Study Analysis of IoT in FMCG Smart Tags and their Significance in Counterfeit Prevention

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Abstract. Current study portrays a novel method for counterfeit prevention and brand security in the FMCG business. The introduced approach consolidates Internet of Things, Cloud, and Mobile advancements with the utilization of specially crafted savvy labels (smart tags) applied to each product to give track and follow capacities. The smart labels join QR code with extra data printed with an imperceptible photochromatic ink. The labels are enacted by spotlight on cell phones during the checking. Prior to checking, clients are provoked to choose the setting of the products (available, sold, and consumed) to give extra data about each product container as it travels through the inventory network. Consumer family types reveals essential information on family types and roles in selecting the product for purchasing. The statistical analysis of family type is 84.7 and 15.2 percentage (out of 354 members) in nuclear and joint family respectively. Awareness percentage on smart tags is 49.15, 32.17 and 18.07 percentage in consumer awareness, unaware and may be respectively. Analysis of fake products identification on smart tags is 53.67, 27.96 and 18.36 percentage in consumer identification, unidentified, and may be respectively. Counterfeit information on products identification on smart tags is 97.74, 2.259 percentage in counterfeit information obtained by consumer is higher than not obtained consumers. Analysis of benefit percentage on products is 94.63, 5.37 percentage in benefit percentage is higher than non- obtained consumers. Likeliness of IoT - Smart Tags on products is 76.28, 23.72 percentage (out of 354 members) in interested percentage is higher than not interested consumers.

Keywords: Digital Transformation, Human Sensor Network; Smart Tags; Brand Protection, Counterfeit Prevention, Fast Moving Consumer Goods.

1   Introduction

Fast Consumer Goods (FMCG) there is a complete issue of non-brand goods and products [1]. The product business is not a special case and the counterfeit product is a real problem for

manufacturers and customers [2,3]. Fraudulent product influences the shape and profit of the manufacturer, however it can also harm consumers. The overall product market analysis shows that the market share of counterfeit in the product industry falls in the range of 0.2% to 1%, while a few tests have increased to 4-5% [4,5]. Many emotional tests come from China where a fraction of the total counterfeit product imported from Europe has been tested to be about 20% and in some cases very high, while product consumption is rising which makes China a fast-growing product market, ahead of the US and Russia [3,6,7].

The most popular way to create a product is to print a fake logo that takes a different brand name and invisible changes in the brand name and logo of friends to deceive the buyers of the products. Often, forgers use valid names derived from more expensive products and see them in less expensive products with similar jars. Finally, in some cases the drink inside the bottles is a counterfeit product, representing a major health concern, and [7]. This is a real issue in Montenegro, as a remnant of Southeast Europe, which was one of the formal promotions of this work. Figure 1 shows cases of fraudulent Montenegro products sold in the Western Balkans and Eastern Europe. In these cases, words that have the same appearance as the first one are used. The most curious model is a five-liter jug of product that has never been sold for a five-liter bulk.

Food security is an important and increasingly fundamental problem due to population growth and the current approach to agribusiness creation [8,9]. The design of the Internet of Things (IoT) is another unique benefit of farming and networking in general. Combined with other fine data (IT) patterns, it will play an important role in the advanced transformation of agriculture and food production through brilliant associations of compatible materials that can be detected, detected and remotely controlled [10], [11], [12]. The basic development of IoT applications in transmission and distribution is common in precision farming, food tracking and subsequent, welfare and quality management, food preparation and integration, and food consumer [8]. Food identification frameworks, often restricted by applicable laws, are often achieved through cultural frameworks, within an independent organization or part of a food production network using important developments and paper routes [13].

The arrangement furnishes a portable application that collaborates with purchasers such that each time clients check a QR code remarkably recognizing an item moment (for example product bottle), they give a report on the status and area of that specific container. In this manner, each jug is independently followed and followed all through the store network and these data updates can be utilized to recognize whether there is an expected fake issue with that specific jug.

2 Research Methods

A semi-structured qualitative preliminary study that focused on consumer's perceptions of smart labelling. The study involved 354 members who were generally familiar with smart labelling - IoT. The results indicate that the respondents could see the benefits of the technology.

