Application of Analytical Hierarchy Process for Investigating Satisfaction Factors in Organizing a Marathon Running Event

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Abstract: *The research on the application of analytical hierarchy process for investigating satisfaction factors in organizing a marathon running event was conducted by means of quantitative and qualitative methodology. The findings revealed that the importance of these factors was 7.395; the factor satisfaction was 6.901, resulting in 69.44 percent of the satisfaction index of the marathon race at present. For "Hierarchy Weight Value of Factors" of how all seven main satisfaction factors of the marathon event were related to the three stakeholders; event's organizers, athletes and sponsors, it was found that the sponsors and event's organizers got the most valued weight in terms of cost investment factor (0.32 and 0.25) respectively, but the athletes got the most valued weight in terms of competition system factor (0.23). Overall, the competition system factor was the most valued weight (0.25). Under this factor, the sponsors gave the most valued weight to mini marathon [10.550-15.0 Km.] (0.301); the event's organizers gave the most valued weight to marathon [42.195 Km.] (0.342), and the athletes gave the most valued weight to half marathon [21.1-32.0 Km.] (0.332). The overall findings of the three stakeholders' weight hierarchy of factors in organizing a half marathon, a mini marathon, a marathon and a fun run (0.285, 0.281, 0.263 and 0.171 respectively). However, when this model of the competition system was applied to a real marathon competition, it was found that the values of the satisfaction factors and indexes considerably increased. The findings from this research can be applied to running a marathon competition organization efficiently and effectively when its purposes are clearly specified and when each satisfaction factor is selected and modified to suit the objective of the organization which organizes the marathon event.*

Keywords: Satisfaction Factors, Analytical Hierarchy Process, Marathon Running Event

Introduction

"Walking and Running for Health" is a type of exercise which is easy, economical, and popular. Other activities can be integrated in walking and running, which are core exercise, to boost up healthiness such as swimming, cycling, and aerobic dance. The effort is to offer good health particularly to youths and senior citizens from exercise on a regular basis is in line with integrated development whose center is on the citizen, on the ground of national development plan. The aim is to encourage people in all levels of the nation to have exercise, sport, and participate in recreation as a part of their routine, which would lead to improving the quality of life, boosting up body and spirit, and implanting virtue, morality, and sportsmanship, to shape happy society so as to become a healthy country. This concept aligns with The Eleventh National Economic and Social Development Plan (2012 – 2016) (Office of the National Economic and Social Development Board, 2012) and The Fifth National Sport Development Plan (2012 – 2016), (Sports Authority of Thailand, 2012) launched by the government and state enterprise. In addition, as Thailand has to deal with swift and complicated changes more

than ever, rooted by domestic and offshore, where these changes are an opportunity and a risk to national development, particularly an obligation as a part of AEC community in 2015, it is necessary for Thailand to urgently prepare the country to be ready and adaptive for the change in the appropriate direction in terms of people, society, and economy, and be able to move the country forward in pursuit of happiness for Thai society on the ground of sufficient economy. This reason has revealed its importance in the eye of private organizations together with marketing opportunities. That is, "Sport for All", marathon running events in particular, are likely to be a good opportunity to promote and publish about the brands of product and services to be known and to be attractive to customers widely and quickly. It is also a suitable way to establish relationships to customers and return profits to the society, in order to develop levels of satisfaction, starting from continuous satisfaction to the highest satisfaction which eventually would become "loyalty" for that event

