A Study on Sensorial Marketing with Biometric Technology

SangHun Nam[1] and JungYoon Kim[2*]

[1]Media Businsss, Dept. of Newmedia, Seoul Media Institute of Technology, 99, Hwagok-ro 61-gil, Gangseo-gu, Seoul, South Korea
[2]Graduate School of Game, Gachon University, 1342 Seongnam Daero, Sujeong-Gu, Seongnam-Si, Gyeonggi-Do, South Korea, 461-701
[1]shnam@smit.ac.kr, [2]kjyoon79@gmail.com

Abstract

Recently, the wearable device combined with smart devices are being popularized through the health-related industry and the contents by being combined with biometric technology. Combined with current and expected ubiquity and pervasiveness of connected smart devices it gives ground to application in many areas, including marketing. In addition, the biometric technology has potentials to be used not only in the personalization marketing but also in marketing area such as promotion, brand management, etc. It is used for the service that recommends the product by measuring the characteristics such as consumer's preference, etc. using the facial impression analysis technology and the eye tracking technology is being applied to the marketing area such as homepage, product display, etc. The potential of biometric technology and body sensors for context relevant, personalized, real-time, interactive communication with consumers and shoppers is seen as a driver of traffic and transaction, facilitator of movement along the path to purchase and able to enhance their experience. If the human bio-information is utilized, the consumer's preference can be obtained more exactly and it is expected that the emotion and feeling measuring technology is applied in marketing area, marketing will achieve the new innovation. This paper proposes a conceptual model that indicates the potential of smart wearable devices for sensorial marketing as opposed to the standard industry practices of marketing to drive business results and competitive advantage. In addition, the potentials of new marketing method is described by analyzing the marketing method using human bio-information and related technology.

Keywords: Sensorial Marketing, Biometric Technology, Wearable Device

1. Introduction

Recently, together with the popularity of virtual reality industry, lots of investments are being made in the related hardware, software and platforms and growing rapidly and developing into the most important industry. Combined with current and expected ubiquity and pervasiveness of connected smart devices, it influences application in many areas: games, entertainment, education, marketing, social network services smart cities, smart homes, health, transportation, industrial automation [1], as well as retail and marketing. Technological development has enabled interner of things (IoT) technologies decreasing costs, increasing devices' computing power, cloud services, interoperability and security and privacy improvement [2]. These factors contribute to decreasing technology, organizational and financial barriers to expand the technologies in marketing and retail industries.

The development of computer performance makes the hardware to fulfill the many calculations rapidly and the restriction of the space, which can interact with the user, is reduced by releasing diverse wearable devices as the resolution of the sensors is being increased and the devices become compact. In addition, as the smart devices are popularized, the infrastructures that the people always can connect with network have been built and they have excellent hardware performance, they can be served as data hub and controller for the wearable devices. The smart device manufacturers are making new interface environment by fusing new technologies whenever they launch new product. Main expectation from benefits in marketing and retail is seen in the potential of sensors and actuators for context relevant, personalized, real-time, interactive communication with consumers and shoppers as a driver of traffic and transaction, facilitator of movement along the path to purchase, able to enhance their experience [3][4]. The smart device users are the potential buyer being favorable for advanced technology and having high purchasing power. The wearable devices fused with smart devices are being popularized as they are related to the users' health by being combined with biometric technology but the biometric technology has great potential to be used in the marketing area such as promotion, brand management, *etc*.

Context has been one of the important concepts related to teachnological applications for marketing. Contextual inputs are used to deliver relevant information and services to the user [5]. The sensors integrated into ubiquitous mobile phones and tables, which have become integral part of people's lives, become the source of contextual information like location tracked via GPS [6]. Another important source of contextual information are social networks when combined with other contextual inputs from a mobile device, this becomes a source for predicting behavior, recommendations or personal support.

This paper particularly focuses in the marketing to the field of shopper marketing: planning and execution of all marketing activities that influence a shopper along and beyond the path to purchase. Together with smart devices, mobile phones play an important role in the process of sensorial marketing: from the initial shopping trigger, to the purchase, consumption, repurchase and recommendations stages. With a mobile device at hand, a shopper can initiate or leave the purchase cycle at any point, can do search, check products and obtain information, find out about prices, find store location and working hours, do the actual purchase, and check recommendations. The technological system should enable the seamless shopping process and user experience even when the sensors, or users, or both are on the move. Customer experience and customer satisfaction are some of key success factors of marketing efforts, and they should be reached at any stage of the purchase cycle: pre, during or post purchase [7].

