

Sensor based running solutions: a quantitative segmentation study

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Abstract

The aim of this study was to identify different segments of runners, and build a profile of these segments in order to gain a better understanding of the market. With a survey, data was collected and results showed that it was possible to segment the market to a certain extent into Competitive runners, Weight watchers and Health Gurus. Competitive runners had higher levels of fun in running and ran longer distances than the other segments. Weight watchers attached more value to the benefit of losing weight and in improving their physical appearance. Additionally, the weight watchers attach high value to the motivating capabilities of sports applications. The Health gurus attached the highest value to the general health benefits accompanied with running. Furthermore, the Health gurus attach the highest benefit towards injury preventing capabilities of sports applications. Respondents in this segment rate the function of being informed on their physical wellness significantly higher than the other segments. The segments however, were fairly homogeneous on a large set of variables. This provides opportunities for a single marketing strategy (e.g. price/promotion) that can reach the different types of runners. Further research can be done towards attitudes and perceptions towards different types of similar products in the market.

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Introduction

1.1 General introduction

In a time where health and lifestyle are of growing importance in our daily routines, more attention is paid towards the products and processes that promote a healthier way of life. A balanced lifestyle and health driven habits are often accompanied by sports. A favorable and commonly practiced sport is running. It is accessible to most and is therefore one of the most popular sports in the Netherlands. Over two million people are actively participating in running. Running however is a sport that is associated with copious amounts of injuries (van Gent et al., 2007). Around 640.000 injuries are related to running in the Netherlands alone.

A factor that partly accounts for these immense amounts of injuries is fatigue. Studies have shown that fatigue is able to cause significant changes in the mechanics of running (Clansey et al., 2012), which then could partly cause injuries. Fatigue causes a decrease in the ability to absorb a potentially injury inducing impact. The relation between fatigue and injuries is therefore of importance when trying to reduce the risk of injury. These findings are emphasized in the study of Reenalda, Maartens, Homan and Buurke (2016). By making use of wireless sensor technology it was possible to analyze running mechanics in a three-dimensional grid on a continuous basis. The inertial sensors provided data of several trained runners over the course of a marathon. By statistically analyzing the data, the study showed that there were significant changes in running mechanics over the course of a marathon for the runners. This shows the potential of 3D kinematic analyses, particularly outside of laboratories and controlled environments. Further study into this field could assist in the reduction of running injuries. A company that is active in this niche is SensoRun.

1.2 SensoRun

SensoRun is a company that was founded in august 2015 by partners Edgar Cukier, Erik Maartens and Jasper Reenalda. The CEO, Edgar Cukier, has a business oriented background whose expertise is used to coordinate the entrepreneurial aspects of the startup. Jasper Reenalda is a motion scientist who works at Roessingh Research and Development. There he is active at the department of revalidation technologies. His research focus lies on the effect of fatigue on movement patterns. Erik Maartens is a biomedical engineer who is also active at RRD. There he helps in the development of sensory systems and algorithms that are able to map human

performances. At SensoRun he can use that expertise to develop feedback systems using inertial sensors. At SensoRun attention is fixated at preventing primary and secondary running injuries and at improving performances. By analyzing individual running techniques and delivering direct advice/feedback this is possible. Current systems that can provide these results are either extremely expensive, complex and location-based or they are too simple, inaccurate and do not provide enough sensory data.

1.3 Product

SensoRun is in the process of developing a product that further builds on current applications of movement analysis and feedback in order to prevent and support in the recovery of injuries. The product consists of three inertial sensors that can be attached to the body and that communicate and transfer data to a designated smart device, such as a smartwatch or smartphone. The sensors are easily attached and reattached through an adhesive. These sensors can accurately capture the movements of the legs of the runner.

The software measures and interprets different sets of parameters, consisting of stride length and frequency, vertical oscillation and numerous others that have been based on scientific research and are linked to injury prevention and performance enhancement.

Traditional running applications that provide feedback on a runner technique, lack in depth, because these applications work with a single, correct way to run. When a runner diverts from this, they are told that their technique is wrong. At SensoRun this view has been rejected. Their research has shown that there is not one single truth to running techniques. It depends on the individual runner.

This is where the SensoRun product distinguishes itself. It provides real-time, high quality feedback, which is applicable to each individual runner. It therefore provides unique feedback, tailored to the individual runner, something that other products are not able to do. The system not only provides valuable information on the running technique, it is also able to adapt its feedback model when changes are recognized by the biomechanical parameters. Through a comprehensible visual and auditory feedback system, the runner receives insightful information on his/her running mechanics.

This forms the basis of the product, furthermore functions and parameters can be extended by adding more external sensors such as heart rate monitors which provide additional valuable data for the runner.

1.4 Problem description

The first prototype has already been developed and has successfully been tested at the Enschede Marathon and at the Zevenheuvelenloop in 2015. Within several years the product can be introduced to the market. Therefore, SensoRun is approaching a stage where it is important to gain a thorough understanding of the consumers of sportive apps. This lack of understanding is the problem at hand. In order to design a marketing strategy, the company should investigate the diversity of a market. One of the most useful tools for understanding the diversity of the market is segmentation (Ruiz, Chebat and Hansen, 2004). Companies are not able to connect with all customers in large, broad or diverse markets. But what is possible is to divide these markets into segments with clusters of customers with distinct wants and needs. The next step is to identify these segments and to determine which segment it serves most effectively. “Businesses can cope with this diversity by grouping customers with similar requirements and buying behavior into segments” (Dibb, 1998, p.394). This is called target marketing. Instead of scattering marketing efforts, it is now possible to focus on the consumers that have the greatest chance of being satisfied. Segments such as professional coaches and runners have already been considered. Physiotherapists and sports doctors are also possible customers that would appreciate and utilize the added value of the SensoRun application. It is however interesting to consider the segment of athletes who do not run as a profession. This could range from casual runners to serious runners. Identifying interesting customer segments will therefore be the primary focus of this study.

1.5 Aim

According to Kotler and Keller (2006), there are three essential stages of market segmentation: segmentation, targeting and positioning. These stages are seen in Figure 1 below. This study will focus on the first step of this process; segmentation.

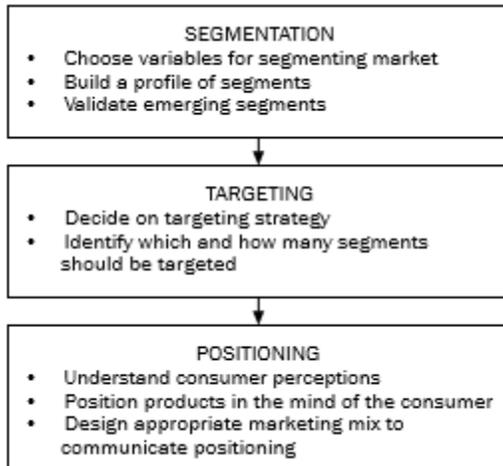


Figure 1. The STP of market segmentation. Reprinted from “Market segmentation: strategies for success”, by S. Dibb, 1998, *Marketing Intelligence & Planning*, 16(7), 395.

Aim:

- This study aims to identify different segments of runners, and build a profile of these segments by using descriptors and behavior related variables. .

1.6 Research questions

What are the benefits sought of potential market segments, and what market descriptors and behaviors define those segments?

Supported by:

What are the benefits sought in sports that define the different segments of runners?

What descriptors define the main segments of runners?

What are the main benefits sought in sports applications by the different segments of runners?

2.1 Targeting specific markets

In the world of sports there is a vast amount of different kinds of consumers. They differ on a large cluster of attitudes, values and perceptions (Shank,2002; Westerbeek & Smith, 2003). The

understanding of these variables can be a challenge, but also an opportunity for marketers when introducing a new product. The importance of segmenting to marketing strategy is widely accepted (Sewall,1978), and is therefore a solid basis for understanding the market. Since the article of Wendell Smith (1956), an increasing amount of attention is being paid to the importance of segmentation. It is a dominant concept in the practice and literature of marketing (Wind,1978). It is important for organizations to identify segments, for it should only target the segments that it can satisfy better than its competitors. Many small companies are too small to serve the whole market, and do not have the resources to do so. By focusing on specific groups, it is possible to tailor the products and marketing mix elements towards the needs and wants of the segment. The targeted segments should then be able to differentiate and appreciate the products from other products on the market (Kotler, 1999). Until other competitors are able to copy your approach, you have a competitive edge compared to rival businesses. Even with a standard product or service, meaning no extraordinary attributes, it is possible to achieve a competitive advantage by adapting it to the needs of a certain niche (Dibb & Simkin, 1996). When a business is able to offer a product or service that is specific for the segment, then that competitive advantage is multiplied (McBurnie and Clutterbuck, 1988).