Presently, organizers of marathon running events in Thailand have dramatically developed systems for the event, for example, an attempt to change the system of the marathon event to contain more varieties of distance over various times by offering 3, 4, and 5 distances (categories of competition system), rather than merely having one or two distances. Moreover, other activities may be available at the competitions such as road bicycle racing (road bike/mountain bike), cross country bike competition (mountain bike), aerobic dance, family rally, and cycling for health. In order to increase attractiveness and options for athletes and their families, tour packages are added at a time of bringing the athletes to attend each event. This also adds a new perspective and marketing opportunity for sponsors of each marathon running event. The strong growth of marathon running events and applying new technology to the events are obvious, nevertheless, there is no research on main factors affecting marathon running events which can create satisfaction to the organizers, athletes, and sponsors who have diversity and complexity. These participants do not have clear structure, especially in terms of decision making to be consistent with quantitative factors. The satisfaction factors in these three stakeholders have shown some positive attitudes regarding mind, emotion, [applied from Hall, O'Mahony, and Vieceli (2009)] and sentiment of these 3 groups of people involving with marathon running event, although the satisfaction is abstract created by expectation or hierarchy rank based on capability of fulfilling the requirement at a time of marathon running event. The satisfaction factors can be altered due to time, value, and experience of persons in these three stakeholders. [applied from Hall, O'Mahony, and Vieceli (2009)] . Therefore, an effort to manage satisfaction factors which corresponds to standardized marathon running events on the ground of satisfaction quality requires a tool for decision making. This is the reason why the researcher has adopted the "Analytical Hierarchy Process: AHP", a system created to imitate the human thinking process which is easy to understand by comparing elements in pairs (pairs :- It is comparison of two factors between the first and second one that which one would have higher hierarchy throughout all factors). and finding a weighting level of factors, aiming at processing the results, leading to the best alternatives, based on the decision-making criteria for an achievement of overall goal (Saaty, 1980), for the benefits of marathon running events in the future. Thus, the researcher is interested to conduct a research on "Application of Analytical Hierarchy Process for Investing Satisfaction Factors in Organizing a Marathon Running Event".

Objective, Scope, and Framework of the Research

The research on the "Application of Analytical Hierarchy Process for Investigating Satisfaction Factors in Organizing a Marathon Running Event" is subject to satisfaction factors collected from organizers, athletes, and sponsors in the areas of Bangkok, vicinity, and six regions in Thailand including the north, north east, south, west, east, and central (based on geographical criteria), to create a model for competition system; the competition system created would be suitable for and corresponding to the hierarchy of satisfaction factors towards marathon running event. The researcher set up the objectives as follows:

Figure 1:- The model is derived from experience in participating conferences including field trips abroad and literature review. It is related to 3 stakeholders and can be classified into 7 main groups. The AHP is applied to prioritize the importance level of 7 main factors in order to create a model of organizing marathon running events. The researcher adopted the model to the actual events to test whether the model from research can be used in practice or not.

To study the satisfaction factors towards marathon running events in terms of the importance on factors, satisfaction of factors, and creating "satisfaction index" for current marathon running events;

1. To study the hierarchy of satisfaction factors which affects organizing marathon running events and creating a model of marathon running system, by means of the "Application of Analytical Hierarchy Process for Investigating Satisfaction Factors in Organizing a Marathon Running Event" on the basis of satisfaction factors collected from organizers, athletes, and sponsors; and

2. To evaluate the results of using the created model, by applying the analytical hierarchy process (AHP) in organizing three marathon running events, so as to be spatial data for the research.