In this article, the biometric technology being used in marketing was studied. In Chapter 1, overview of sensorial marketing applied with smart wearable devices and biometric technology is discussed. Chapter 2 presents the related studies pertinent to sensorial marketing and the application of smart wearable and biometric technology. Chapter 3 elaborates on sensorial marketing and presents the conceptual model for sensorial marketing. Analysis on the human-oriented marketing technique are explained and Chapter 4. While Chapter 5 describes the conclusion and future research direction of the study.

2. Related Research

Literature studies have shown that researches is focusing on certain aspects of marketing and technology using smart devices as well as biometric technology. Majority are addressing technology related topics while some are discussing specific application solutions for sensorial marketing, or discussing contemporary marketing practices driven by technology advancement. There is a gap in bringing all these aspects in one comprehensive framework that would enable the institutions as well as practitioners to tackle the implementation in marketing and personalized business.

Smart wearable technology can have various applications in sensorial marketing that include those that are directly facing shoppers and those more related to business infrastructure and processes. The processes involving marketing comprise of geo-targeting, personalized offers, customized purchase experience, automatic replenishment, drawing shoppers to store, in store digital interactive screens and, product and offer co-creation [8][9]. In addition, the component of infrastructure and process related practices are intelligent store ambient and store layout, demographic and behavioral targeting, collaborative supply chain, payment process, and seamless cross-channel experience [10][11][12].

There are a number of different technology solutions for smart wearable technologies: radio frequency identification (RFID), near-field communication (NFC), bluetooth low energy (BLE), wireless fidelity (Wi-Fi), Z-wave and others [13]. The common requirements for these technology are small size, low energy use, computing power, connectivity, interoperability, security [14]. Protocols like RFID and NFC have been used in retail practice for inventory tracking or payments. BLE is a protocol that is attracting attention of retailers and marketers in recent years. As it has become the standard in most of current smart phones it lands itself for real-time, contextual, personalized communication and activation at or close to point of purchase, identifying microlocation [15]. BLE is a modification to the standard Bluetooth protocol to allow short range, low bandwidth, low latency, very efficient communication. They are used when sending small amounts of data periodically is needed. IoT systems contain application, network and perception layer and comprise a number of component modules: interaction with local biometric and wearable devices, local analysis and processing, interaction with remote devices, application specific data analysis and processing, integration into business processes and enterprise, and user interface.

Smart weable devices and biometric technology have the capability to generate enormous amount of data. In order for this data to generate useful information and create value to the user, they should be connected and enabled via cloud services and big data analytics, comply with security and privacy requirements [16]. In addition, within the enterprise there should exist adequate organization. It is not only corporate entities who can generate added value and financial gains out of data such as consumers and shopper could have that same opportunity selling their own data generated by the intelligent devices in their homes and lives, for the benefits of personalized and relevant added services and experience [17].

3. Sensorial Marketing

Smart marketing are applied in order to position a certain market brands, maintain its validity on the market and enhance its value. The use of senses enables one to relate to a practice increasingly prolific in the world of marketing with the aid of smart devices and biometric technologies. One technique is branding which is associated with every graphical stimulus that characterizes a specific market brand such as logo, colors, images, icons, characters, as well as the transmission of its values through these. However, traditional marketing has been somewhat unfair to reduce branding to a purely visual expression because of its fundamental and important variable to the success of a brand or an organization.

Sensorial marketing has been used as a tool that exploit the senses through stimuli designed to be directly related to a particular brand. It has become a strategy of differentiation and positioning where modern marketing begins to make use of tools that would have never thought in the past, starts to break traditional schemes, and thinks laterally in order to expand and solidify the mental territory each brand occupies in one's brain as consumers. It may sound too sophisticated however that link product-consumer

through the description of the first and sensitivity to receive and process information from the environment in which people live makes it a natural process.

3.1. Sensorial Marketing Senses

The following are the components of the human senses that contribute to sensorial marketing.

A. Sight. The the sense of sight is regarded as the most significant medium used by market brands to generate recognition and develop an identity in the market. It is used to identify a specific product that are recognized through corporate logos, colors, characters and other graphical tools. Colours and shapes are the first way of identification and differentiation. Many brands are associated to a specific color, then it is memorised more easily in the consumers' unconscious such Coca Cola is red, Kodak is yellow, *etc*. This provides the epicenter of all business strategy in most corporations. Table 1 sums up the characteristics of each color and their impact on consumer behavior [18].