The segmentation approach can provide a variety of benefits. Through segmentation, companies are able to identify new opportunities in customer groups that are under served. In mature or in declining markets this can be particularly advantageous, for some segments may still be growing (Hooley and Saunders, 1993). By targeting specific markets, companies can become more efficient. With fewer resources it is possible to create a loyal and satisfied customer base. By concentrating efforts on customer groups with homogeneous requirements, companies are more likely to satisfy the diversity of needs with their limited resources (Choffray and Lilien, 1978; Webster, 1991). By analyzing the customer through segmentation, a business is more in tune with its customers. Being more in tune then results in a better understanding of the consumer behavior, wants and their needs. Having a better understanding can lead to an increased responsiveness in terms of the product on offer. All of this improved understanding allows businesses to determine the appropriate segments and the nature of competitive advantage to seek and to develop marketing programmes that are tuned to this understanding (Bonoma and Shapiro, 1983; Frank, Massy and Wind, 1972; Garda, 1981; Powers, 1991). More clarity is then conceived on the process of marketing planning. By highlighting the marketing programme

requirements for customer groups, an important step is made towards creating a suitable marketing strategy (Dibb, 1998). The goal is to create value for your offer and for the marketing efforts to be effective. For the firm this means the identification of valuable customers, the targeting of promotions and communications and higher customer lifetime value. These in turn provide sustainable profit growth. If the efforts are effective, the customers are provided with customized products/services, personalized experiences and increased customer satisfaction. This results in customer loyalty and retention.

2.2 The macro approach

“Benefits sought” are the key ingredients to an effective segmentation (Crompton, 1983). Studies have shown that in the service sector, benefits sought are the fundamental reasons of existence for that service (Haley, 1968). In order to identify the needs of potential customers, several different approaches can be used. There is the possibility of the macro approach, and that of the micro approach. The approach that will be used in this study is that of the macro approach. With this approach the total potential market can be investigated. The market is then delineated in terms of needs of the potential segments. After the segments have been identified on the basis of their needs, it is possible to describe these segments with additional geographic, socio-demographic or behavioral descriptors.

2.3 Variables used for segmenting customers

Through market segmentation it is possible to divide the market into well-defined slices. A market segment consists of a group of customers that share similar needs and wants. For a marketer, it is the task to identify the nature of the markets and to select the appropriate segments to target. To segment these markets a broad number of variables can be used.

Market segmentation presupposes heterogeneity in the preferences of buyers (Green & Krieger, 1991). This affects the eventual choices of the buyers for certain products or services. These heterogeneous preferences for products and services can be linked to variable characteristics of a person or a product (Mahajan and Jane, 1978). These person variables range from demographic characteristics and psychographic characteristics, to product usage and current brand loyalties. The heterogeneity is also explained by situational variables (e.g buying a product for oneself or somebody else). Market segmentation helps to deal with the heterogeneity

of the demand by balancing the variability of needs, and providing an opportunity to satisfy those needs (Dibb, 1998). When companies are aware of this heterogeneity they can act upon this by modifying the service or product attributes, promotion and price. In a market where buyers and sellers seek the best options resulting in a mutual satisfaction of each other's profit objectives, companies can thrive by gaining the upper hand through market segmentation.

The variables can be split up into descriptors, bases and behavior variables.

2.3.1 Descriptors

Descriptors are the variables that describe "who" the customers in the segment are.

Perhaps one of the first variables to be used in history was geographic segmentation. Particularly used by small manufacturers that wanted to limit their investments, or whose small distribution channels were not able to cover the entire country (Haley, 1968). Through geographic segmentation, the market can be divided into different geographical units such as nations, regions, cities and neighborhoods. The company can then decide to operate in certain areas. Regional differences in consumer preferences can provide a basis for geographic specialization (Thomas, 1980). This way a business can tailor its marketing programs to the needs and wants of specific areas or regions. By combining geographic data with demographic data even richer descriptions of consumers and their neighborhoods can be yielded.

In demographic segmentation, the market can be divided on variables such as family life cycle, social class, nationality, family size, age, gender, education and income.

The wants and abilities of consumers change during the life cycle stage. People have different concerns at different stages in life, and this provides opportunities for marketers to focus on certain age segments that may be more concerned with their sportive performances.

Gender segmentation could be of value when trying to promote and sell the actual product. Men and women have different attitudes and behave differently (Brennan, 2009). When promoting a product, men like to read the product information and let that information form an attitude towards the product, whereas women want to relate to a product on a more personal level (Meyers-Levy & Maheswaran, 1991; Meyers-Levy & Sternthal, 1991)

2.3.2 Bases

Bases are the variables that describe "why" the customers do certain things. Not every person who buys a certain product has the same needs, wants or benefits from it. Using variables such as

benefits sought, can help determine the behavior of certain segments. By segmenting consumers according to their needs, it is possible to contrast these segments with other segments in terms of geographics, demographics and life cycles. This way a reasonable deep understanding of the people within a segment can be obtained (Haley, 1968). This provides opportunities to present a product to specific segments in the most favorable light possible.

People want as many benefits as possible, but it is interesting to analyze the relative importance customers attach to these benefits. The way segments differ in this can provide a lever in segmenting the market.

2.3.3 Behavior

These variables segment “what” the customer does. Many marketers believe that variables related to aspects of product usage are good starting points for segmenting a market (Kotler & Keller, 2006). Every product has several kinds of users, ranging from nonusers, to ex-users, potential users, occasional users and regular users. Companies want to keep regular users, and try to attract potential users or to persuade ex-users to come back. The users of products can then be sub divided into light, medium and heavy users of the product. Heavy users often are just a small slice of the total amount of consumers, but they do account for a high percentage of the total amount consumed. Therefore it is more interesting for marketers to attract few heavy users instead of many light users.

2.4 Requirements

In order to develop segments that are meaningful for the business that is selling its product/service, these segments should hold up to certain criteria (Kotler, 1980). The first criterion that should be met is that of a *sufficiently large* segment. A segment should be worth the consideration of the developments of designated programs, services, products, distribution or pricing strategies. The minimal size of a segment is determined by looking at the possibilities of tailoring a separate marketing mix for each segment. If this is possible the segment is large enough.

The next criterion is that the segment should be *measurable*. Each segment should be quantifiable in size. Using demographic and socio-demographic characteristics of segments, data can be collected on expected sizes of potential segments.

The final criterion is that the segments should be *accessible*. The elderly, non-English

minorities or illiterate people are segments that are difficult to reach. In order to communicate with these groups, special platforms might need to be set up. It is easier, and financially more viable to select a segment that is accessible.

2.5 Segmentation in running

In sports, there are many different kinds of runners. Research was able to determine significant differences between men, women, recreational, competitive and obligatory runners (Ziegler, 1991; Ogles & Masters, 2003; Ogles, Masters & Richardson, 1995). In the study of Ziegler (1991), the differences between male and female runners, and between competitive and recreational runners was studied. Significant differences were found between the segment of recreational runners and the segment of competitive runners. Competition, mental fitness and social recognition were of greater importance to the recreational runner than to the competitive runner. Competitive runners also had more injury related concerns than the recreational runner. In a set of attitudes containing among others attitudes such as drudgery, enjoyment, obligation and dealing with stress the competitive and the recreational runner differed.

In the study of Ogles, Masters and Richardson (1995), the obligatory runner was analyzed. The obligatory runner (excessive miles per week, running with an injury and refusing to skip running sessions) was reported to be more influenced by achieving personal running goals, improving themselves and performing to beat others. The recreational runner on the other hand, was more influenced by general health concern and not with goal oriented performances.

Significant differences between men and women were found as well. Men rated the benefits of increased energy, improved muscle tone and knowledge of physical capabilities higher than women (Ziegler, 1991). In the study of Yates (1991), it was suggested that social factors might account for the differences between men and women. Women are often judged on their physical attractiveness, while men are judged on their physical effectiveness or strength.

The above results show that there is heterogeneity of preferences within the population of runners. This heterogeneity provides the opportunity of market segmentation. When developing marketing programs, and how to promote a product, results like these are relevant in segmentation studies, for different runners might seek different benefits in a sports application. Women might use sport applications for basic purposes, for they are not as competitive and performance oriented as men (Callen, 1983; Johnsgard, 1985). Men on the other hand might be more interested in the extensive applications of the SensoRun product. The different types of

runners (e.g recreational, competitive and obsessive) might all need their own marketing mix, tailored to their own specific needs and wants. With additional demographic data, a profile of the different segments of runners can be formed. With the support of a profile, the different segments can be reviewed to see if they meet the requirements of a meaningful market segment (Kotler, 1980). When approaching obligatory oriented runners, it could be of importance to emphasize the “performance enhancing” capabilities of the sport application. Whereas the competitive runner might be more interested in the injury prevention of a sports application. These heterogeneous benefits sought, could be utilized to achieve a competitive advantage over other competitors. This is important to research for a company like SensoRun. Through research, a better understanding can be received of these differences and with this better understanding it is possible to satisfy potential customers better than the competitors. In order to satisfy the needs of the runners that form a potential customer base, their benefits sought should be researched.

Hypothesis

In the study of Ziegler (1991) the different benefits sought by runners were explored. Using a questionnaire with a subscale of commitment to running and questions related to perceived benefits of running, runners could be divided into a competitive segment and a recreational segment. Significant differences between the competitive runner and the recreational runner emerged in terms of benefits sought in running. The Recreational runner indicated that the variables of competition ($t = 3.20, p < .05$), mental fitness ($t = 2.62, p < .05$), and social recognition ($t = 2.98, p < .05$) were of greater importance to them than to the competitive runner. Another significant result was that the recreational runner rated higher on the benefit of enjoyment ($t = 3.06, p < .05$) than the competitive runner.