DataCollection

A quantitative approach was taken through a large-scale data collection via an online survey research. This research was able to call upon members whom met the predetermined demographic criteria of the survey, in this case, household grocery decision makers between the ages of 18 and 65.

S.No	Attributes
1	Name
2	Age
3	Sex
4	Educational qualification
5	Marital status
6	Residential location
7	Occupation
8	Family type
9	Household shopping
10	Do you aware of smart ags
11	can you identify the fake products
12	Reliability of smart tags
13	Is it important to gather information regarding counterfeit?
14	Do you think that our community will benefit from IoT based Smart tags
15	Is it important to educate consumer about counterfeit and how to report one? Do you think consumer would like the smart tags
16	Did you find this study useful?

Weka 3.9.8. tool has implemented for the analysis and the below methods have implemented in this research work.

3 Results And Discussion

Study results indicates the significance of IoT based smart tags. Quality analysis of various parameter including consumer family type, awareness on smart tags, Identification of fake products, importance of counterfeit information, benefits of smart tag, likeliness of IoT smart tags

Qualitative analysis:

Analysis of consumer family

Consumer family types reveals essential information on family types and roles in selecting the product for purchasing. The statistical analysis of family type is 84.7 and 15.2 percentage (out of 354 members) in nuclear and joint family respectively (Figure 1 & Table 1).

Table 1. Analysis of consumer family

S.No	Family Type	weight	Percentage
1	Nuclear	300	84.7

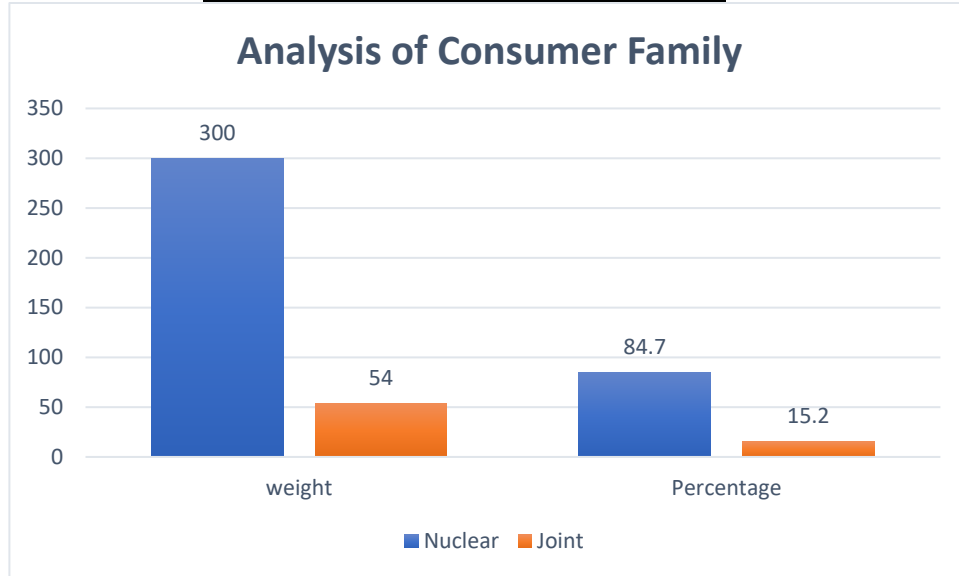| 2	Joint	54	15.2

Figure 1. Analysis of consumer family

4 Awareness on smart tags

IoT based Smart tags predict the essential data information on selecting the product for purchasing. Awareness on smart tags by consumer is needed for betterment of IoT. The statistical analysis of awareness on smart tags is 49.15, 32.17 and 18.07 percentage (out of 354 members) in consumer awareness, unaware and may be respectively(Figure 2& Table 2).