Table 1. Impact of Colors on Consumer Behavior [18]

Color	Impact	Uses
Red	Highest stimulation hue: strong excitation power. Red increases the pulse and heart rate, as it raises blood pressure, and stimulates appetite.	Really popular in restaurants as it increases appetite. However, due to its exciting properties, red is more likely to be used in bars.
Orange	Orange is friendlier than red, but still stimulate appetite and attract attention, especially among kids and teenagers.	Companies like Burger King or Dunkin Donuts use orange as main colour.
Pink	Sweet and appealing. The perfect colour for sweets.	Mainly used by candies producers as Sweet'N Low, and sweet shops.
Yellow	Comforting colour. It can also mean tangy, creamy or delicious connected to aliments.	Popular hue for tea houses or pastry shops.
Green	Meaning of refreshment and nature. Connected to vegetables, it is means healthiness for the consumer.	Green is a delicate colour, as if not used in the right environment it is not appealing but can be repelling.
Blue	Associated with sea and sky calmness, suggest trust and serenity.	As blue icy hues refer to purity and coolness, this is the ideal colour for products like bottled water.
White	Sign of purity, cleanness and coolness. White is the basic colour, as it brings out everything else.	In a restaurant, white is used everywhere the customer expects for cleanness (plates, kitchen)
Black	On a packaging, black is symbol of top-ofrange, quality and sobriety.	As it is the darkest colour, black is exclusively used to create a very specific environment.

B. Sound. Probably the second most used medium by marketing and advertising is the sense of hearing. Visual objects are significant but for big companies they are not sufficient to influence the consumer purchase decisions and decide to provide new features to their products and brands. Vital prducts that are utilized by their manufacturers to expand their marketing strategies include the famous Nokia tune, the specific Intel notes at the end of each commercial, the Iusacel ringtone of an incoming call and even the sound coming out of the doors of many car brands such as GM or Chrysler that are designed to be unique and generate acknowledgement in the buyer's mind. Many of the sounds derived from the use of certain particular product begin to be taken advantage of overused to contribute to a consumption experience and therefore an enhanced recall and consumer association.

C. Touch. The sense of touch allows users to develop a physical memory and include certain products in their daily activities. These products highlights the smartphones, mobile devices and sensitive touch screen tablets that are so common today. There are also the textured book covers, labels and printed shirts, forms that are better adapted to one's hands in bottles of mayonnaise, sauces, and beverages as well as plush, furry fabrics that are pleasant to the touch. No doubt brands recognize the singular sensitivity and natural tendency to feel the environment as a means of interaction and involvement with it.

D. Taste. This medium is generally overused especially for food and beverage brands such as secret formulas treasured over the years, special and exotic ingredients, and grandma's recipes that provide a whole mystique around one's favorite food or drink. Comparatively, there are medicines with a pleasant taste for children, and bubble gum flavored toothpaste. The involvement of the sense of taste in business strategies has come out of their habitat to start their small steps in unexpected areas such as pencils and other office supplies for those who bite incessantly as well as toys and clothing with flavor for toddlers.

E. Smell. Being the most sensitive of all senses due to the ability to smell anything, human nose can distinguish over 10,000 different odors. With this, it has a tremendous evocative power of memories and experiences over the years. Thus, a myriad of brands have been quite functional from acommercial standpoint of business.

In this present age, the most successful brands are the ones that deliver feelings and emotions. By stimulating senses, emotions will be delivered and learning will be stimulated. This is very effective, because our senses are directly linked to the limbic part of one's brain that is responsible for memories, feelings, pleasure and emotions. When a brand tickles multiple senses, users will experience the brand more profoundly and connect with it on a deeper emotional level. Sensorial marketing appeals to all the senses in relation to the product brands.

3.2. Conceptual Model for Sensorial Marketing

In this study, the proponents have identified the deficiency of having a conceptual model of smart wearable devices and biometric technologies for marketing and selling that would be based on relevant business practices and technology solutions, connecting the manufacturers and sellers activating potential shoppers, combining the user interface and internal business processes. The developed model for marketing and personalized selling is depicted in Figure 1. The diagram depicts a model containing the business process from planning through implementation to evaluation.

