An Analytic Hierarchy Process Approach to Marketing Tools Selection for Science and Technology Parks

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Abstract.

Research background: Several studies have highlighted the importance of the Science and Technology Parks (STPs) to economic development. The reputation and image of the STPs substantially contribute to the expansion of the parks, which in turn enhances the region's innovation capacity and economic development. However, there are few, if any, studies conducted to clarify the applicable marketing techniques for the brand promotion of the STPs.

Purpose of the article: This study aims to determine and select the most appropriate marketing tools to promote the brand image and the reputation of the STPs in Vietnam, especially in the case study of Quang Trung Software City.

Methods: The qualitative and quantitative research methods are used to analyze data collected from 20 participants who are managers and experts working in several disciplines. Moreover, the analytic hierarchy process is implemented to find out the priority of six proposed marketing tools.

Findings & Value added: The findings reveal that online and offline marketing channels should be combined to promote the brand image of the STPs effectively. This study pioneers in researching the selection of the techniques for the marketing strategies of the STPs in Vietnam; thus, it contributes to the theoretical implications and managerial practice.

Keywords: *science and technology parks; brand image; marketing tools; analytic hierarchy process; brand promotion.*

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1 Introduction

Science and Technology Parks (STPs) have held a critical position in the economic development of various countries [1]. The foundation of the STPs has contrived the accumulative platforms for infrastructure development and resource allocation to enhance technology and innovation. Several STPs have been built following the model of the Stanford Research Park, which was the first STP in the world, to take advantage of the global economic integration in which many technology companies have started to invest abroad. Those high-tech companies refer to locating their business in well-managed zones where gather several other technology companies to form the clusters, which no place is more suitable than the STPs. While developed nations have witnessed the growth and development of various modern science parks, other emerging countries also realized the role of STPs in promoting regional economic growth and international competitiveness [1,2]. In the context of Vietnam, STPs are supposed to contribute significantly to the development and innovation of the economy, especially when the country pursues sustainable development goals, which cannot be fulfilled without the leading role of STPs. However, STPs in Vietnam are relatively young comparing to the neighboring countries. A few STPs have been well developed in Ho Chi Minh City and Hanoi, which is not enough for the economy. In addition, most STPs in the nation merely concentrate on enhancing technology and neglect the importance of branding in their strategies. Furthermore, studies on domestic STPs are deficient and have not well supported the national strategy of research and developemnt. Therefore, it is necessary to conduct this research to get a deeper understanding of STPs by examining the case study of Quang Trung Software City (QTSC).

Branding is defined as the process of representing and promoting the brand image of a specific firm to the market to attract the customer's attention, which has been the interest of researchers and managers for years [3,4]. Companies have realized that B2B digital or online branding strengthen the information flow and customers' trust [5]. In this study, branding for the STPs can be similar to B2B branding because the STPs are attempting to attract potential park tenants who are technology companies to locate their businesses in the STPs. Therefore, branding for the STPs is the process which embodies the reputation and the image of the parks on the particular markets. The brand image significantly contributes to initiating the connections among firms and ensuring growth in the long run [3]. Similarly, brand image plays a critical role in the long-term development of the STPs where provide lands and services as well as nurture and promote the innovation capacity for technology companies. The reputation of the STPs is one of the fundamental criteria for decision-makers to choose the location for their companies. Branding offers the "invisible" values for partners through the reputation and later enhances the market connections [4]. Besides, a strong brand of the STP may attract technology-leading companies to locate in the area. Promoting brand image and the public awareness on the STP is, therefore, crucial for all the marketing strategists because the brand image that they are managing decides the success and revenues of the STP and park tenants in the future [6]. Branding or brand promotion has been comprehensively examined in many sectors of the economy. However, there are few, if any, studies concentrating on the brand promotion of the STPs. Therefore, it is crucial to conduct this study to determine methods better to enhance the reputation of STPs.

