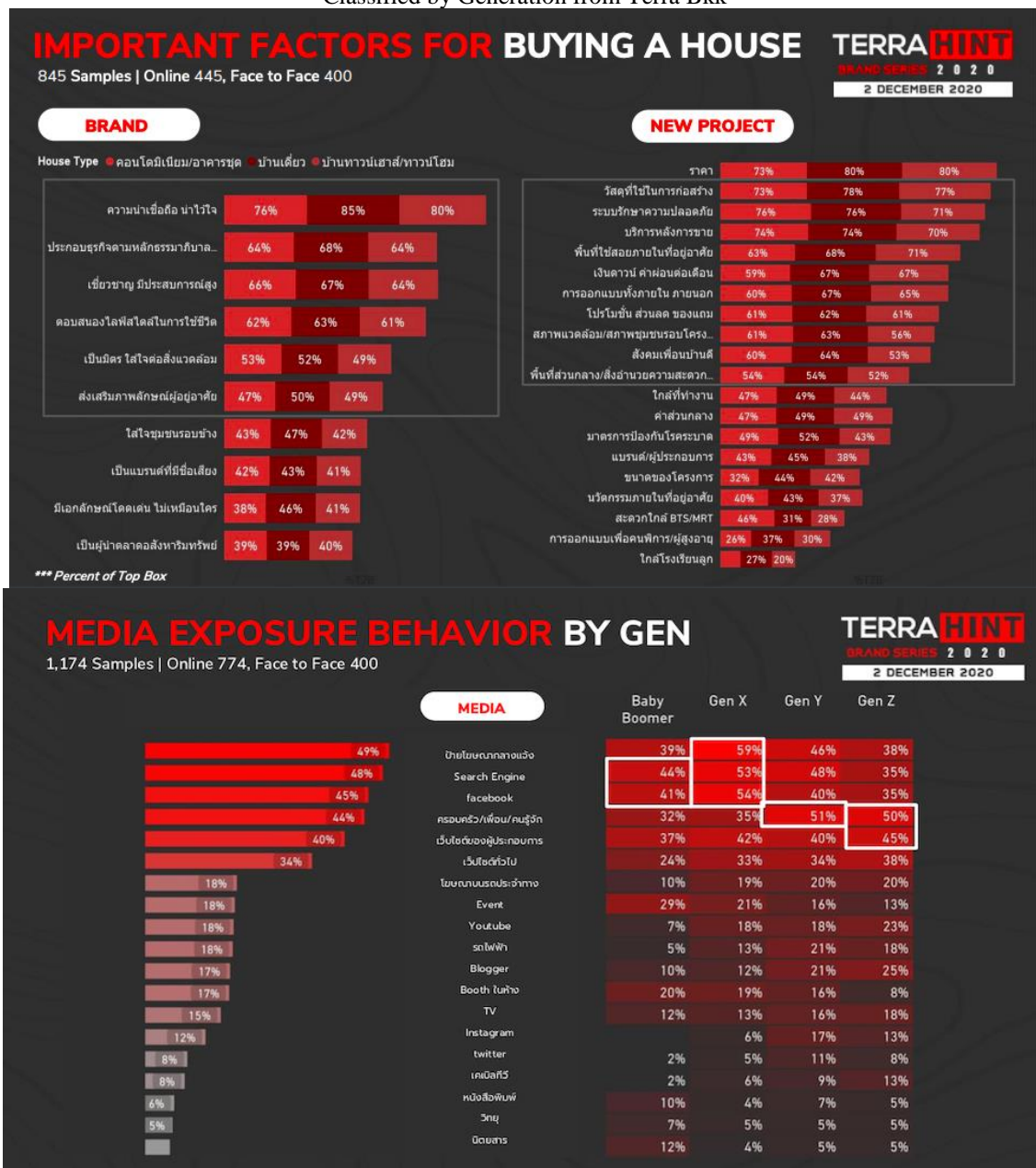
Source: <https://blog.sansiri.com/prop-tech-technology/>

Type 1 (technology related to property trading) has a mean value of 1.6740, indicating that technology related to property search has been put into practice, and most people with a desire to buy a house were influenced consciously and unconsciously. However, there was little need due to high-value property which is still necessary to inspect the condition before purchasing or transferring ownership although technology simplifies the journey to reduce cost and time.

Type 2 (in-home technology) had a mean value of 1.9588, indicating that in-house technology can provide convenience to residents and point out the lifestyle of people. It is likely that Gen Y and below are particularly interested in it. Due to changing era, it's not just the new generation who has been aware of the necessity of technology, but the TerraBkk study also suggested that Gen X was also influenced by home technology.

Type 3 (after-sales service technology) is mainly related to the service of security or management of the entire village or condo juristic person which was found to have a mean value of 2.1986, indicating that compared to other types of PropTech, homebuyers were very satisfied with this technology, commenting this kind of technology was useful affecting home buying behavior of the sample group.