In the planning phase, resources and technologies are linked with processes and consumer and shopper interaction. This phase defines the marketing strategies for the tended target which are the consumers and shopper based on insights. It also involves targeting of key performance indicators of corporate infrastructure and business process.

These comprises of well-defined objectives that will generate and establish the scope, technology solutions and resources needed such as money, time and people.

The focus of implementation stage is defining the interaction of user activity, trigger and reaction mechanism. It enables the linking of the smart wearable devices and biometric technologies with the marketing platform in order to solve and provide capabilities to data processing and analytics. Trigger are categorized as spatial, temporal or event based while reaction mechanism can be notifications, actions or recommendations [2]. The components of the planning phase include the resources at perception layer, data exchange protocol at network layer and process and analytics at the application layer.
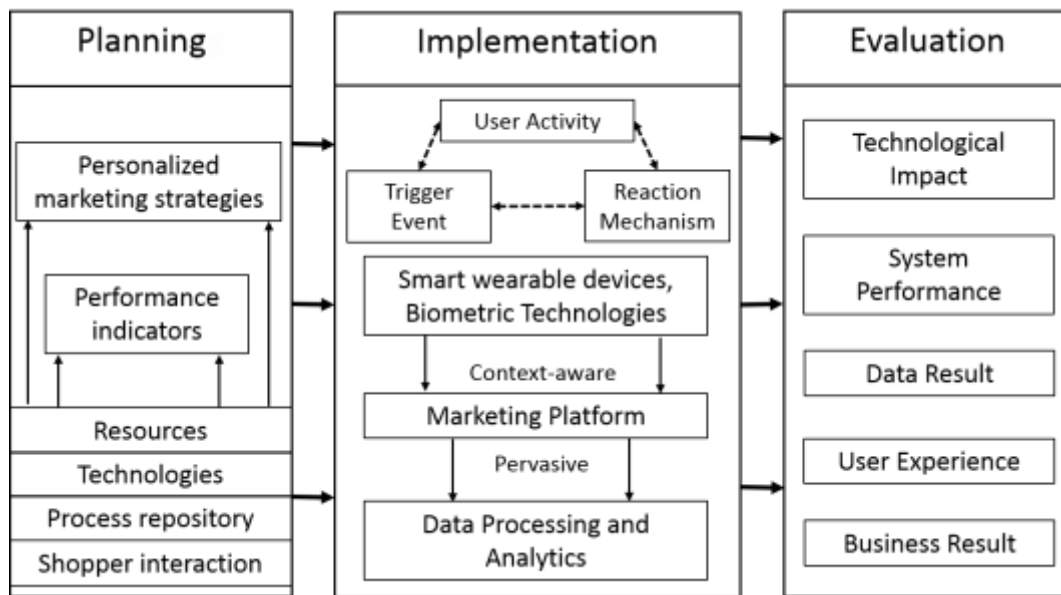

Figure 1. Conceptual Model for Sensorial Marketing

The conceptual model assumes choice of actual technology where each solution can have its benefits and limitations and the business processes that have to be put in place to have the meaningful implementation and system performance and drive satisfactory user experiences and business results. Appropriate data analytics enable technological interventions such as shopper interaction, product inventory, logistics, payments, and contents.

The implementation of the conceptual model on sensorial marketing should be able to provide technological impact assessment and validation of its contribution to business results which include direct and indirect financial results and sustainable competitive business advantage. The premise of successful personalized marketing is to create the lasting relationship with the customers and buyers in order to assess the impact on the target consumers and shoppers to measure, track, and correct. Thus, the system has to perform flawlessly and be supported by lasting organizational design.As such, expectation is that the platform delivers incrementality to business performance measured by revenue and different efficiency and productivity ratios.