This research aims to find out feasible and effective B2B marketing tools appropriate for the STPs to promote the brand image to attract more potential park tenants. In the digital era, online channels are supposed to dominate marketing strategies because of their importance, efficiency and effectiveness. However, in the context of STPs, there are no comprehensive papers conducted to clarify whether online marketing tools have completely dominated or not; thus, it is essential to conduct a research on the marketing tools selection for the STPs, by examining the case study of QTSC, in order to choose the appropriate tools and re-evaluate the roles of offline marketing tools in the digital era. This study is the pioneer in Vietnam in terms of applying the analytic hierarchy process for the marketing strategies of STPs. In addition, this research implements

theory into practice, and it can be an empirical case study for future research on marketing management of STPs.

2 Literature review

2.1 Branding for Science and Technology Park

STP concepts vary in different studies, and there is no dominant definition of STP [7]. Although many experts could not reach an agreement for a universal definition, the notion of STPs commonly comprises three characteristics: the development of real estate and specialized service centers within the area; the combination of activities promoting technology and knowledge transfer; and the collaborations between the private sector, public sector, and academic institutions [8]. In developing countries, STPs play a role as a stimulant to enhance the growth of new technology-based firms (TBFs) by providing supports for them to survive and expand their businesses. In addition, STPs are particularly essential in upgrading the economy and promoting innovation in emerging markets [9]. For instance, previous research on Tsinghua University STP of China states that STP remains a critical factor in the progress of elevating China's innovation system [10]. Furthermore, STPs are supposed to deliver favorable environments and conditions to encourage the connections among companies, higher education institutions (HEIs), and venture capitalists, and raise the international perception on tenant enterprises [11]. Hence, the brand image can be a critical element to maximize these roles. In specific, the positive image of STP contributes to attracting potential TBFs to set up their business in the park and establish cooperation with HEIs. The STP's brand image implies the park's reputation and the park tenants' perceived quality of services and facilities provided by the STPs. A well-managed STP can foster collaboration, technology, and knowledge transfer, which later on creates values for park tenants [1]. To be more specific, the relationships among leading technology companies, prominent HEIs, and well-managed STPs can encourage educated and skilled labor to work in the parks, which intensifies the values of the STPs. Creating and strengthening the brand image of the STPs, especially young STPs, are supposed to have positive effects on their future expansion. A successful STP can establish its branches to other regions of the country, given the context that the STP is located in highly dense and expensive areas. Tsinghua University Science Park (TusPark) in China can be a prominent example of the extension after successfully developing its brand image. Specifically, TusPark has formed more than 30 branches in China by 2012 to resolve the deficiency of land and other resources [10], which offers a valuable model for a young STP like QTSC.

A reputable STP is expected to become a brand name to provide favorable conditions and value-added contributions for tenant companies [1,2,11]. Hence, a well-known brand image of the STP can directly support early-stage companies in terms of creating credibility and providing essential facilities and services which cannot be supported if firms establish outside the STP. Those assistances can be served as certification for young enterprises [6], which in turn promotes the brand image of the STP. Moreover, park tenants who are B2B customers are willing to settle their business for reputation [11]. Hence, those discussions emphasize the notion that a famous brand image of the STP not only attracts potential firms but also supports the existing park tenants.

In this study, STPs are viewed as particular companies that provide crucial facilities (known as hard services) and professional knowledge (known as soft services) supporting the operations and growth of the knowledge-based park tenants [1]. The park tenants who lease the offices or land, and purchase for the services provided by the STPs can be seen as B2B customers of the STPs. Thus, promoting the brand with the support of marketing tools is significantly essential to attract potential park tenants and expand the STPs to other areas. Specifically, various STPs in