Ogles, Masters and Richardson (1995) were able to form homogeneous samples of runners that represent obligatory and recreational types of runners. “Behaviorally identified obligatory runners report being more influenced by achieving personal running goals, improving themselves, performing well enough to beat competitors, and as a result receiving recognition from family and peers for their accomplishments which extend beyond physical wellbeing.”

Based on these results H1, H2 and H3 are formed.

H1: The population of runners can be segmented into at least three heterogeneous segments that are homogeneous of nature.

H2: The recreational oriented runners attach more value to the benefits of social interaction, mental health and enjoyment than competitive oriented runners.

H3: The obligatory oriented runners are more likely to be interested in running applications that improve competitiveness and performances.

Another relevant result from the study of Ziegler (1991) was the exploration of the medical concerns of runners. The competitive runners indicated that they continued running when they had an injury. More competitive runners also indicated that they have had to consult with a medical doctor because of an injury that resulted from running ($F(1,385) = 11.67, p < .01$). Based on these results H4 is formed.

H4: The competitive oriented runners are more likely to be interested in running applications that help in the prevention/recovery of injuries.

In the study of Ogles and Master (2003) a typology of marathoners based on their motivations was formed. The results showed that men were overrepresented in the competitive runner segment. Overall, male runners report greater competitive motivation (Callen, 1983; Johnsgard, 1985). An experiment performed by Niederle and Vesterlund (2007) also provides evidence for the statement that men are more competitive oriented than women. The participants of the experiment had to perform tasks and had the choice to do this at a noncompetitive piece rate or a competitive tournament incentive scheme. Results where that 73% of the men chose for the tournament, whereas only 35% percent of the women made that choice.

Based on this H5 is formed.

H5: The competitive oriented runners segment consists of mostly male runners.

Method

4.1 Sample

The sample of respondents consists of 247 runners. These runners were contacted by posting messages on Facebook communities and on forums. Several students who participated in competitive running events also filled in the survey. On these platforms runners have the

opportunity to share their experiences with running and to ask questions related to running. The Facebook groups used were; “Hardlopen”, “HARDlopen en meer FUN” and “Rotterdam marathon 2017 deelnemers”. The forums used were that of www.hardloopforum.com and www.chatnrun.nl.

The valid sample consisted of 143 male (58.6 %) and 101 female (41.4 %) respondents. The average age of the respondents was 43.78 years ($SD=9.36$), ranging between 19 and 64 years.

Results showed that the respondents were active runners. On average the respondents ran more than 3 times a week, ranging from 1 to 10 sessions. The average distance for each running session was 11.01 Km ($SD=3.34$), ranging from 1 to 20 Km. In the problem description, it was mentioned that runners ranging from “casual” to “serious” are potentially interesting segments to approach. The above results show that the sample contains runners of these different calibers. The sample therefore seems to be fairly representative for the population of runners.

4.2 Selection of variables in the survey

An overview of the variables can be found in the appendix A.2. The segments will be identified by the benefits that they seek in running. It is however the total configuration of benefits sought that makes it possible to differentiate between the segments. It is not that one segment seeks a specific benefit, and that another seeks a completely different benefit, for each segment wishes to have as many benefits as possible. What can differ between segments is the relative importance attached to these benefits (Haley, 1968). Therefore, the respondent can attach a value to each of the benefits sought. The total value that the respondent can attach to all benefits combined is limited. By using this scale the relative importance of each benefit can be analyzed. Based on findings in Haley (1968) a scale for questions 14 and 15 (appendix A.3) is used in order to receive results that make it possible to analyze the relative importance attached to benefits sought.

For questions 5, 6 and 13, a seven points scale is used. In the study of Preston and Colman (2000) results showed that rating scales with the fewest response categories yielded the least reliable scores. The stability of the tests was the lowest for two, three and four-point scales. The most reliable scores were found using 7, 8, 9 and 10 response categories. This was also the case for validity and discriminating power. To prevent respondents getting intimidated by the amount of categories the lowest number of reliable response categories were used, namely seven.

Combined with additional descriptive and behavioral variables a profile of these segments can be built. The variables of these questions consist of:

Descriptors

Demographics:

Age, gender, lifecycle

These are all variables that help build a profile of a segment.

Psychographics:

Level of socialization

The level of socialization that runners seek when they run can be used to differentiate between social and non-social runners. In the study of Ziegler (1991) the variable of social recognition was significantly different between the recreational and the competitive runner.

Level of obligation

With this variable, the obligatory runners can be set apart from the solely competitive runners and the recreational oriented runners. In the study of Ogles et al. (1995), runners that feel obligated to run differ significantly in benefits sought from recreational runners.

Behaviour

Usage

The level of usage can be used to describe the different segments of runners. Variables related to aspects of product usage are good starting points for segmenting a market (Kotler & Keller, 2006). With additional information on usage, segments that are current users or non-users of sports applications can be identified. The next step is to determine what strategy needs to be implemented to attract these different levels of users.

Level of activity

The questions related to level of activity (running sessions and distance covered) are used to determine the level of specialization to some extent. Level of activity, combined with other questions, e.g concerning the possession of sports applications and price, can be used to

differentiate between segments with different levels of specialization. Because the target markets are likely to seek different benefits, the nature of the product preferred will differ at different levels of specialization (Crompton, 1983). Level of activity has also been linked with the risk of injury. With increasing distances, the risk of injury increases as well (Koplan, Powell, Sikes, Shirley and Cambell, 1982).

General medical issues

This variable gives insights into the level of medical injuries of different segments. The SensoRun application is designed to provide solutions to certain injuries. Therefore, segments that have high injury rates might be of significance for further research.

Participation

The level of participation in either competitive running or in running associations can give indications towards the level of competitiveness. Results could also provide opportunities for marketers to reach interesting segments. If certain segments are of interest, and it is known that a significant percentage of that segment is member of a running association, it is easier to approach such a segment.

Bases

Physical health

The general physical health concern is a variable that can be used to identify significant differences between a recreational and an obligatory runner. The recreational runner is more concerned with general health concerns than runners who feel more obligated to run (Ogles, Masters and Richardson, 1995). Based on these results the benefits sought in sport applications might be similar. To differentiate between different segments of runners the variable of weight is included in the category of physical health. In the study of Koplan et al. (1982) weight loss was commonly associated with running. Therefore, it might be an important benefit sought for certain segments.

Personal performance enhancement

In the studies of Ogles, Masters and Richardson (1995) the obligatory runner was more influenced by achieving goals and improving themselves compared to recreational runners. Yates

(1991) suggested that men are more interested in their physical effectiveness than women. The variable of performance enhancement could therefore provide significant differences between types of runners and even the gender of runners. Men and women have different attitudes and behave differently (Brennan ,2009), and therefore gender segmentation could be valuable when developing a marketing strategy.

Competitiveness

Obligatory runners have shown to be more interested in beating others and performing better than their competitors (Ogles et al., 1995). Competitiveness can be used to show significant differences between different kinds of runners and also between gender (Callen, 1983; Johnsgard, 1985). Sport applications might be of interest for segments that seek competitive enhancing tools.

Injuries

Studies have shown that segments of runners differ in concerns about injuries. Competitive runners are significantly more concerned with injuries than recreational runners (Ziegler, 1991). The needs and wants in sport applications might differ as well.

An imbalance in the biomechanics of a runner (e.g leg length inequality), has been identified as a major contributing factor to running injuries. The correction of these defects may be of great importance in the treatment of running injuries (Bruner, Cook, Brinker & Dickinson, 1990). Since this is one of the functions of the SensoRun application, it is relevant to explore segments that seek the benefits of injury preventing and injury recovering tools.

Mental health & Enjoyment

Recreational runners seek other benefits than competitive or obligatory oriented runners, such as mental health and enjoyment on a higher level than other types of runners (Ziegler, 1991). These variables can show significant differences between sets of segments.

Basic functions, self-esteem, aesthetics & motivation

Some segments might seek very simple benefits in running and in the use of sports applications. Men are more judged on their physical effectiveness and strength, while women are judged on their physical attractiveness (Yates, 1991). Possible differences like these could be found between different types of runners as well. Segments that are more interested in simply looking good might not be the most interesting segment to approach in the marketing mix. This could include segments that would only be interested in the most basic functions of a sports application. That is why it is important to identify unwanted segments as well, for resources should not be wasted on attempting to reach these segments.

Due to the fact that the respondents were in Dutch Facebook communities and that the Forums were in Dutch, the decision was made to adapt the survey so that it was as clear as possible for the respondents. The questions were therefore asked in Dutch.

In appendix A.3 the survey used can be found.