3.3. Conceptual Model Design

The conceptual design of the model is applied on sensorial marketing and personalized business scenario. The scenario is related to a person outdoor with smart wearable devices and biometric technology serving as shopper activation. With the aid of a mobile application, it provides user experience, and provide possibilities to leverage device functionalities such as location for geo-targeting. Detecting the person's activities allows

the system to identify the what the person needs in terms of business services and products. For instance, a person outside is running for 30 minutes and sweating a lot, smart wearable devices sends bio-information data to the system that the person needs to drink water or other refreshments. The system can offer choices of drinks and food to the person, the person selects it and the system connects to appropriate restaurants for delivery of the service or products. Figure 2 depicts the conceptual model scenario for sensorial marketing.
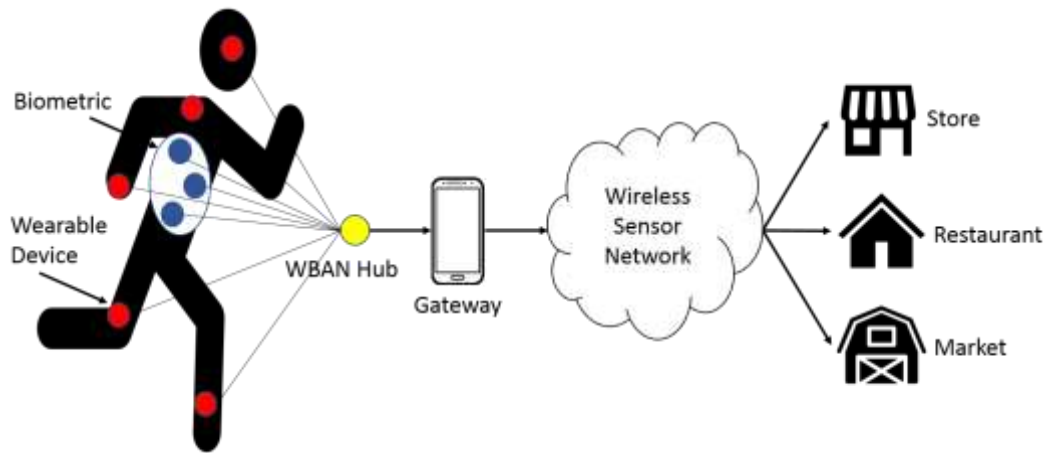

Figure 2. Conceptual Model Scenario

The main objective of using body sensors for consumer activation is to generate incremental commercial results above and beyond standard promotional practices. To have such activations implemented at scale, they should be beneficial for all parties involved: manufacturer and seller. Concrete features which are expected to generate incremental value are personalized offers based on system user behavior and utilizing new medium of communication where a sensor trigger just before the purchase. In addition to final commercial results, it is important to understand users' perceptions and attitudes. Assuming their system data sharing agreement, there is a need to validate users see and value the benefits of personalized communication and offers, whether such communication is seen as acceptable or intrusive as well as whether there is an impact on attitudes towards brands included in the particular promotional program.

Based on available extensive consumer and shopper research, application functionalities are designed to address shoppers' needs and they are: food search, shopping list creation, current retailers' leaflets and promotions review, store location, interactivity questions, and comments posting. From the system behavior analytics, all users searching for similar products or who are adding items from the offer to their shopping lists would receive notification about the offer and recommendation to add to basket and purchase. Objective of this phase would be to trigger the purchase, increase basket size with this bundle offer and generate traffic to retailer's stores. Further, when in vicinity of the wearable devices activated outlets, users would be receiving notification on the offer triggered by the sensors in store.

It is important to monitor and check functionality of all system components including the wearable sensors and biometric performance, exchange with users and servers, efficiency of the application algorithm and notifications, redemption of digital coupons. To achieve above mentioned measurement targets, the proponent would propose following methodology: in market test and volumetric modelling to track sales results, exit interviews with shoppers triggered by the sensors in store, and system performance tracking via existing database.

4. Analysis of Human-Oriented Marketing Technique Element

The most important subject in the sensorial marketing is the consumer analyzing and satisfying the consumer who purchases the product is the most important element of marketing. For such reason, in marketing, to understand the consumer, the techniques that analyze and forecast the consumer are applied. In the traditional marketing phase, which provide the sensual information to the consumer, establish the marketing strategy by analyzing the general trend of the target consumers but currently, they have been developed to the phase that applies the personalized marketing by using different data to each individual based on the user information. Marketing can be applied by using bio-information of the individual and widely, based on the surrounding environmental information. For long-term, the personalization marketing is being increase and shows the successful results by analyzing the products preferred by user and by combining with the artificial intelligence technology that can analyze the pattern that the individual acts in life.