the world, as constrained by the urbanized areas, have started to expand by forming more branches such as TusPark in China, extending to other locations such as Hsinchu Science Park in Taiwan, or admitting new members who are information and technology parks (ITPs) as the case of QTSC in Vietnam. Many STPs have successfully built their brands, which is a prerequisite for the expansion [12]. Branding for the STPs is considered a relatively new topic because there is a limited literature review on the brand of the STPs. In addition, branding for the STPs is more complicated than regular B2B companies because of the differences in size and management system. Specifically, some of the STPs are partially regulated by the governments, which causes somewhat more problematic and ambiguous in implementing strategies to promote the STPs' brands for expansion. Variety of STPs have tried to promote research and development (R&D) capacity, with assistance from governments, to enhance the innovation, which is one of the most effective ways to promote their brands and attract potential park tenants in the long run [8]. However, while the long-term strategies taking time to carry out, the STPs need many other approaches to promote their brands, such as applying practical marketing tools themselves or collaborating with large technology companies.

2.2 Identification of marketing tools for promoting the brand of Science and Technology Parks

2.2.1 Print media

Print media comprises of many physical printing materials such as newspapers, magazines, and brochures, etc. Despite the developement of social networking and other digital marketing communications, print media is still pertinent in companies's marketing strategies [13]. In terms of life span, the magazine is supposed to have the longest life span because it is portable and convenient to pass from person to person. The content demonstrated in magazines is also selective and knowledgeable; thus, magazines are suitable for particular groups of readers interested in specific disciplines. In the case of the STPs, magazines can be used to provide the information about the parks and offer the opportunities of collaboration, and it can be directly distributed to potential B2B customers or future park tenants to advertise. Similarly, the newspaper is also an effective way to promote the brand image of the STPs because of its broad coverage of readers. The newspaper has a shorter lifespan than the magazine; however, it is informative and published daily. Despite the proven effectiveness, print media has a problem with the high cost [13]. Therefore, besides print media, the STPs are advised to combine other channels to overcome budget pressures and achieve better branding outcomes.

2.2.2 Networking or industry events

Offline event marketing and relevant tactics have significantly drawn companies' attention for several years. Event marketing, especially networking or industry events, has been proved as a powerful offline marketing tool to approach and communicate with both existing and potential customers, and to distinguish the company's brand from other [14]. Networking or industry events create favorable conditions for many businesses operating in the same industries to share the experiences and advertise their brand, products, and services through face-to-face interactions. In the case of the STPs, industry events can be opportunities to introduce competitive advantages and approach technology companies to attract them to place their businesses in the parks. In addition, a networking or industry event can be a place for companies to expand their business networks and find appropriate B2B partners. The critical issues of networking or industry events are how to publicize the events, reach the target customers, and ensure the expected scale of the events with the limited marketing budget [15]. The cost of organizing a networking or industry

event is relatively higher than that of other offline marketing tools; thus, STPs should integrate several marketing tools to maximize the events' effectiveness and efficiency, and raise awareness of potential park tenants about the events [15].

2.2.3 Corporate website

Many firms evaluate that when they implement various marketing techniques, the official website is indispensable. The corporate website is the platform where the company promotes the brand by providing essential information about the establishment of the company, products, and services offered for B2B partners. As the case of QTSC, the website of the park contains additional information such as park's members and the community, the technology incubator, and the recent projects, etc. The corporate website is a one-way channel and highly controlled by the company, which means that the company ultimately decides the content they want to post on their website [16]. Using a corporate website delivers many advantages to the company. First, the website is a cost-effective method for marketing practitioners to approach domestic and international customers. Second, the corporate website can enhance the relationship between the company and its customers [17]. Therefore, the marketers can utilize the company website as one of the web-based tools to increase brand awareness and strengthen the relationship with partners.