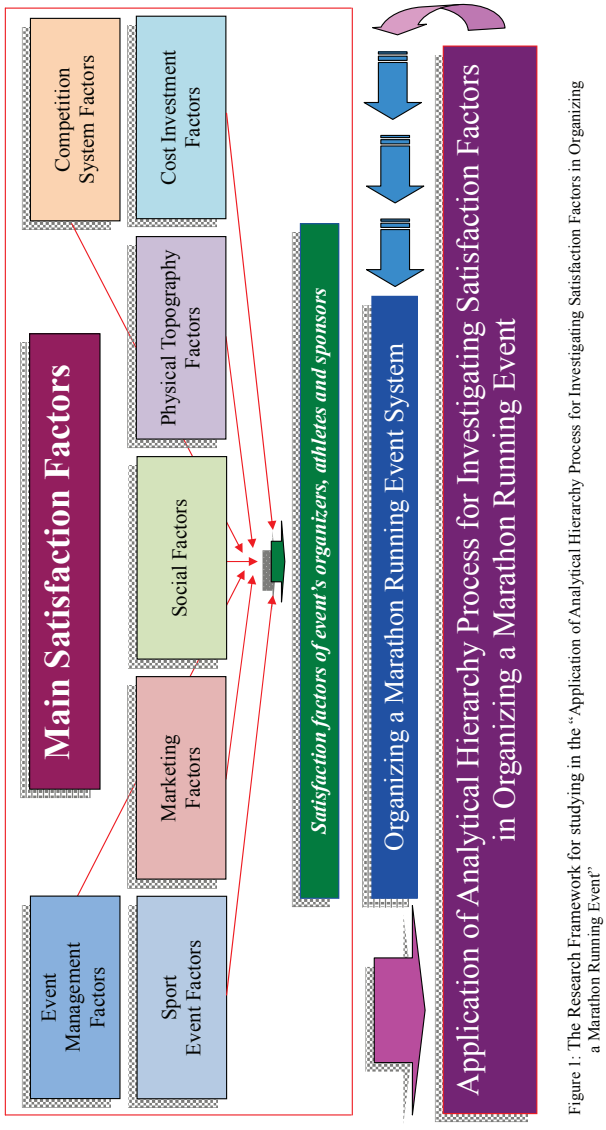

Figure 1: The Research Framework for studying in the "Application of Analytical Hierarchy Process for Investigating Satisfaction Factors in Organizing a Marathon Running Event"

Literature Review

Apart from the satisfaction factors towards organizing a marathon running event derived from data collection in the venues of marathon events by using questionnaire to interview a sample group of 2,632 persons and in-depth interview to a sample group of 65 persons (3 stakeholders: 30 athletes, 20 event organizers, and 15 sponsors), the researcher applied the data collected from numerous sources, especially in literature review as the following.

Schofied (1983); Hensen and Gautheir (1989); Zhang, Pease, Hui, & Michaud (1995) mentioned about factors in attending sports events such as economic factors, demographic factors, game attractiveness factors, and residual preference factors which correspond to Wells, Southall, and Peng (2000). They also added about social psychological factors. Ferreira and Armstrong (2004) additionally talked about other factors which are overall popularity of sports, free offerings and promotion, pre-game and in-game entertainment, convenience and accessibility, labels physical contact, facility, and ticket price. Furthermore, Lee and Bang (2003) proposed that the factors include team performance, weather, competition, fan identification, social interaction, entertainment, new stadium, and quality of food services. Hall, O'Mahony, and Vieceli (2009) provided their opinions that the factors consist of emotion, true fan, front room, back room, media alternative, and family and friend. In terms of intention to attend and participate sports-related activities, Zeithaml, Berry & Parasuraman (1996); Cronin, Brady & Hult (2000); Ajzen (2005), Carroll (2009), Dolmont (2009), Menefee (2009), and Yoshida (2010) give similar opinions that the factors comprise of game revisit, recommendation, positive word of mouth, persuasion, purchase of souvenirs, loyalty to company or service,

higher spending (the customers are willing to pay more for better goods or services) based on the importance and attraction of games or activities. Hensen and Gautheir (1989); Yoshida and James (2010) identified about the related factors i.e. competition in special occasions, number of reputational sportsman, and atmosphere of games. In this regard, Smith (2008: 36-39) specified that the attractions of activity are psychological, social and cultural, and personal. Wann (1995); Funk (2000); Funk & Pastore (2000); Trail, Anderson & Fink (2000); Wann, Royalty & Rochelle (2002); Shank (2009) added and supported that the activities which can attract spectators and participants must have excitement, enjoyment, and entertainment value which can build or boost up pride of individual or community motivated by sports. Meanwhile, the athletes can build up alliance, sociability, relaxation, representation of success, source of knowledge, artistic value, economic value, family relationship, necessity for alliances sharing similar quality of expression, and physical and qualitative characteristics of participants who want to escape the monotony of everyday life.

Therefore, in order to organize marathon running events and create games carrying the above-mentioned factors completely, Masteralexis, Barr & Hums (2005) and Westerbeek, Smith, Turner, Emery, Green & Van (2007) mentioned about event management that it must comprise main functions which are financial and budget management (for the success of overall competition), risk management (which is loss management such as asset, equipment, image, market share), organizing competition (i.e. framework of event, equipment, necessary facility, schedule of activity, considering important supporter, making agreements of signs to be placed, venue, food and beverage, sale of souvenir, marketing promotion activity, transportation, communication, responsibility, authority line, security, policy, and mass controlling), registration management, voluntary management, and marketing management. Funk (2008) gave his opinion that organizing sports competitions needs to consider facility service, communication tool, food and beverage, geographical relation of venues, accommodation, sign and decoration, language service, maintenance of infrastructure, medical treatment and first aid, transportation, and safety and security.