The facial expression analysis technology is the traditional method to extract the emotion that the user feels in the marketing stage. Bentley in Great Britain made the application 'Bentley Inspirator' (Figure 3), which extracts the emotion of consumer from the facial expression and applies it in the marketing using the smart device camera [19]. While the user views the image shown by the application, it proposes the car suitable for user by extracting the facial expression of the user though the camera equipped in smartphone, converting it into emotional data and combining the color, tire, interior, *etc.*, of the car. Professor Charles Spencer of Oxford release the service recommending appropriate food by reading the emotion through the facial expression of the user [20].

As a technology to track the direction of human pupil, the eye tracking technology is being used for marketing analysis of various enterprises such as Unilever, Cadbury, *etc.* Being developed to monitor adhesion type, glasses type and HMD embedded type, Eye tracking module enable to track the pupil in all display environments. If the direction of consumer's pupil is analyzed, the arrangement in the showcase can be designed by measuring at which product the consumer is watching and what order the eyeline is moving and the design element, which the user show lot of interests, can be extracted in the product design.

Figure 3. Bentley Inspirator

The image information such as facial expression or movement of pupil can be adjusted intentionally by the individual but the bio-data cannot be adjusted by the will of man. So, the bio-information can be the method to judge the condition of people but to match with the intention exactly, many researches are needed. Currently, the bio-information are collected mainly through the wearable devices and utilized as information related to the health such as exercise, rehabilitation, *etc*. Fitbit supports the functions such as

measurement of heart rate, movement using the accelerometer, sleep cycle analysis, etc [21] (Figure 4). Sensoria can measure the heart rate, movement and sole contact using the clothes and accessories such as socks and bracelet and can apply related devices to new areas by selling the developer kit [22].

Figure 4. Fitbit Charge 2

As the researches to forecast the emotion using bio-information, the bio-information started being used in new areas. Lightwave provided the emotional information of the audiences by providing the wristband to the audiences measuring the heart rate and movement in the performance together with Pepsi in SXSW 2014 [23]. It analyzed the audiences who watched the movie Revenant in pre-release screening together with 20th Fox's digital making team and acquired the data that the audiences received the shock 15 times, their hearts were pounded 14 times, the audiences concentrated on the movie without moving for 4716 seconds and was surprised 9 times. This project showed that it can be used in movie analysis and market in a new manner.

In sensory marketing, expectation is the driver of success. The first glimpse of a product will set expectations of the form, the material, the smell. If these expectations do not come true which the expectation does not match the user sensorial input of the product, the will be surprised by sensory mismatch. This has an impact on the product experience, that is, when the experience with the product exceeds the expectation, consumers will often evaluate the experience as positive, if the interaction falls short the experience will often be viewed as negative.

In the light of brand perception, sensory mismatch also has an influence on the brand evaluation. Consumers form an image of a brand personality when they interact with a brand. By giving a brand human-like characteristics, consumers create and sustain an intimate relationship with a brand. The effects of brand personality on sensory mismatch were researched by [24]. They tested consumption of products that were visually aligned with how they feel with sensory match such as a bag of coffee that both looks and feels like burlap and that were visually not aligned with how they feel with sensory mismatch such as a bag of coffee that looks like burlap but feels like paper. They found that consumers intuitively link sensory mismatch to a brand's personality.

One would think that when the mismatch is negative with the material from a dress looks like silk, but in reality it's made of cotton, a consumer should have a negative evaluation about the product. But this is not always the case. In case of an exciting brand, the mismatch will sometimes be perceived positively. This is because consumers view the mismatch as more authentic of the exciting personality of the brand. Sensory match such

as touch and sight that are aligned is more preferred for sincere brands, because the match is seen as more authentic of a sincere personality. This shows that the success of a given sensory marketing tactic highly depends on how consumers perceive the brand.

In general, consumers form stronger relationships with sincere brands like Hallmark, Volvo, Coca-Cola than with exciting brands like Apple and MTV. In essence, a brand's personality influences how its actions and behaviors are perceived by the customer. These actions can be derived from consumer reviews, advertising, past experience and of particular interest of this article, how the product looks.

4.1. Evaluating Technological Impact and System Performance

For the whole wearable device and biometric based system program to work, following is a requirement. The user should have the smart phone on that should be installed, the phone has Bluetooth activated, beacon is active and communication algorithm is correct. The system has a functional database and analytics and reporting interface. To do tracking, sensors would be added to the database tracking system which would enable monitoring of their performance. In addition, the project manager should have the responsibility to monitor cross functional implications of the project and run post activity review with all involved departments to assess the success and sustainability of implemented process and business practices to support the system implementation afterwards.