2.2.4 Social networking sites

Social media is considered as two-way marketing channel where the companies and the customers can interact with each other [16]. Firms recently have recognized the importance of social media; thus, they have permeated the online social platforms by directly providing their websites to social networking sites to promote the brand image and establish a brand community. Firms can take advantage of several social networking sites such as Facebook, LinkedIn, Google+ to connect and enhance relationships with their partners and attract potential customers. Social media channels have been proved to benefit and enhance companies' economic value [18]. In the case of the STPs, the management team can employ various professional social sites such as LinkedIn and Google+ to approach potential park tenants to offer them opportunities to cooperate. In addition, social networking sites support the STPs to gain customers' insights that enable the parks to improve the services. Social media channels are an effective way to provide information about the STPs and connect members in the parks and establish communities, which in turn promotes the brand image.

2.2.5 Email marketing

Email marketing is one of the main marketing channels for B2B companies in the digital era because of its convenience and effectiveness. Email is considered a two-way communication channel in which business partners can interact with each other by delivering emails containing the necessary information. However, most of the time, email marketing is classified as a one-way marketing channel because B2B companies often use email to send brochures, newsletters, promotions, etc. without requiring responses [16]. The email characteristics of flexibility, ease of use, and cost-effectiveness allow STPs to approach target partners to precisely deliver what the parks offer. In addition, firms can quickly gather data and feedback to gain customer insights, which helps firms to adjust and improve marketing strategies in the future. Email marketing is cheaper and more effective than other online marketing channels [19]. The marketing team of the STPs can take advantage of email from several platforms such as Gmail and Outlook to offer the services and the opportunities for collaboration. Nevertheless, B2B companies have to consider some problems using email as a marketing communication channel. First, the content of an email should clearly present the offers to partners. Second, the frequency of sending emails needs to be

calculated carefully to avoid duplication, which may confuse partners and can be categorized as spam, and thus it cannot react to the audiences. Therefore, the STPs should be aware of these phenomena and concentrate on directly addressing the customers' needs to maximize the effectiveness of email.

2.2.6 Search Engine Marketing (SEM)

Search engines are widely used by Internet users to garner information because of its effectiveness in retrieving relating information from websites and navigating customers towards the company products and services [20]. A stronger presence in search engines positively influences brand equity, which leads to higher profits. SEM has become more popular among B2B companies because it enables them to increase their ranking and the presence of their websites to target customers. SEM strategies often comprise some actions such as paid advertising, SEO, and keyword-related banner advertisements. Marketing campaigns applying SEM emphasize that marketing budget and keywords matching contribute to customer engagement. Thus, STPs can create a list of keywords that concentrate on the relevance and diversity to enable business partners to easily access corporate websites when searching those keywords on search engines. SEM is considered to be a one-way communication channel because there is no interaction between the company and its customers. The firm, in addition, cannot completely control the search engines but must depend on the service providers and the number of customers searching the relevant keywords [16].

3 Methodology

This research applies a mixed research method that combines qualitative and quantitative approach to achieve the objectives of selecting appropriate marketing tools to promote the brand of QTSC. A comprehensive literature review and semi-structured interviews with the representatives from QTSC were included in the qualitative approach to propose six marketing tools. Next, the measurement scale was also scrutinized by the advisor and the park representatives before sending it to participants. Meanwhile, the quantitative method is applied by using the AHP approach to evaluate and rank the marketing tools derived from the qualitative step.

There are several marketing tools extracted from previous published papers. Concurrently, a semi-structured interview was conducted with a group of representatives from QTSC to get a general view of the current marketing tools that the park is using to promote its brand. The questions were proposed by the authors to merge the academic knowledge from the literature review with the practical situation in the business environment. After the discussion, there are six marketing tools proceeded to the quantitative phase, namely print media, networking/industry events, corporate websites, social networking sites, email marketing, and SEM.