According to the above-mentioned data of satisfaction factors of organizing marathon running events which was gathered from numerous sources, a total of 85 factors were classified into 7 main factors as the following.

(1) Event Management Factors (EMF)
(2) Sport Event Factors (SEF)
(3) Marketing Factors (MKF),
(4) Social Factors (SOF)
(5) Physical Topography Factors (PTF),
(6) Cost Investment Factors (CIF)
(7) Competition System Factors (CSF)

Methodology

The research on the "Application of Analytical Hierarchy Process for Investigating Satisfaction Factors in Organizing a Marathon Running Event" is combined by using both qualitative and quantitative methods. The researcher gathered information from literature review and survey by using questionnaires to interview sample groups for data in marathon running venues, through multistage random samplings. The methods are blended from cluster sampling, stratified sampling, and simple random sampling from 2,632 contestants, 55 venues, 38 provinces, and 6 regions in total. The researcher also collected data from in-depth interviews on the ground using the purposive sampling method from 30 athletes, 20 event organizers, and 15 sponsors, with a total of 65 persons. In addition, 3 test venues were designed to evaluate the results obtained from applying AHP, aiming for geographical data as case studies which were "Hua-Hin Mini and Super Half Marathon 2013 (Mountain, Sea, Beach)", "Chaiyaphum International Marathon 2013" and "Angthong Super-Mini Half Marathon 2013 (Green Field)". The AHP process is then applied repeatedly to analyze the suitability and correspondence of the importance factors and satisfaction factors regarding 3 stakeholders. The data applied for the analysis is derived from experience in the venue of marathon events of researcher, inquiry, advice and instruction from knowledgeable people in marathon running business, domestic and offshore experts. It is also from studying related documents and research papers.

Results and Discussions

According to the research on the "Application of Analytical Hierarchy Process for Investigating Satisfaction Factors in Organizing a Marathon Running Event", the researcher can summarize and provide opinions in the results of research as the following.

The data analysis on marathon running events implying 85 factors involved with qualitative satisfaction, while only 7 factors are the most important which can be used for collecting the data by verbal questionnaires, whose quality of survey had received approval from the experts. (Experts :- They are basically categorized into 4 groups with a total of 35 persons. These are (1) organizers of marathon running events of 20 persons, (2) Thai and foreign scholars who possess the knowledge of mass sports (marathon) of 9 persons, (3) the committee members of Thai Health Promotion Foundation of 3 persons, and (4) the companies organizing the running events with 15-30 years of experience of three companies.) The aims of survey are to study and analyze the importance factors, satisfaction factors, satisfaction index, and hierarchy of satisfaction factors, and evaluation on organizing marathon running in actual venues by adopting the model of competition system which is built up from AHP based on the above-mentioned qualitative data of organizing marathon running. The results of data analysis can be explained by issues as the following.

1. The confirmatory analysis on importance factors:

In determining importance factors, 7 main factors in which some of them correspond with previous integration of some authors. They are (1) event management factors (EMF) [Masteralexis, Barr & Hums (2005); Westerbeek, Smith, Turner, Emery, Green & Van Leeuwen (2007); Lee and Bang (2003)], (2) sport event factors (SEF) [Schofied (1983); Hensen and Gautheir (1989); Zhang et al. (1995); Wells, Southall, and Peng (2000); Ferreira and Armstrong (2004)], (3) marketing factors (MKF) [Zeithaml, Barry, and Parasuraman (1996); Cronin, Brady, and Hult (2000); Ajzen (2005);

Carroll (2009); Dolmont (2009); Menefee (2009); Yoshida and James (2010)], (4) social factors (SOF) [Hensen and Gautheir (1989); Yoshida and James (2010); Smith (2008); Wann (1995); Funk and Pastore (2000); Trail , Anderson & Fink (2000); Wann, Royalty & Rochelle (2002); Shank (2009); Hall, O'Mahony, & Vieceli, (2009)], (5) physical topography factors (PTF), (6) cost investment factors (CIF) [Masteralexis, Barr & Hums (2005); Westerbeek, Smith, Turner, Emery, Green & Van Leeuwen (2007)] and (7) competition system factors (CSF) [AIMS : Association of International Marathon and Distance Races (2012)]. The study results contain the following information.