4.2. Evaluating Business and Data Result

To be able to precisely evaluate the effect a wearable sensors brings as a varying new factor in the promotional practice, and there is a need to simultaneously track sales in stores with sensors and those without. For the purpose of objective measurement and understanding the causality of sensors to sales, digital coupons as well as in store execution quality such as positions and management of display units, external agency partner should be engaged. Defined success criteria would be statistically significant sales increase that are measured as sell-out revenue of all promoted categories and products of a company.

The test would be implemented in areas for the following reasons that application users, logistical ease for sensors and displays placement and field monitoring. Selected stores should be of different format such as supermarkets and convenience stores that should have standard turnover based on seller's historical data and should be in frequent traffic areas. Upon selection of sensor activated stores, other outlets representing their statistical parameters of location, turnover, format, equipment and implementation should be selected that would server as the reference control group to benchmark sensor base outlets results against.

Analyzing digital coupons redemption based on direct data from the seller vs smart mobile phones where users will get the redemption rate, which is an important metric of marketing promotions success. The hypothesis is that this redemption rate will be higher than standard promotions redemption rate with 3-8% based on historical data.

4.3. Evaluating User Experience

Privacy, user control, and transparency are critical for acceptance in many areas in society. For application users that receive transparent data policy and can choose to accept it when installing the application since it does not require identification and revealing personal data. Initial trials with sensors indicated potential issue of excessive interaction with users which caused their negative reactions and rejection. Unexpected privacy intrusion by an advertiser can be seen as positive if it fits users behavior and provide added value either as benefits or entertainment.

In order to evaluate consumers' reaction to planned program and to do it as close to the act itself, the proponent plan to do interviews with shoppers with standardized

questionnaire administered by the interviewer at the retail outlet once the shopper completes the shopping trip. Exit interviews would be conducted at the outlets activated with biometric technology. The sample would comprise of people triggered by the sensor that would be the respondents selection or elimination criterion. Minimal realized sample in each outlet should be 30 respondents. Questionnaire duration would be up to 5 minutes. Base questions would aim to measure user satisfaction level, reasons for satisfaction or dissatisfaction, ease of use, relevance, expectations about similar activations in the future, perception of promoted brands together with standard demographics. Analysis would be done by standard descriptive statistics as well as variance analysis between satisfied and dissatisfied users.

5. Conclusion

This article investigated and analyzed the case that applied the bio-information to the marketing. The paper proposed a conceptual model in sensorial marketing and selling that combines the business practice with smart wearable devices and biometric technology solutions, connecting the manufacturers and sellers activating potential shoppers, combining the user interface and internal business processes. The objective of the conceptual model design is to implement and evaluate the efficiency of the technology for its impact in sales and the purchase cycle. The evaluation system would give comprehensive insight into economic, psychological and technological effects. The possibilities of communicating with the consumer or shopper in real time, at any stage of the purchase cycle and in relevant context, with personalized content and relevant benefit for the user are key reasons for sensorial marketing as relevant and potent tool for marketing tactics. It can improve business processes and user experience being applied for inventory management, retail logistics, payment systems, store employees management.

The marketing is being changed into the personalized marketing by the development of technology and since the personalization marketing can be fused with diverse industrial areas, it has great potentials. Since the social foundation to acquire the bio-information of the users easily was prepared by the development of wearable technology, the personalization marketing is going to be expanded continuously. The bio-information acquisition technology is being developed even to the research to extraction the emotional information by acquiring the bio-signal such as heat rate and brainwave starting from the use of image information such as face and eyes [25]. The personalization marketing research will required the research for new marketing method generated by connecting with social network services.

Acknowledgments

References

[1]   O. Vermesan, P. Friess, P. Guillemin, H. Sundmaeker, M. Eisenhauer, K. Moessner, F. Le Gall and P. Cousin, "Internet of Things Strategic Research and Innovation Agenda", Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, **(2013)**, pp. 7-151.

[2]   A. Al-Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari and M. Ayyash, "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications", IEEE Communication Surveys & Tutorials, Fourth Quarter, vol. 17, no. 4, **(2015)**.

[3]   V. Petrock, "The Complete Industry-by-Industry Guide for Marketers", eMarketer, **(2016)** May 16.