In the quantitative phase, the AHP approach was chosen to resolve the problem. Firstly, the AHP is a relatively simple and optimal approach for the assessment of marketing tools. The AHP can generate the priority for the tools proposed in the context of this study, which is suitable for finding the combination of effective marketing techniques for the brand promotion of the park. Secondly, the AHP is supposed to be a useful and flexible tool for making decisions [21]. The characteristic of AHP is the decomposition of a complicated issue into a hierarchical structure. The ranking result or prioritization generated from AHP analysis is the most critical outcome that this study targets. The questionnaire was designed by applying the Saaty's scale by using the AHP approach [21]. The questionnaire was distributed to 20 persons to evaluate six alternatives in pairs. The determination of sample size was based on a previous research in which states that small sample size is considered qualified to achieve the desired outcomes in qualitative research [22]. In addition, there is no requirement or general regulation on the minimum sample size for

the researches applying the AHP approach. In addition, to obtain and maintain the quality of the results, the participants should be experts and professionals who have intensive knowledge or experiences in the relevant topic. Therefore, the number of 20 participants in this research is accepted. The data collection phase was conducted mainly at QTSC and a public university located in Ho Chi Minh city, Vietnam.

4 Results and Discussions

There are 20 participants taking part in this study, including 14 people from QTSC and six people from the public university. Most of them are working in the companies while the remaining is teaching and researching in the public university. Sixty percent of the participants have achieved bachelor's degree. Meanwhile, 40 percent of the participants have attained Master and Ph.D. degrees. The majority of the respondents work for large companies with the number of employees from 100 to 500. The participants work as managers, specialists, lecturers, and employees in various relevant fields such as business management, economics, public policy, general marketing, event marketing, strategy and market development.

The Analytic Hierarchy Process is applied to determine the priorities of six marketing tools for QTSC. The data was entered into the system software to its suitability. The consistency ratio of this study is 0.018, which is less than 10%, as suggested by [21]. Therefore, the results are appropriate. The priority is presented in Table 1. The tool of networking or industry event (NI) accounts for the highest percentage in all six alternatives, with 23.2% of relative weight value. The corporate website (CW) follows with a relative weight of around 19.8%. The search engine marketing (SEM) takes the third position with the priority weight of 18.5%. Social networking sites (SNS) account for 15.5%, while the relative weight of print media (PM) is 14.4%. Particularly, SNS and PM respectively gain the fourth and fifth positions. Email marketing (EM) is considered the least preferable marketing tool with a weight value of approximately 8.5%.

Table 1. The ranking order from the analytic hierarchy process

Criterion	Marketing tools	Ranking	Weights
NI	Networking/industry events	1	23.20%
CW	Corporate website	2	19.80%
SEM	Search engine marketing	3	18.50%
SNS	Social networking sites	4	15.50%
PM	Print media	5	14.40%
EM	Email marketing	6	8.50%

Based on the results, this study shows that NI is considered the most preferable marketing tool for the STPs, especially in the case of QTSC. It can be explained that face-to-face meetings create favorable conditions for the firms' representatives to communicate to promote their brands directly. Moreover, though the networking event is an offline marketing tool, it is still a powerful technique for marketing campaigns. Online marketing is significant due to technology development, but it does not mean that offline marketing is downgraded. The first position of NI emphasizes the argument that offline marketing should not be ignored. Hence, it can be combined with online tools in order to create marketing synergies and achieve better outcomes, which is in line with the research of [23]. The following positions are online tools of CW, SEM, and SNS, which implies the importance and effectiveness of online marketing in the digital era. B2B companies have been advised to uphold a strong online presence through various platforms such as websites, blogs, or through social media platforms. These arguments are compatible with the previous study [5]. In addition, compared to the AHP results and the opinions derived from discussions with many participants, the CW is generally the most powerful online marketing tool for QTSC rather than SEM and SNS. In the context of the STPs, it can be explained that there are

no other official platforms providing enough information for the B2B partners than the corporate website does.