4.3 Procedures

Factor analysis

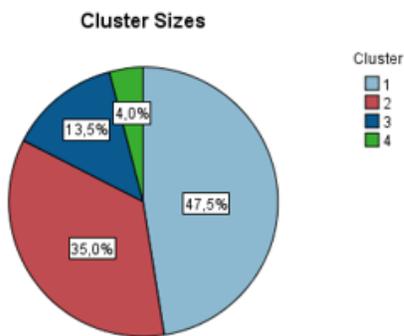
Using factor analysis, the variables of benefits sought in running and benefits sought in sports applications are reduced to a limited amount of factors. The variables with correlation coefficients lower than 0.4 (absolute value) are excluded in order to find strong correlations. A selection of variables of Q14 and Q15 were used. These questions contained variables that expressed the relative importance attached to the benefits of running and running applications. The KMO and Bartlett's Test measure of sampling adequacy showed that these variables were appropriate for factor analysis (large KMO statistic of 0.829). In graph 2 (A.6) a scree plot is provided of the factor analysis. The 5th factor was the last factor with an eigenvalue larger than one. Additional factors only provided a small amount of variance explained for each factor. Therefore the extraction was limited to 5 factors.

The outcome of the factor analysis provided five factors that are used in the cluster analysis. The procedures of the factor analysis can be seen in appendix A.4.

Twostep cluster analysis

Using the five factors provided, a twostep cluster analysis was performed. These factors are then used as input variables for the cluster analysis. To determine the number of clusters the AIC (Akaike's information criterion) values are plotted in a graph (Graph 1). In this graph a clear elbow is seen at 4 clusters. Therefore 4 clusters will be the initial amount of clusters used in the twostep cluster analysis. The output in Table 2 shows that the analysis is considered "fair". The following figure 2, is a fragment of graph 3 (Cluster sizes).

Figure 2. A fragment of Graph 3 (A.6), with the distribution of respondents among the 4 clusters.



The analysis provided two major clusters, one average cluster and one small cluster.

Descriptors

Using cross tabulation and one-way ANOVA tests, differences in descriptor variables are explored. If the homogeneity of variance test (Levene's test) had been violated the Games-Howell post-hoc was used. If not violated the LSD,S-N-K method was used. .

Behavior

Using one-way ANOVA tests, differences in behavior variables are explored. If the homogeneity of variance test had been violated the Games-Howell post-hoc was used. If not violated the LSD,S-N-K method was used.

Bases

In order to determine the differences between the clusters several one-way ANOVA tests are performed. The dependent variables used in the one-way ANOVA, are that of individual sub questions (of Q14 and Q15), for these are the easiest to interpret.

Results

5.1 Differences between clusters

Descriptors

Demographics

Gender

The distribution of gender within the clusters is as follows; in cluster 1, 54 male and 52 female respondents were clustered together. In cluster 2, 3 and 4 the distribution was 51:27, 18:12 and 8:1. Significant statistical differences in gender between the clusters were not found. This is seen in the Chi-square value of $X^2 (df=3) = 7.475, p > .05$

Age

The clusters were similar in age (Cluster 1 $\bar{x} = 44.12$; Cluster 2 $\bar{x} = 41.67$; Cluster 3 $\bar{x} = 46.67$; Cluster 4 $\bar{x} = 48.56$). Significant differences between Cluster 2 and Cluster 3 ($p < .05$) and between Cluster 4 and Cluster 2 ($p < .05$) were found.

Psychographics

Preference to run alone

This variable dealt with the preference of runners to run alone. On a seven points scale the clusters had similar preferences to run alone (Cluster 1 $\bar{x} = 3.82$; Cluster 2 $\bar{x} = 4.12$; Cluster 3 $\bar{x} = 3.97$; Cluster 4 $\bar{x} = 4.89$). Significant differences between the clusters were not found, $F(3,19) = 3.849, p > .05$.

Level of obligation

To determine the level of obligation the statements *het voelt slecht aan als ik een hardloop sessie oversla* and *ik moet gewoon lopen, zelfs als ik geen zin heb* were given to respondents. On a seven points scale the clusters had similar levels of obligation to run (Cluster 1 $\bar{x} = 2.54$ and 3.07 ; Cluster 2 $\bar{x} = 2.73$ and 3.18 ; Cluster 3 $\bar{x} = 3.03$ and 3.17 ; Cluster 4 $\bar{x} = 2.22$ and 3.33). Significant differences between the clusters were not found $F(3,219) = 2.627, p > .05$ and $F(3,219) = 0.346, p > .05$.

Behavior

Sports gear

The distribution of respondents owning a sports application seems to be similar, in Cluster 1, 93 respondents own an application and 13 do not, in Clusters 2, 3 and 4 the distribution is 71:7, 26:4 and 7:2. The Chi-square was not significant, $X^2(3) = 1.640, p > .05$.

The approximate amount spent on these applications did not significantly differ for $F(3,190) = 5864.373, p > .05$. The approximate amounts were: Cluster 1 $\bar{x} = 228.92$; Cluster 2 $\bar{x} = 226.04$; Cluster 3 $\bar{x} = 216.96$; Cluster 4 $\bar{x} = 272.86$.

Level of activity

The level of activity was determined by asking the respondents how many running sessions they had each week, and the average length of each of those sessions. The average amount of running sessions each week was very similar for each cluster (Cluster1 $\bar{x} = 3.22$; Cluster 2 $\bar{x} = 3.59$; Cluster 3 $\bar{x} = 3.40$; Cluster 4 $\bar{x} = 3.44$). No significant differences were found between the clusters in terms of the amount of sessions, $F(3,219)=2.099$ $p>.05$.

There was however a significant difference in the distance covered for each session for $F(3,219)=39.269$ $p<.05$. The average distance covered (in Km) for each cluster is: Cluster1 $\bar{x} = 10.36$; Cluster 2 $\bar{x} = 11.97$; Cluster 3 $\bar{x} = 10.93$; Cluster 4 $\bar{x} = 10.89$. In the post-hoc analysis it shows that there was a significant difference between Cluster 1 and Cluster 2, $p<.05$. With a mean difference of 1.62 Km each session, Cluster 2 seems to run the furthest, and Cluster 1 seems to run the shortest distance.

Participation

The level of participation in running associations and in competitive running was explored with two categorical variables. The first categorical variable did not show any significant differences between the clusters in terms of being a member of a running/athletics association, This is seen in the Chi-square value of X^2 (df=3) =2,202, $p>.05$. The distribution of Cluster 1, was that 35 were member of a running association and 71 were not. For Cluster 2, 3 and 4 this was 30:48, 10:20 and 5:4

When the respondents were asked if they participated in competitive running, significant differences between the clusters were found X^2 (3)=14.328, $p<.05$. Cluster 1 had 83 respondents participating in competitive running, and 23 respondents not participating. For clusters 2, 3 and 4 this was 76:2, 24:6 and 8:1. In a one-way ANOVA, it was possible to see what caused this difference. Post-Hoc analysis showed a significant difference between Cluster 1 and Cluster 2, $p<.05$. Cluster 2 has significantly more respondents participating in competitive running.

Medical issues

Medical issues of the respondents were explored with several questions dealing with the frequency of injuries, visiting the physiotherapist due to severity and the continuation of running with an injury.

The frequency of injuries showed some significant differences ($p<0.05$) between some of the clusters (Cluster1 $\bar{x} = 5.04$; Cluster 2 $\bar{x} = 5.24$; Cluster 3 $\bar{x} = 5.03$; Cluster 4 $\bar{x} = 3.89$). In the post-hoc analysis Cluster 4 showed to have significantly lower values than Cluster 1,2 and 3. Cluster 4 seems to have the lowest frequency of injuries of all the clusters.

Visiting the physiotherapist due to severity of injuries was not a variable that differed among the clusters ($p>0.05$) (Cluster1 $\bar{x} = 4.85$; Cluster 2 $\bar{x} = 4.97$; Cluster 3 $\bar{x} = 5.03$; Cluster 4 $\bar{x} = 4.44$).

Similar results are seen when using the variable dealing with the continuation of running with an injury ($p>0.05$) (Cluster1 $\bar{x} = 4.78$; Cluster 2 $\bar{x} = 4.9$; Cluster 3 $\bar{x} = 4.9$; Cluster 4 $\bar{x} = 5.22$).

Bases

The twostep cluster analysis was performed with factors that consisted of the following variables. These variables will therefore provide the most significant differences between the 4 clusters. The following results will therefore provide the most relevant values for the building of the profiles.

Benefits sought in running/Motivation

To stay physically healthy

Table 1 displays the mean per cluster. This variable showed significant differences between most of the clusters. All of the clusters (except Cluster 3/4) differed significantly amongst one another ($p < 0.05$) in the post-hoc analysis.

Table 1

The mean's of the four clusters for the variable "To stay mentally healthy"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 25.32$ |
| Cluster 2 | $\bar{x} = 14.18$ |
| Cluster 3 | $\bar{x} = 45.17$ |
| Cluster 4 | $\bar{x} = 73.89$ |

In this analysis results show that cluster 3 and 4 significantly attach the most value to the benefit of staying physically healthy. Cluster 2 attaches the least value to this benefit (Table 1).