When considering an analysis table of correlation coefficient among observable variables, it was found that most of variable correlation is 0.335 – 0.730, and standard deviation is 6.977 – 34.180 from the total of 2,632 samples in this study. After considering, Kaiser-Meyer-Oklin Measure of Sampling Adequacy (KMO) and Barlett's Test, KMO, a number measuring the random adequacy which is supposed to be close to 1 or its minimum should be 0.5, its actual value is 0.892. While Barlett's Test of Sphericity Approx. Chi-Square provides 11547.971, df 21, and Sig. .000; it is a value testing the relation of variables. In this regard, p-value is close to zero which is less than 0.05, or a significant level. This number represents that each variable used in this analysis has suitable relation. Therefore, each variable can be used for a method of factor analysis.

The results of analysis by means of linear structural relationship model (LISREL Model) found that the importance on factors (expectation on factors) in organizing a marathon running event model is consistent with empirical data. These can be considered from $\chi^2 = 4.0$, df 5, p 0.87, GFI 1.00, AGFI 1.00, RMR 0.0020, RMSEA 0.000, and $\chi^2 / df = 0.806$. The p value amounting to 0.87 which is more than 0.05 showed the acceptance of null hypothesis which specifies the model used for measuring factors correlated to importance on factors in organizing marathon running event and empirical data model has no difference. The result of analysis on GFI and AGFI found that is close to 1. Moreover, RMR and RMSEA which are close to 0 and under 0.005 represent the alignment of theoretical model and empirical data.

2. The confirmatory analysis on satisfaction of the 7 main importance factors:

The confirmatory analysis on satisfaction in 7 main factors consisting of (1) event management factors (EMF) [Masteralexis, Barr & Hums (2005); Westerbeek, Smith, Turner, Emery, Green & Van Leeuwen (2007); Lee and Bang (2003)], (2) sport event factors (SEF) [Schofied (1983); Hensen and Gautheir (1989); Zhang et al. (1995); Wells, Southall, and Peng (2000); Ferreira and Armstrong (2004)], (3) marketing factors (MKF) [Zeithaml, Barry, and Parasuraman (1996); Cronin, Brady, and Hult (2000); Ajzen (2005); Carroll (2009); Dolmont (2009); Menefee (2009); Yoshida and James (2010)], (4) social factors (SOF) [Hensen and Gautheir (1989); Yoshida and James (2010); Smith (2008); Wann (1995); Funk & Pastore (2000); Trail , Anderson & Fink (2000); Wann, Royalty & Rochelle (2002); Shank (2009); Hall, O'Mahony, & Vieceli, (2009)], (5) physical topography factors (PTF), (6) cost investment factors (CIF) [Masteralexis, Barr & Hums (2005); Westerbeek, Smith, Turner, Emery, Green & Van Leeuwen (2007)] and (7) competition system factors (CSF) [AIMS : Association of International Marathon and Distance Races (2012)] provided the results as below.

When considering an analysis table of correlation coefficient among observable variables, it was found that most of variable correlation is 0.555 – 0.789, and standard deviation is 6.977 – 39.098 from the total of 2,632 samples in this study. After considering Kaiser-Meyer-Oklin Measure of Sampling Adequacy (KMO) and Barlett's Test, KMO, a number measuring the random adequacy which is supposed to be close to 1 or its minimum should be 0.5, its number is 0.921. While Barlett's Test of Sphericity Approx. Chi-Square provides 15007.102, df 21, and Sig. .000; it is a value testing the relation of variables. In this regard, p-value is close to zero which is less than 0.05 or a significant level. This number represents that each variable used in this analysis has suitable correlation. Therefore, each variable can be used for a method of factor analysis.

The analysis on confirmatory component by Lisrel program found that satisfaction model in organizing a marathon running event is in consistent with empirical data. It can be considered by , df 5, p 0.544, GFI 1.00, AGFI 1.00, RMR 0.0025, RMSEA 0.0000, and . The p which is beyond 0.052 means the acceptance of null hypothesis which specifies the model used for measuring factors correlated to satisfaction in organizing marathon running event and empirical data model has no difference. The result of analysis on GFI and AGFI found that is close to 1. Moreover, RMR and RMSEA which are close to 0 and under 0.005 represent the alignment of theoretical model and empirical data.