Meanwhile, SEM is also a middle-effective tool for QTSC to promote the brand image by utilizing search engines to enhance its online presence. It allows potential park tenants to quickly approach the corporate website or other relevant information by entering the keywords into search engine. On the other hand, SNS is not highly evaluated with the lower-middle position in the ranking. According to the interview with the participants, they suppose that SNS is not too important in the marketing strategy of QTSC because of differences in the nature of target customers. Notably, social media platforms such as Facebook, LinkedIn, Google+, and so on seem not to significantly contribute to the brand image of QTSC and rarely potential park tenants approaching the park by social media channels. Thus, B2B firms, especially QTSC, do not highlight SNS in their marketing strategies, which is in harmony with the research of [18]. Print media is one of the least effective marketing tools overall because it does not briskly gain the target customers. In addition, print media is expensive and detrimental to the environment, which is compatible with the previous study [13]. Hence, reducing the allocation for print media is expected to cut costs for the companies. Last but not least, email marketing is considered to be the least effective technique in this study. Interestingly, although this is one of the cheapest and fastest marketing tools, it is ranked in the last position. This result is incompatible with the study of [19], in which has reiterated the effectiveness of email marketing. The possible explanation for this finding is that email can easily be classified into the spam folder, and several potential companies often ignore the information attached in the advertising emails. Moreover, it is less likely that emails can reach the management boards who are competent to decide whether to locates their companies in the park or not. Therefore, it is not an effective marketing tool in terms of targeting potential park tenants.

5 Conclusion

In conclusion, this research aims to determine and rank the appropriate marketing tools for the brand promotion of STPs, in the case study of QTSC in Ho Chi Minh city, Vietnam. This study uses mixed methods to find out the priorities of six proposed tools. Moreover, the AHP approach is utilized to rank the marketing channels to assist the park in selecting the most appropriate tool or the effective combination of tools for its marketing strategy. The results reveal that networking or industry event is the most preferable tool to promote the brand of QTSC while email marketing is the least preferable technique. Moreover, except the industry events, online marketing tools dominate the ranking table. Besides, no marketing communication channels are outranking all others, which implies that marketing integration or the combination of several marketing tools is significantly essential.

Regarding theoretical implications, this study contributes to the deficiency of literature review on the marketing tools selection for the STPs. This study is also an application of the AHP that is first implemented to select the marketing strategies for the STPs, which is the pioneer in Vietnam. In terms of managerial implications, this study provides an overview of the marketing plans of QTSC for the management boards. It is hoped that the findings can assist the marketing department and the top managers of the park to allocate its resources better to promote its brand. From the practical perspective, choosing the suitable marketing tools is critical because QTSC aims to attract larger companies to locate their businesses in the park and use its strong brand to establish STP chains and expand the networks to other provinces and regions in Vietnam. Therefore, this study is considered as one of the references which can support QTSC's strategies.

5.1 Recommendations and limitations:

Firstly, by scrutinizing the findings of this study, we suggest that QTSC needs major assessments that consider a wide range of criteria to decide to use suitable marketing tools for specific purposes accurately. Secondly, the marketing practitioners of QTSC can consider organizing more networking or industry events for many companies to gather and share their experiences and increase the chance of attracting potential park tenants. Thirdly, QTSC should enhance the official website to provide more necessary information and news. Fourthly, SEM and SNS can be employed because of its availability and cheapness; however, QTSC should not rely on these tools but use them as additional techniques with other major marketing channels. Moreover, the social network platforms need to be selected carefully to ensure the professionals of the park but still can cover the wide range of potential B2B customers. Finally, printing media and email marketing should be remained with the least efforts because it is not highly recommended by the experts in this study.

There are two fundamental limitations remained in this research. First, due to some objective constraints, the research is mainly conducted in Ho Chi Minh city. Further studies on the same topic should consider visiting other cities and provinces where QTSC is planning to generate the QTSC chain and increase the variety of respondents' profiles. Secondly, the previous literature review on the same topic is significantly limited, which causes difficulties during the procedure. Thus, this study hopes to contribute to the deficient literature review for further researches.

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