To lose weight/maintain the right weight

This variable showed several significant differences between some of the clusters in terms of the benefit of losing weight/maintaining the right weight.

Table 2

The mean's of the four clusters for the variable "To lose weight/maintain the right weight"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 19.49$ |
| Cluster 2 | $\bar{x} = 3.76$ |
| Cluster 3 | $\bar{x} = 7.47$ |
| Cluster 4 | $\bar{x} = 37.22$ |

Cluster 4 has the highest mean, but does not differ significantly ($p>0.05$) from the other clusters (Table 2). Cluster 1 however does differ significantly from cluster 2 and 3 ($p<0.05$), and is therefore the cluster that attaches the highest value to the benefit of losing weight/maintaining the right weight. Cluster 2 and 3 attach the lowest value (do not significantly differ from one another).

To keep up with others

This variable did not show any significant differences between any of the clusters ($p>0.05$).

To be better than others

This variable did not show any significant differences between any of the clusters ($p>0.05$).

So I can improve my own performance

This variable showed several significant differences between some of the clusters in terms of the benefit of improving personal performances.

Table 3

The mean's of the four clusters for the variable "So I can improve my own performance"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 7.72$ |
| Cluster 2 | $\bar{x} = 24.41$ |
| Cluster 3 | $\bar{x} = 9.00$ |
| Cluster 4 | $\bar{x} = 51.67$ |

Cluster 2 and 4 (do not significantly differ from each other) have significantly higher means ($p<0.05$) than Cluster 1 and 3. Cluster 2 and 4 attach the highest value towards achieving personal performance (Table 3). Cluster 1 and 3 attach the least value to the benefit of improving personal performance ($p<0.05$), but do not significantly differ from each other.

To stay mentally healthy (e.g cope with stress)

The only cluster that significantly differed from other clusters was Cluster 4 ($p<0.05$).

Table 4

The mean's of the four clusters for the variable "To stay mentally healthy (e.g cope with stress)"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 17.26$ |
| Cluster 2 | $\bar{x} = 15.12$ |
| Cluster 3 | $\bar{x} = 12.83$ |
| Cluster 4 | $\bar{x} = 63.33$ |

Cluster 4 is the group of respondents that attach the highest value to the benefit of staying mentally health when they go for a run (Table 4).

To improve my physical appearance

The benefit of improving the physical appearance provided significant differences between the clusters.

Table 5

The mean's of the four clusters for the variable "To improve my physical appearance"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 6.98$ |
| Cluster 2 | $\bar{x} = 3.83$ |
| Cluster 3 | $\bar{x} = 2.53$ |
| Cluster 4 | $\bar{x} = 35.56$ |

Cluster 4 has the highest mean, but does not differ significantly ($p > 0.05$) from the other clusters (Table 5). Cluster 1 does significantly differ from 2 and 3 ($p < 0.05$), and is therefore the cluster that attaches the highest value to the benefit of improving the physical appearance. Cluster 2 and 3 attach the lowest value (do not significantly differ from each other).

To have fun

This variable provided significant differences between the clusters.

Table 6

The mean's of the four clusters for the variable "To have fun"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 19.20$ |
| Cluster 2 | $\bar{x} = 35.08$ |

| | |
|-----------|-------------------|
| Cluster 3 | $\bar{x} = 20.50$ |
| Cluster 4 | $\bar{x} = 74.44$ |

Cluster 2 and 4 do not significantly differ from each other ($p>0.05$) (Table 5). Together they do significantly differ from Cluster 1 and 3 ($p<0.05$). Cluster 2 and 4 attach the highest value to the benefit of having fun when running, while 1 and 3 attach the lowest value.

Because I must (obligation)

The clusters did not show any significant differences in the level of obligation ($p>0.05$). These results were also reflected in previous findings.

Benefits sought in sports applications

To prevent injuries

Significant differences in the injury preventing benefits of sports applications were found amongst the clusters.

Table 7

The mean's of the four clusters for the variable "To prevent injuries"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 1.47$ |
| Cluster 2 | $\bar{x} = 1.29$ |
| Cluster 3 | $\bar{x} = 13.83$ |
| Cluster 4 | $\bar{x} = 28.89$ |

Cluster 4 has the highest mean, but does not differ significantly ($p>0.05$) from the other clusters (Table 7). Cluster 3 does differ from 1 and 2 significantly ($p<0.05$), and is the cluster that attaches the highest value to injury preventing capabilities of sports applications.

To recover from injuries

The clusters did not show any significant differences in the value attached to recovering abilities of sports applications ($p>0.05$).

To acquire knowledge on physical wellbeing

This variable provided significant differences between cluster 3 and the other clusters.

Table 8

The mean's of the four clusters for the variable "To acquire knowledge in physical wellbeing"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 8.91$ |
| Cluster 2 | $\bar{x} = 8.04$ |
| Cluster 3 | $\bar{x} = 27.33$ |
| Cluster 4 | $\bar{x} = 36.67$ |

Cluster 3 was significantly different ($p < 0.05$) from Cluster 2, 3 and 4 (Table 8). Cluster 4 had the highest mean, but was not significant. Cluster 3 is the cluster that attaches the highest value to the ability of sports applications to provide knowledge on the runners' physical wellbeing.

To become better than others

No significant differences ($p > 0.05$) were found amongst the clusters. These results reflect previous findings concerning competitiveness.

To keep up with others

No significant differences ($p > 0.05$) were found amongst the clusters. These results reflect previous findings concerning competitiveness.

To improve my performance

This variable provided significant differences between cluster 3 and the other clusters.

Table 9

The mean's of the four clusters for the variable "To improve my performance"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 17.76$ |
| Cluster 2 | $\bar{x} = 19.58$ |
| Cluster 3 | $\bar{x} = 10.33$ |
| Cluster 4 | $\bar{x} = 44.44$ |

Cluster 3 attached significantly less value ($p < 0.05$) to the ability of improving personal performances with sports applications (Table 9). Cluster 1,2 and 4 showed no significant differences ($p > 0.05$).

[To share my accomplishments](#)

This variable provided significant differences between cluster 3 and the other clusters.

Table 10

The mean's of the four clusters for the variable "To share my accomplishments"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 6.58$ |
| Cluster 2 | $\bar{x} = 8.08$ |
| Cluster 3 | $\bar{x} = 2.00$ |
| Cluster 4 | $\bar{x} = 40.00$ |

Cluster 3 attached significantly less value ($p < 0.05$) to the ability of sharing accomplishments with sports applications (Table 10). Cluster 1,2 and 4 showed no significant differences ($p > 0.05$).

[To motivate me](#)

This variable provided significant differences between several clusters.

Table 11

The mean's of the four clusters for the variable "To motivate me"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 15.98$ |
| Cluster 2 | $\bar{x} = 10.05$ |
| Cluster 3 | $\bar{x} = 3.13$ |
| Cluster 4 | $\bar{x} = 40.00$ |

Cluster 4 has the highest mean, but does not differ significantly ($p>0.05$) from the other clusters (Table 11). The other clusters all differ significantly ($p<0.05$) from one another. Cluster 1 attaches the highest value to the motivating abilities of sports applications, where Cluster 3 attaches the lowest value.

To track my distance and speed

This variable provided significant differences between cluster 4 and the other clusters.

Table 12

The mean's of the four clusters for the variable "To track my distance and speed"

| | |
|-----------|-------------------|
| Cluster 1 | $\bar{x} = 44.18$ |
| Cluster 2 | $\bar{x} = 50.59$ |
| Cluster 3 | $\bar{x} = 39.53$ |
| Cluster 4 | $\bar{x} = 74.44$ |

Cluster 4 differs significantly ($p<0.05$) from the other clusters (Table 12). The respondents in cluster 4 attach the highest value to the ability of sports applications to track distance and speed.

5.2 Profiles

Using the results from the analysis a profile of each segment could be developed.

Cluster 1 – "Weight watchers" WW

54 male and 52 female respondents

44.12 years old

87.74 % own a sports application

Average price of sports application € 228.92

Run relative short distances each running session

Has relative low participation in competitive running

Attaches relative high value to the benefit of losing weight/maintaining the right weight, in running

Attach relative low value to the benefit of running with concerns to improving personal performance

Attach relative high value to the benefit of running with concerns to the improvement of physical appearances

Attach relative low value to the benefit of running with concerns to fun

Attach relative high value to the motivating capabilities of sports applications

Cluster 2 – “Competitive runners” CR

51 male and 27 female respondents

41.67 years old

91.03 % own a sports application

Average price of sports application € 226.04

Run relative long distances each running session

Has relative high participation in competitive running

Attach relative low value to the benefit of running with concerns of staying healthy

Attach relative low value to the benefit of running with concerns to losing weight/maintaining the right weight

Attach relative high value to the benefit of running with concerns to improving personal performance

Attach relative low value to the benefit of running with concerns to the improvement of physical appearances

Attach relative high value to the benefit of running with concerns to fun

Cluster 3 – “Health gurus” HG

18 male and 12 female respondents

46.67 years old

86 % own a sports application

Average price of sports application € 216.96

Attach relative high value to the benefit of running with concerns of staying healthy.