[4]   V. Shankar, M. Kleijnen, S. Ramanathan, R. Rizley, S. Holland and S. Morrissey, "Mobile Shopper Marketing: Key Issues, Current Insights, and Future Research Avenues", Journal of Interactive Marketing, vol. 34, **(2016)**, pp. 37-48.

[5]   C. Perera, C. H. Liu, S. Jayawardena and M. Chen, "A Survey on Internet of Things From Industrial Market Perspective", IEEE Access, vol. 2, **(2014)**, pp. 1660-1679.

[6]   N. M. Fong, Z. Fang and X. Luo, "Geo-Conquesting: Competitive Locational Targeting of Mobile Promotions", Journal of Marketing Research, vol. LII, **(2015)** October, pp. 726-735.

[7]   R. Gupta and R. Garg, "Mobile Applications modelling and security handling in Cloud-centric Internet of Things", 2015 Second International Conference on Advances in Computing and Communication Engineering, 978-1-4799-1734-1/15, 2015 IEEE.

[8]   N. M. Fong, Z. Fang and X. Luo, "Geo-Conquesting: Competitive Locational Targeting of Mobile Promotions", Journal of Marketing Research, vol. LII, **(2015)** October, pp. 726-735.

[9]   S. H. Choi, Y. X. Yang, B. Yang and H. H. Cheung, "Item-level RFID for enhancement of customer shopping experience in apparel retail", Computers in Industry, vol. 71, **(2015)**, pp. 10-23.

[10]   E. Frontoni, A. Mancini, P. Zingaretti and V. Placidi, "Information Management for Intelligent Retail Environment: The Shelf Detector System", Information, vol. 5, **(2014)**, pp. 255-271.

[11]   K. Nur, M. Morenza-Cinos, A. Carreras and R. Pous, "Projection of RFID Obtained Product Information on a Retail Store's Indoor Panoramas", IEEE Intelligent Systems, 1541-1672/15.

[12]   E. Pantano and H. Timmermans, "What is smart for retailing?", Procedia Environmental Sciences; 12th International Conference on Design and Decision Support Systems in Architecture and Urban Planning, DDSS 2014, vol. 22, **(2014)**, pp. 101-107.

[13]   A. Al-Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari and M. Ayyash, "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications", IEEE Communication Surveys & Tutorials, Fourth Quarter, vol. 17, no. 4, **(2015)**.

[14]   M. Radhakrishnan, A. Misra, R. K. Balan and Y. Lee, "Smartphones & BLE Services: Empirical Insights", 2015 IEEE 12th International Conference on Mobile Ad Hoc and Sensor Systems, 978-1-4673-9101-6/15.

[15]   J. Cai, "Vertical Social Network for Retail Business Eco-system, A Proof of Concept", The Second International Conference on ETechnologies and Business on the Web (EBW2014) – Malaysia, **(2014)** March.

[16]   C. Perera, R. Ranjan, L. Wang, S. U. Khan and A. Y. Zomaya, "Big Data Privacy in the Internet of Things Era", IT Pro, Published by the IEEE Computer Society, **(2015)** May/June, 1520-9202/15, pp. 33-39.

[17]   Tata Consultancy Services, Internet of Things: The Complete Reimaginative Force, TCS Global Trend Study, **(2015)** July.

[18]   L. Eiseman, "Impact of colours on consumer purchase behavior", **(2000)** April 17.

[19]   http://www.bentleymotors.com/en/world-of-bentley/ownership/technology/bentley-inspirator.html (2017.07.06.)

[20]   C. Hill, "Wearables–the future of biometric technology?", Biometric Technology Today 2015.8 (2015): 5-9.

[21]   https://www.fitbit.com/kr/technology (2017.07.11.)

[22]   http://store.sensoriafitness.com/sensoria-developer-kit/ (2017.07.11.)

[23]   https://www.psfk.com/2016/02/the-revenant-leonardo-dicaprio-emotion-tracking-lightwave.html (2017.07.11.)

[24]   A. Sundar and T. J. Noseworthy, "Too Exciting to Fail, Too Sincere to Succeed: The Effects of Brand Personality on Sensory Disconfirmation", Journal of Consumer Research, vol. 43, no. 1, pp. 44-67.

[25]   H. Sim, W.-H. Lee and J.-Y. Kim, "A Study on Emotion Classification utilizing Bio-Signal (PPG, GSR, RESP)", Advanced Science and Technology Letters, vol. 87, **(2015)**, pp. 73-77.