Figure 6. Factors Affecting Home-buying Behavior and Proportion of Technology to Search for Houses Classified by Generation from Terra Bkk



Source: <https://www.terrabbk.com/articles/199277/>

Based on the survey data from Terra Bkk's sample group that studied all factors affecting house buying, it was found that price had the greatest impact on house-buying behavior. Unsurprisingly, given the nature of the home as both a capital and a high-value commodity, most people need to consider the affordability of this type of housing. However, construction materials, security system, after sales service, living space in the house, the environment, and in-house technology were all factors that people tend to pay attention to when considering buying a home, especially Gen Y and Gen Z, who will be the driving force of the property market. They tend to pay more attention to convenience and better quality of life. Therefore,

analysis results indicated the relationship of the technology acceptance model (TAM) tended to increase according to the social mechanism.

To get in-depth into the age group influenced by PropTech, the research team gathered house search data of people who are interested in buying a house via search engines, such as Google. There was a statistical increase in online house search rates compared to the past. This is in line with the ever-increasing need for technology. According to statistics, 45-53% were using technology to find properties.

From the perspective of property developers, it is interesting why many brands like Sansiri, Ananda, Pruksa, and many others were interested in investing in technology. The survey results found that technologies. For example, social media advertising did not only create a channel for customers to reach more easily, but it also increased brand awareness, which is a factor compared to making a purchase decision. In addition, from interviewing and asking personnel related to brand management, they commented on the need to develop PropTech to be up-to-date and keep pace with competitors. Due to the highly competitive property market, if one step is delayed, it could have an intolerant effect in the future. In addition, the introduction of technology helps to promote the added value of the product which makes the buyer agree to pay more for benefits, convenience, safety, and satisfaction.

SWOT Analysis of Technology Adoption in the Property Industry

Strength and Opportunity

Technology for Sales and Channels to Search for a Property

Currently, human beings are receiving more and more information through media in daily life, especially in online media. Property developers have their own communication channels, including websites and various social media to help increase channels for public relations and reduce costs. This includes the purchase of online advertising media and online marketing through influencers which is also an increase in advertising channels and the expansion of the customer base for communicating with the target customers more precisely through Big Data technology to find information and compare projects more conveniently and faster.

In addition, technology also helps to create new marketing opportunities to make sales to reach customers more easily, such as adding an online booking channel through the E-commerce system. In addition to providing quick convenience for customers, it also increases sales opportunities and expands the customer base. Recently, property operators, such as

Origin, Sansiri, Ananda, and Sena have joined hands with E-commerce (Lazada and Shopee) to open online condo reservations with special discount campaigns and a trend of application of new technologies to help in the sale, such as Virtual Reality technology to help in property trading since buyers who want to buy property can see the sample house as if looking into the sample house project without having to travel to the Sales Gallery. Apart from online technology reducing some costs and hidden costs, it also expands the scope of the customer base further by reducing the limitations of the place.

Home and Living Technology

Property operators tried to adopt technology in their residential products to benefit in many aspects, including the safety of life and property, health, convenience, cost savings, and energy conservation. These are all competitions to increase the benefits of the product and differentiate it from other brands, resulting in benefits for customers from competitive products in the market, causing development.

Based on the questionnaire, technologies that people are interested in include safety and health technologies. It can be seen that these two technologies are highly competitive as part of the selling point of entrepreneurs. They were also trying to develop the limitation of technology to be more secure and more convenient for users, such as a system using QR codes to access various areas for visitors, making central areas more secure, and the history of people in and out. At the same time, residents can access the area more easily through facial recognition and storage system, fingerprint, and visitor information entering the project which can be tracked in case of an emergency as a part of the health technology. This may be due to the current trend that people are becoming more health-conscious together with the current epidemic situation and pollution, resulting in more people paying more attention to this aspect significantly. For example, the MQDC develops smart home systems to control the level of CO₂ by working with the ERV to help add oxygen into the house through the PM 2.5 dust filter and exchange the cold before being brought in.

The property developers tried to adopt these technologies. Although some had a high cost in the early stages, they produced good results in the long-term future in terms of reduced construction costs, cost of energy, and support from the government in the use of renewable energy, such as the pre-cast system construction technology of Pruksa that has invested in R&D for the system and set up the factory itself. As a result, there was a quality construction standard at a lower cost than ordering pre-cast from other factories or even using solar energy in homes

and common areas. For many entrepreneurs, such as Sena, L&H, Pruksa, and AP, the residents have reduced utility expenses. Therefore, property developers in Thailand started to be aware of the importance of technology used in daily life more and bring PropTech to be the highlight to meet the increasing demands of consumers by trying to develop to make it easier for residents and increase convenience for them.

After Sales Service Technology

According to the questionnaire, respondents emphasized after-sales service technology (average: useful - very useful which is more than technology about the home and living). This type of technology has been invested at a relatively low cost, compared to other technologies. It also promotes after-sales service to serve quickly to meet the needs of customers more precisely. In addition, the introduction of technology to help after-sales service also reduced the administrative burden of the condominium and housing juristic department.