Attach relative low value to the benefit of running with concerns to improving personal performance

Attach relative low value to the benefit of running with concerns to the improvement of physical appearances

Attach relative low value to the benefit of running with concerns to fun

Attach relative high value to the injury preventing capabilities of sports applications

Attach relative high value to the capabilities of sports applications to provide information on the runner's physical wellbeing

Attach relative low value to the performance improving capabilities of sports applications

Attach relative low value to the capabilities of sports applications to share accomplishments

Attach relative low value to the motivating capabilities of sports applications

Cluster 4

After analyzing the results, cluster 4 was deemed as not valid. Respondents that were clustered into Cluster 4 were a set of runners that misinterpreted several of the questions in the survey. More information on this can be found under the discussion/limitation heading.

Conclusion

Hypothesis

H1: The population of runners can be segmented into at least three heterogeneous segments that are homogeneous of nature.

Results have indicated that it is possible to segment the respondents into three fairly heterogeneous segments, which are homogeneous of nature. However, expectations were that these three segments would consist of recreational, obligatory and competitive runners.

Outcomes of this study provided different characteristics of the segments. The profiles provided in the results indicated that the segments could best be described with the labels of Weight watchers, competitive runners and health gurus. Although the expected labels differed, H0 is still rejected and H1 is accepted.

H2: The recreational oriented runners attach more value to the benefits of social interaction, mental health and enjoyment than competitive oriented runners.

Through analysis it was not possible to find a valid segment that could be labeled as "recreational oriented runner". Cluster 4 was the cluster that showed to be the most promising, it is however not a valid segment.

The variable of social interaction did not provide any significant differences ($p > .05$) between the clusters. The variable of mental health was only significantly different between cluster 4 and the rest of the clusters. Since cluster 4 is not a valid cluster, the significance is not valid. The variable of enjoyment was found to be significantly highest among the cluster that was labeled as “competitive”. These findings combined provide no significant evidence to reject the null hypothesis.

H3: The obligatory oriented runners are more likely to be interested in running applications that improve competitiveness and performances.

All of the variables related to levels of obligation turned out to be non-significant ($p > .05$). No differences in the level of obligation were found between the clusters and therefore a segment of “obligatory oriented runners” could not be identified. H0 is therefore not rejected.

H4: The competitive oriented runners are more likely to be interested in running applications that help in the prevention/recovery of injuries.

Results showed that it is more likely for the health oriented runner to be interested in applications that help in the prevention of injuries.

H5: The competitive oriented runners are mostly male.

The competitive cluster consisted of 78 respondents. The distribution was 51 male : 27 female respondents. The T-Test was not significant at $p > .05$. H0 is not rejected. There is not a significant difference in gender distribution within the competitive cluster.

Research questions

What are the benefits sought of potential market segments, and what market descriptors and behavior’s define those segments?

This research question is answered by answering the following sub questions.

What are the benefits sought in sports that define the different segments of runners?

The three valid segments found are labeled as “Weight watchers” (WW), “Competitive runners” (CR) and “Health Guru’s” (HG). The WW attached the relative highest benefit (compared to the other segments) to the benefit of losing weight and improving their physical appearance. WW

however attached low benefits to the benefit of having fun and that of improving their personal performances. The CR attached relative high value to the benefits of improving personal performances and to that of having fun. The CR did not attach high values to the benefits of improving physical appearances, losing weight/maintaining the right weight and that of general health. The HG attached the highest relative value to the benefit of generally staying healthy. The HG runners attached relative low values to the benefits of fun, improving personal performances and improving physical appearances.

What descriptors and behaviors define the main segments of runners?

Most of the descriptive and behavioral variables (e.g. demographics & psychographics) did not provide any significant differences among the identified segments. WW however appeared to run relative short distances. The level of participation in competitive running was the lowest in the WW segment. In contrast to the WW, the CR segment ran relative long distances and had the highest participation in competitive running.

What are the main benefits sought in sports applications by the different segments of runners?

The WW seemed to attach the relative highest value to the motivating capabilities of a sports application. Runners in the CR segment showed no significant differences in benefits sought compared to the other segments. Runners in the HG segment showed the relative highest value attached to the benefits of preventing injuries and that of receiving information on their physical wellbeing. They did however care the least for motivating, performance improving capabilities and the ability to share accomplishments.

Wrap up

Results showed that it was possible to segment the market to a certain extent into Competitive runners, Weight watchers and Health Gurus. Competitive runners had higher levels of fun in running and ran longer distances than the other segments. Weight watchers attached more value to the benefit of losing weight and in improving their physical appearance. Additionally, the weight watchers attach high value to the motivating capabilities of sports applications. The health gurus attached the highest value to the general health benefits accompanied with running. Furthermore, the health gurus attach the highest benefit towards injury preventing capabilities of

sports applications. Respondents in this segment rate the function of being informed on their physical wellness significantly higher than the other segments. The segments however were fairly homogeneous on a large set of other variables.

Implications

Results of this study show that it is possible to segment the market of runners into segments that significantly differ on several benefits sought. These segments however do not significantly differ on a large set of demographics, psychographics, benefits sought and behavior. This would indicate that the market seems to be fairly homogeneous. This provides opportunities for a single marketing strategy that can reach as many types of runners as possible. An important point of interest for Sensorun at this stage is the price of the product. What are consumers willing to pay for an application, like the sensor based running app? In the analysis no significant differences in price paid for a sports application was found between the segments. The willingness to pay is homogeneous in the sample. The mean price paid by all of the respondents was € 226. This could give a reasonable indication towards the price that consumers are willing to pay for sports accessories. The distribution of runners that owned a running application did not differ amongst the segments. In the total sample however, 216 respondents owned an application whereas 27 did not. A significant amount of these runners are potential customers, for they are already in the possession of similar products. The segments did not show to have significant differences in frequency of injury, severity of injury and willingness to run with an injury. All of the respondents seemed to have similar results with concerns to injuries. This makes all of the respondents equally potentially interested in applications that prevent injuries/help treat injuries.

Further research

Results showed that the respondents attached a relative low value towards the injury preventing and injury recovering abilities of sports applications. A possible explanation for this could be the level of awareness of the potential of sports applications. In order to determine if this is the case, a study towards product awareness should be performed. Such a study could provide more insights towards the level of advertisement for example. If there is low product awareness, suitable marketing campaigns need to be developed in order to improve the awareness.

Another study that could be performed in future research is that of analyzing the different attitudes consumers have towards current products on the market and towards the new product of Sensorun. Consumers their attitudes towards different functions of sports applications could be

included in this. This could provide insights towards the additional sensors that could be included in the product.

Discussion/Limitations

There were several limitations to this study. The first set of limitations are caused by a common concern that is paired with surveys and self-report. Respondents may not respond truthfully, but answer the questions with answers that make them look good (Steenkamp, De Jong & Baumgartner, 2010). These social desirable responses might have affected the results of this study. Respondents showed no significant differences in the level of obligation (addiction) and in the level of competitiveness. Previous studies have shown that it is possible to segment using these variables. A possible explanation for this lack of variance is that of social desirable response. Respondents might not want to admit to their addiction to running, or to that of the aspiration of becoming better than others. In further study, more attention should be paid on the formulation of questions so that the level of competitiveness/obligation is not as evident. If the questions are more ambiguous, respondents might provide more insights into their level of competitiveness/obligation.

The descriptive variable of lifecycle was not used in the analysis. The literature that was studied provided evidence that data on respondents their life cycle could be of value. Unfortunately, a lot of confusion arose concerning the question about life cycle. Therefore, this possibly valuable data was not utilized. In a future study a previously successful method (found in literature) for analyzing respondents their life cycle should be used.

In the analysis, Cluster 4 had some outlying results. After further study it seemed that SPSS had clustered together a set of respondents that did not fully understand the questions concerning benefits sought. These respondents had exceeded the maximum of points that they could attach to each benefit. The result was that the relative importance attached could not be compared to the other clusters.

The lack of heterogeneity between clusters in terms of demographics and psychographics could be explained by the fact that most of the sample consisted of respondents that were member of Facebook groups such as “Hardlopen”. In the sample description, it was expected that the sample was representative for the population of runners. This was based on their behavior. The amount of running sessions and the distance covered in each session showed that the respondents differed among each other. Casual runners would run once a week, and serious

runners would run, in extreme cases, up to ten times a week. This however only covered behavior. It is possible that the community of these groups consist of similar runners with similar demographics and psychographics. The runners that feel the urge to join online communities might feel similar about running. This could partly explain the lack of heterogeneity.

Appendix

A.1 Method of literature study

To provide a framework that delivered background information, new insights and structure in this study, a literature study, was performed. Using the available databases of the Wageningen library relevant articles and studies were found and used for this study. The database used were Google Scholar and Scopus. The reason that Google Scholar was utilized is that this database is able to search indexes created from the full text or part of the text of the document, rather than just abstracts, records and subject terms. The easy use combined with broad results is the reason that this database was used at the start of the study. With Google Scholar, it was possible to create a foothold in the vast amount of literature available.