3. Satisfaction index towards organizing marathon running events:

The calculation on satisfaction index towards organizing marathon running events can be conducted from the result of data analysis in terms of the importance on factors and satisfaction of factors of organizing marathon running events, based on participation in the events in previous year. The researcher can summarize overall current picture of importance on factors averaged 7.395 and satisfaction of factors averaged 6.901. The satisfaction index towards quality of organizing marathon running event amounted to 69.44%. The results of study are the following.

3.1 The analysis in relation to the importance on factors towards satisfaction factors of quality for organizing marathon running events in various aspects found that the 7 main important factors were ranged 7.191 – 7.897. These contained social factor (7.897), event management factor (7.539), sports event factor (7.537), competition system factor (7.512), physical topography factor (7.475), cost investment factor (7.212), and marketing factor (7.191) as a minimum respectively.

3.2 The satisfaction analysis on 7 main satisfaction factors in association with quality of organizing suitable marathon running events in various aspects revealed that the satisfaction value was ranged 6.561-7.598. They contained social factor (7.598), sports event factor (7.155), competition system factor (7.154), physical topography factor (7.065), event management factor (6.938), marketing factor (6.662), and cost investment factor (6.561) as a minimum respectively.

3.3 The analysis on satisfaction index towards 7 main satisfaction factors of organizing suitable marathon running events in various aspects showed the satisfaction index ranged 66.889 – 76.049%. They comprised social factor (76.049%), sports event factor (71.766%), competition system factor (70.828%), event management factor (69.529%), physical topography factor (68.703%), marketing factor (66.959%), and cost investment factor (66.889%) as a minimum respectively.

4. Determining of factor hierarchy based on AHP :

In search of factor hierarchy, the analysis on this matter found that event sponsors and organizers gave the first ranking to “cost investment factor” of 0.32 and 0.25 respectively, from the 7 main satisfaction factors regarding quality of organizing marathon running events. The athletes focused on “competition system factor” as their topmost ranking of 0.23. The first ranking of overall 3 stakeholders went to “competition system factor” of 0.25. However, the second and third rankings of overall 3 stakeholders were “cost investment factor” and “event management factor” of 0.22 and 0.13 respectively.

In terms of analysis on hierarchy of satisfaction factors towards quality of organizing current marathon running event, there are minor factors which are under main factors involved with competition system factor as the following.

The analysis on “competition system factor” found the hierarchy of minor factor which are under the main factor. The sponsors gave the importance to “mini marathon with 10.550 – 15.0 kilometer” as the first rank of 0.301, while the organizers gave the highest rank to “marathon with 42.195 kilometer” of 0.342. However, athletes and overall 3 stakeholders both placed their foremost rank on “half marathon with 21.1-32.0 kilometer” of 0.332 and 0.285 respectively. Nevertheless, the minor factors holding lower hierarchy as the second, third, and fourth were “mini marathon with 10.550-15.0

kilometer", "marathon with 42.195 kilometer", and "fun run with 3.0-7.5 kilometer". The overall 3 stakeholders gave the number of 0.281, 0.263, and 0.171 respectively.

5. Ranking values of marathon competition system:

The ranking analysis of marathon competition system revealed the following results.

In consistent with application of analytical hierarchy process (AHP) and importance on factor, satisfaction of factor, and satisfaction index of organizing marathon running event at present, on the ground of satisfaction from the 3 stakeholders for quality of events, the analysis found that the best competition systems gave the highest importance on factor (7.512), satisfaction of factor (7.154), and satisfaction index (70.83%). These are marathon systems with a distance of 21.1-32.0 kilometer (0.285), 10.550-15.00 kilometer (0.281), 42.195 kilometer (0.263), and 5.00-7.5 kilometer (0.171) respectively. (figure 2 and 3)

	Competition System
Fun Run 3.0-7.5 Km.	0.171
Mini Marathon 10.550-15.0 Km.	0.281
Half Marathon 21.1-32.0 Km.	0.285
Marathon 42.195 Km.	0.263

Figure 2: Ranking of marathon running systems

After considering the result of analysis on ranked marathon running systems as shown in table 8, together with other ranked satisfaction factors towards event management factor and cost investment factor, it was found that the rank of marathon running system at that time is significantly changed. This result led to tests of marathon running system so as to gather fundamental geographic data set which is study cases of 3 venues. The results of study revealed the increase in all satisfaction factors relating to marathon running events in the actual 1-3 venues to reach 3-7% in venue 1, 14-26% in venue 2, and 7-15% in venue 3. Therefore, the "satisfaction index" of 3 venues approximately rose by 10-12%.