Most large entrepreneurs will develop their own application to meet the needs of customers. Most of them have similar basic functions of after-sales services, such as the repair system with an updated status, electricity and water bill alert, public relations of the juristic department, and public relations for the sales of the entrepreneurs. In addition, each was trying to develop various facilities for residents to achieve maximum satisfaction with easy-to-use functions, such as SC Asset with RueJaiOS operating system that can control smart home automation through the app all in one platform while Ananda has developed a reservation system for the use of central areas as well as booking car rentals by the Car Sharing concept under Haupcar.

Weakness and Threat

Technology for Sales and Channels to Search for Property

The prevalence of technology and online media, in fact, were like a double-edged sword since if there is a negative opinion or damage, news and information will spread quickly which will adversely affect the reputation of the entrepreneur and can be more difficult to control and manage. Moreover, another problem with the development of technology in sales and search is that there are still some populations, especially the elderly who are still not familiar with the use of technology. Therefore, marketing to certain groups of customers may still require more traditional media and a different approach to meet target audiences which will increase the complexity of marketing, and the survey also found that about one-third of people still prioritize

traditional sales channels, including visiting the project at the sales office and suggestion from an acquaintance. Therefore, it can be said that new technologies exist only to help promote sales and search. It may take time to change consumer behavior to become familiar with and accept the technology.

Technology Related to House and Living

In addition to safety technology that becomes one of the fundamental factors that entrepreneurs must inevitably use in every project, another technology that entrepreneurs often use in their projects to create a selling point, differentiated from competitors is a technology for convenience due to the high diversity. It can attract the attention of customers, such as Sansiri's robot delivery system, a smart home system that can be controlled by voice via Sansiri's Alexa device and AP.

Even though these technologies provide more convenience in everyday life, operators must be careful in choosing the right technology for their customers since these technologies often come with expensive costs. As a result, the price of the property is more expensive as well. If the chosen technology does not respond to the usage behavior of the residents, it will be costly.

Another threat is that there are still some customers who do not understand and are unable to adapt to these technologies, especially the elderly. The more sophisticated the technology is, it takes time to understand. Staff may need to be provided to teach them how to use it. This is not in accordance with the purpose of these technologies, such as Smart Locker which may not be popular in some areas, or automatic product machines that pay through the application, making it limited to use only among people with smart phones and internet banking.

After Sales Service Technology

Like any other technology, if customer behavior cannot adapt and accept technology in this group, the technology itself becomes a barrier to functions with negative outcomes, like inflexibility and difficulty to use among some groups of customers. Therefore, the technology used, such as the application may not be fully functional and unable to apply the Big Data collected from the app for maximum use.

Based on hypothesis 1, it was found that disruption of technology affected house-buying behavior and property business development in supportive form in terms of satisfaction with

the use of PropTech, such as property search technology and a value impact where people who want to buy houses were more likely to pay more in exchange for the acquisition of technologies. However, advancement in technology was just one of the key factors, and it also takes time to match the technology adoption rate of the population.

Based on hypothesis 2, the tendency for technology acceptance was greater among the population due to the changing social structure and lifestyle, resulting in convenience for more efficient time management and the ability to control expenses and costs which is also a key factor driving the trend in the use of more technology in the future.

Based on data on technology adoption among leading property developers in Thailand with surveys, although PropTech allowed property developers including consumers to gain benefits and began to play a role in the real estate industry, technology acceptance or the results of technology changes that affect various factors were difficult to convey concretely since the realization of technology has other key involved factors, such as price, creativity, invention and limited production. Therefore, the research team focused on the satisfaction towards using various types of technology affecting house-buying behavior in Bangkok. It also conveys the trend of widespread technology acceptance in the future.

CONCLUSION

In conclusion, although the study pointed out that technology benefited property in a supportive way. On the other hand, it indicated that technology is just one factor that affects buying decisions in Bangkok. It is not the main factor as compared to price since PropTech has still not fully involved in the property industry. It still lacks development and implementation for maximum benefit. As a result, consumers were not fully aware of the benefits and capabilities of residential technology since the creation of advanced technology may often come with high investment and high value. However, technology is one of the things that come into development both in business and industry. Therefore, it is observed that the full technological disruption may affect the property business model in the future in terms of production, sales and after-sales services. Therefore, for property developers, it is important to follow whether technology can continue to revolutionize the property industry. In this study, the research team has suggestions for applying the findings and recommendations for future research. Primary data were employed to indicate the satisfaction of technology adoption and the value-added impact of technology use. However, there are limitations in the statistical data of in-depth earnings numbers which can be used to analyze the impact of PropTech on value-added that

occurs more clearly. Therefore, it is suggested that those interested in conducting a study on the value impact that buyers are willing to pay more in exchange for the technology should collect more in-depth statistics to clearly show the importance of PropTech.

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