Using terms such as “segmentation” and “consumer” and “marketing” a series of relevant articles on segmentation were found. Reading and studying these articles provided a solid basis for knowledge on segmentation. Coming across citations in these articles and finding the complete texts led to new sequence of appropriate articles.

After a basic understanding of segmentation was formed, it was possible to search more accurately. A database more suitable for this is that of Scopus. With this database the searching was more refined. Using more specific terms such as “clustering”, “benefits”, “needs” and “behavior”, the results were more tailored towards this study. With these articles, more knowledge was gathered on needs based segmentation. This however contained general theories on this method. Theories which were applicable, but only formed a general understanding. By adding more search field containing terms such as “running”, specific research done in the sports niche was found. All of these terms led to articles containing needs based segmentation studies in running. Articles such as that of Ziegler (1991) and Ogles et al. (1995) were products of this

more specific searching approach. These articles provided results that were valuable for creating the survey, formulating hypotheses and developing a methodology for analysis.

A.2 Overview variables

Descriptor

Demographics

I Gender

Gender *M/F*

II Age

Age

III Lifecycle

Lifecycle *Student-working-living together with partner-having children*

Psychographics

I Social affiliation

Level of social affiliation *preference to run alone*

II Obligation

Level of obligation *feeling bad when skipping running sessions, drive to run without motivation to do so*

Behavior

I Sports gear (application)

Possession *Do you own a sports application (e.g Polar, Garmin, TomTom)*

Willingness to spend *Approximate price of product*

II Level of activity

Sessions *Average sessions each week*

Distance *Average distance each session*

III Participation

Running association *Member Y/N*

Competitive running *Y/N*

IV Medical issues

Injuries *frequency of injuries, frequency of visiting physiotherapist, continuation of running with injuries*

Bases

Benefits sought in running/Motivation

I Physical health

General health orientation *To stay physically healthy*

Weight *To lose weight/maintain the right weight*

II Achievement

Competition *To be better than others, To keep up with others*

Personal *So I can improve my performance*

III Psychological

Mental health *To stay mentally healthy (e.g cope with stress)*

Aesthetics *To improve my physical appearance*

Enjoyment *To have fun*

Obligation *Because I must*

Benefits sought in sports applications

I Physical health

Injuries *To prevent injuries, to recover from injuries*

Physical wellbeing *To acquire knowledge on physical wellbeing*

II Achievement

Competition *To become better than others, To keep up with others*

Personal *To improve my performance*

III Psychological

Self esteem *To share my accomplishments*

Motivation *To motivate me*

IV Basic

Tracking *To track my distance and speed*

A.3 Survey

Sensor Based Running solutions NL

Q1 Bedankt voor het meedoen aan dit onderzoek voor mijn bachelorscriptie aan Wageningen University. Deelname duurt circa 3-5 minuten. Uw gegevens zullen niet worden gebruikt voor andere doeleinden dan dit onderzoek. Er zijn geen goede of foute antwoorden.

Als dank voor uw deelname kunt u kans maken op een bol.com bon, indien u dit zou willen kunt u aan het einde van het onderzoek uw e-mailadres invullen. Voor vragen kunt u terecht bij Daan Verburg via daan.verburg@wur.nl

Door op 'Ja' te klikken geeft u aan dat u het bovenstaande heeft gelezen en ermee instemt.

Q2 Stemt u hiermee in?

- Ja
- Nee

Q3 Geslacht

- Man
- Vrouw

Q3 Leeftijd

_____ Leeftijd

Q4 Levenscyclus (Meerdere antwoorden zijn mogelijk)

- Student
- Werkend
- Samenwonend met partner
- Heeft kinderen

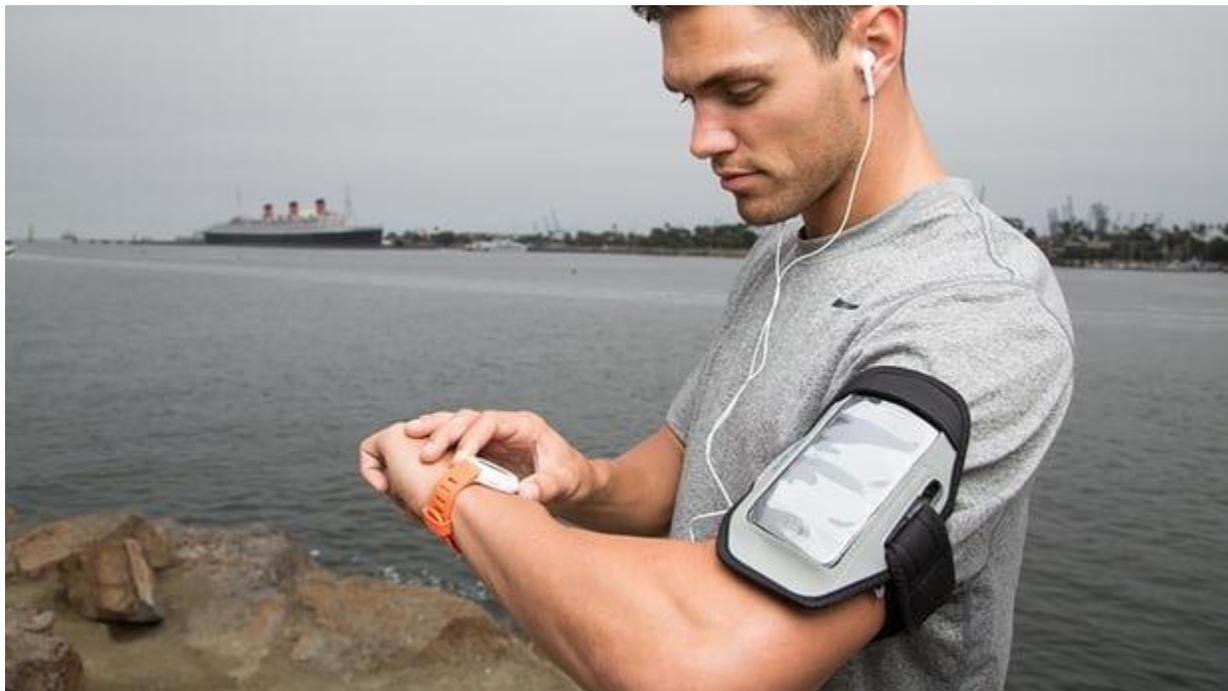
Q5 Voorkeur om alleen te lopen

| | Sterk mee eens | Mee eens | Enigzins mee eens | Neutraal | Enigszins mee oneens | Mee oneens | Sterk mee oneens |
|--|-------------------|-------------|----------------------|----------|----------------------------|---------------|------------------------|
| Ik heb de voorkeur om alleen te lopen | • | • | • | • | • | • | • |

Q6 Gevoel van verplichting

| | Sterk mee eens | Mee eens | Enigszins mee eens | Neutraal | Enigszins mee oneens | Mee oneens | Sterk mee oneens |
|---|-------------------|-------------|-----------------------|----------|----------------------------|---------------|------------------------|
| Het voelt slecht aan als ik een hardloop sessie oversla | • | • | • | • | • | • | • |
| Ik moet gewoon lopen, zelfs als ik er geen zin in heb | • | • | • | • | • | • | • |

Q7 De volgende vraag gaat over hardloop applicaties zoals op de onderstaande foto te zien is.



Q7 Bent u in het bezit van een hardloop applicatie (bijvoorbeeld; TomTom, Garmin and Polar etc)?

- Ja
- Nee

Display This Question:

If Bent u in het bezit van een hardloop applicatie (bijvoorbeeld; TomTom, Garmin and Polar etc)? Ja Is Selected

Q8 Wat was ongeveer de aankoopwaarde hiervan (in €)?

_____ Prijs (€)

Q9 Gemiddeld aantal hardloop sessies elke week

_____ Aantal sessies

Q10 Gemiddelde afstand elke hardloop sessie (Km)

_____ Afstand (Km)

Q11 Bent u lid van een hardloop/atletiek vereniging?

- Ja
- Nee

Q12 Doet u mee aan wedstrijden?

- Ja
- Nee

Q13 Blessures

| | Sterk mee eens | Mee eens | Enigszins mee eens | Neutraal | Enigszins mee oneens | Mee oneens | Sterk mee oneens |
|--|----------------------|-------------|-----------------------|----------|----------------------------|---------------|------------------------|
| Ik heb regelmatig blessures | • | • | • | • | • | • | • |
| Vanwege deze blessures moet ik de fysiotherapeut bezoeken | • | • | • | • | • | • | • |
| Ik blijf doorlopen, zelfs met een blessure | • | • | • | • | • | • | • |

Q14 Wat zijn uw motivaties om te gaan hardlopen (U mag 100 punten verdelen over deze motivaties, het totaal van 100 mag niet overschreden worden)?