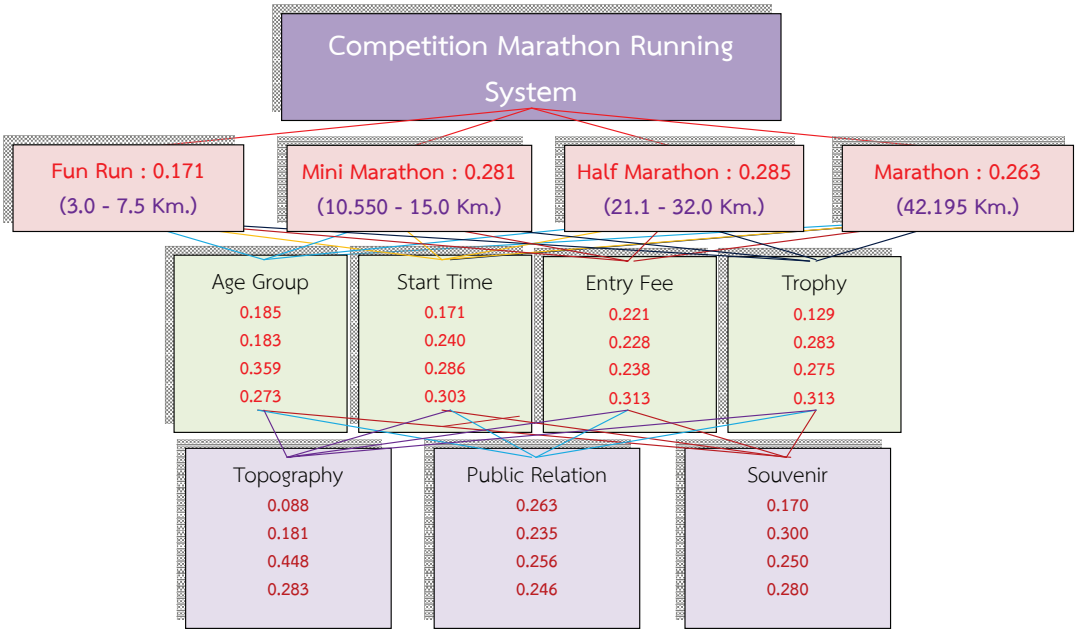

Figure 3: The system of marathon running management holding good ranking :- *It is the best system of organizing marathon running events which was derived from applying AHP. The system is tested in organizing actual three marathon running events. Other minor satisfaction factors are considered such as age classification, starting time, application fee, type of trophy, advertisement, public relations, souvenir, and topography of venues.*

Conclusion

According to the result from integrated analysis of entire data, the researcher can find various interesting points as below.

1. The findings reveal that the importance of these factors is 7.395; the factor satisfaction was 6.901, resulting in 69.44 percent of the satisfaction index of the marathon race at present.

2. Marketing-wise, Half Marathon Competition System [21.1-32.0 Km.], Mini Marathon competition system [10.550-15.0 Km.], Marathon competition system [42.195 Km.] are ranked with 0.285, 0.281, and 0.263 respectively following by Fun Run competition system [3.0-7.5 Km.] with 0.171.

3. Correlation between Marathon event in the past and the subjects (three chosen events) based on satisfaction factors to the three stakeholders is found positively in every dimension that the values of the satisfaction factors and indexes considerably increased.

4. Application of this research can improve both efficiency and effectiveness of the Marathon Running Event Management. Events with different objectives can be managed differently. Among others, these 7 satisfaction factors would benefit to all three stakeholders of Marathon events—organizers, athletes, and sponsors.

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