- _____ Om algemeen gezond te blijven
- _____ Om gewicht te verliezen/om op het juiste gewicht te blijven
- _____ Om anderen bij te houden
- _____ Om beter dan anderen te worden
- _____ Om mijn eigen prestaties te verbeteren
- _____ Om mijn mentale gezondheid op peil te houden(bijvoorbeeld met stress omgaan)
- _____ Om er fysiek beter uit te zien
- _____ Omdat ik het leuk vind
- _____ Omdat ik moet (verplichting)

Q15 Welke functies heeft u het meest behoefte aan in een hardloopapplicatie (bijvoorbeeld TomTom, Garmin en Polar etc) (U mag 100 punten verdelen over deze functies, het totaal van 100 mag niet overschreden worden)?

- _____ Om blessures te voorkomen
- _____ Om mijn afstand en snelheid bij te houden
- _____ Om te herstellen van mijn blessures
- _____ Om kennis te vergaren over mijn fysieke gesteldheid (bijvoorbeeld hartslag)
- _____ Om beter te worden dan anderen
- _____ Om mijn prestaties met anderen te delen
- _____ Om anderen bij te houden
- _____ Om mijn eigen prestaties te verbeteren
- _____ Om mij te motiveren

Q16 Bent u bereid mee te doen aan verder aanvullend onderzoek?

- Ja
- Nee

Q17 Heeft u nog verdere op-of aanmerkingen?

Q18 Emailadres

A.4 Factor analysis

The Bartlett's Test of Sphericity (Table 1) showed that the factor analysis is valid. With a 95% significance level and $\alpha < .05$, the p -value (Sig.) of $.00 < .05$ validation was confirmed. If $p < .05$, the H_0 hypothesis is rejected and H_1 , that there is a significant interrelationship between the variables, is accepted. The Kaiser-Meyer Olkin (KMO) and Bartlett's Test measure of sampling adequacy was used to examine if Factor Analysis is appropriate. The approximate of Chi-square is $X^2 = 1477.590$, with 136 degrees of freedom. It is significant at $\alpha = .05$. The KMO statistic of 0.829 is also large (greater than 0.50). Therefore, Factor Analysis is considered as an appropriate technique for the analysis.

Factor 1

This factor contained high correlations of the following variables;

Om anderen bij te houden (motivatie)(0.819), *Om beter te worden dan anderen (functie) (0.784)*, *Om anderen bij te houden (functie) (0.795)* , *Omdat ik moet (verplichting)(motivatie) (0.734)*, *Om beter dan anderen te worden (motivatie)(0.658)*

Factor 1 also contained a variable that had a lower correlation;

Om te herstellen van mijn blessures (functie) (0.517),

This factor primarily includes the competitive oriented variables, for these have the highest values of correlation. This factor will therefore be labeled as *Competitive*.

Factor 2

Factor 2 contained high correlation of the following variables;

Om er fysiek beter uit te zien (motivatie)(0.698), *Om mijn eigen prestaties te verbeteren (functie)(0.643)*, *om mijn eigen prestaties te verbeteren(motivatie)(0.682)*

This factor also contained a variable with lower correlation;

Om mij te motiveren (functie)(0.568)

This factor includes the variables that are related to personal performance, and will therefore be labeled as *personal performance*.

Factor 3

This factor contained high correlations of the following variables;

Om mijn mentale gezondheid op peil te houden (bijvoorbeeld met stress omgaan)(motivatie) (0.701), *Om mijn prestaties met anderen te delen (functie)(0.781)* , *Omdat ik het leuk vind (motivatie)(0.594)*

Factor 3 also contained variables with a lower correlations;

Om mij te motiveren (functie)(0.401) , *om te herstellen van mijn blessures(functie) (0.434)*

This factor primarily includes psychological oriented variables. This factor will therefore be labeled as *Psychological*.

Factor 4

This factor contained high correlation of the following variable;

Om algemeen gezond te blijven(motivatie)(0.709)

Factor 3 also contained several variables with lower correlations;

Om te herstellen van mijn blessures(funcitie)(0.468), *Om kennis te vergaren over mijn fysieke gesteldheid(funcitie)(0.544)* ,*Om blessures te voorkomen(funcitie)(0.552)*

This factor primarily includes factor that are physically/health oriented. This factor will therefore be labeled as *Physical/health concerns*.

Factor 5

Factor 4 contained high correlation of the following variable;

Om op gewicht te verliezen/om op het juiste gewicht te blijven (motivation)(0.715)

This factor also contained a variable with lower correlation;

Om mij te motiveren(funcitie)(0.409)

This factor is primarily formed by the variable concerning weight. This factor will therefore be labeled as *weight*.

A.5 Cluster analysis

Cluster analysis has become a common tool for marketing researchers (Punj & Stewart, 1983).

The clustering technique can be used by academic researchers and marketing researchers to develop empirical groupings of customers, products or services. Clustering techniques are used to classify people based on a defined set of variables by maximizing homogeneity within a group of people, and heterogeneity between different groups. These sets of people are then defined as clusters. The groupings can then be used as a basis for further analysis. The cluster method used in the analysis is that of the two-step cluster Analysis.

A.6 Output

KMO and Bartlett's Test

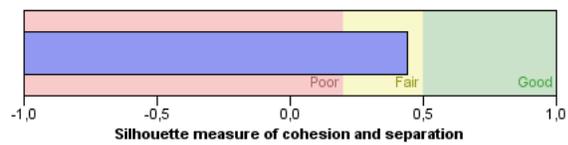
| | | |
|--|------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | ,829 |
| Approx. Chi-Square | | 1477,590 |
| Bartlett's Test of Sphericity | df | 136 |
| | Sig. | ,000 |

Model summary

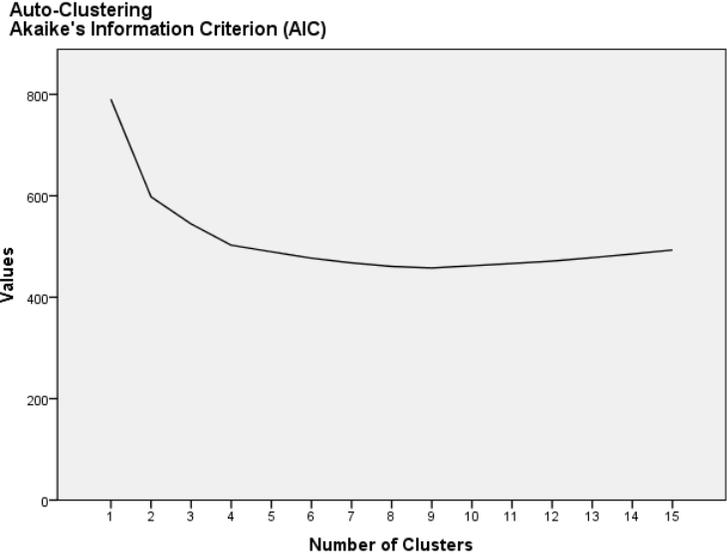
Model Summary

| | |
|-----------|---------|
| Algorithm | TwoStep |
| Inputs | 5 |
| Clusters | 4 |

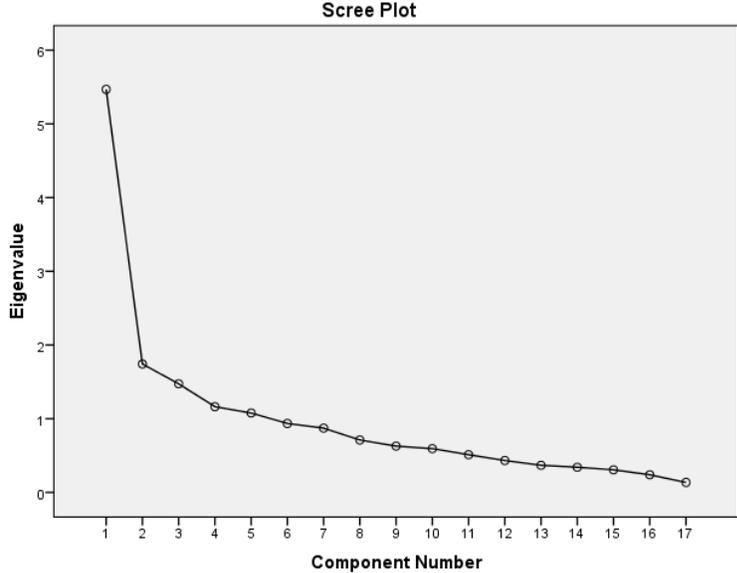
Cluster Quality



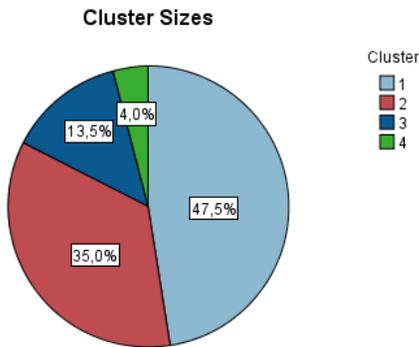
Graph 1 – Line graph plot of AIC values (Two-step cluster analysis)



Graph 2 – Scree plot Factor analysis



Graph 3 – Cluster sizes



| | |
|---|-------------|
| Size of Smallest Cluster | 9 (4%) |
| Size of Largest Cluster | 106 (47,5%) |
| Ratio of Sizes: Largest Cluster to Smallest Cluster | 11,78 |

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