Table 2. **Awareness on smart tags**

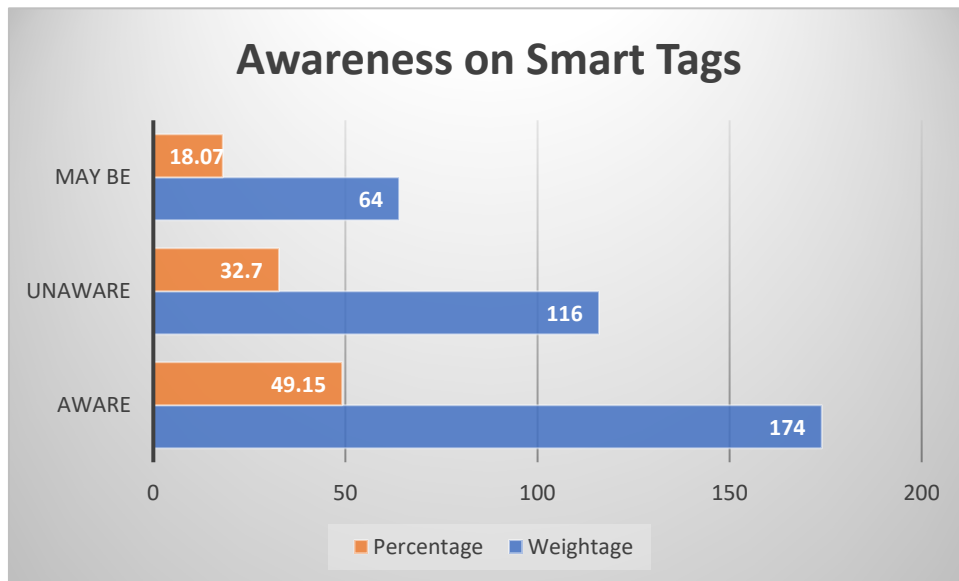| S. No	Label	Weightage	Percentage
1	Aware	174	49.15
2	Unaware	116	32.7
3	May be	64	18.07

Figure 2. Awareness on smart tags

5 Identification of fake products

IoT based Smart tags predicting the fake products for choosing the product for purchasing. Identification of fake products by consumer is needed for betterment of IoT. The statistical analysis of fake products identification on smart tags is 53.67, 27.96 and 18.36 percentage (out of 354 members) in consumer identification, unidentified, and may be respectively(Figure 3& Table 3).

Table 3. Identification of fake products

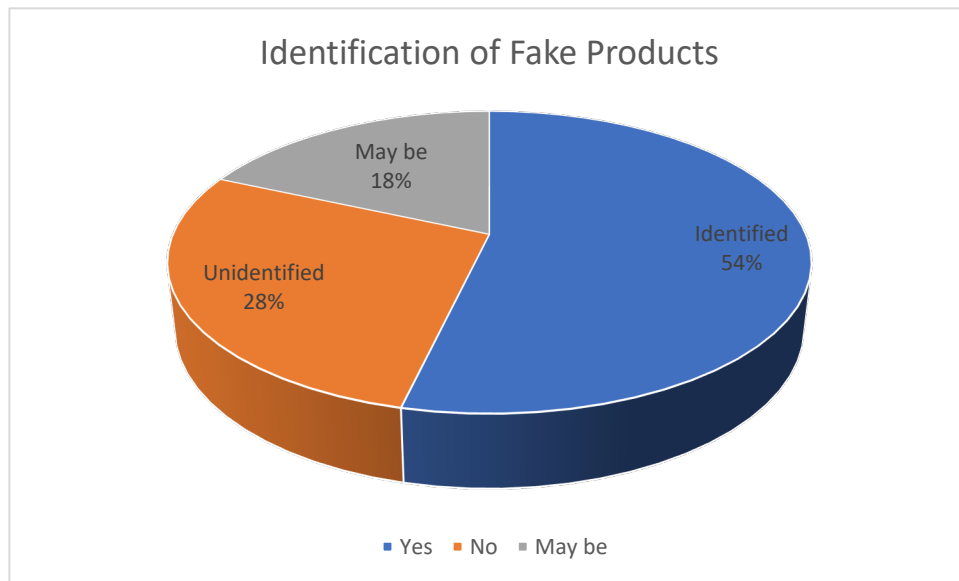| Parameter	Count	Percentage
Identified	190	53.67
Unidentified	99	27.96
May be	65	18.36

Figure 3. Identification of fake products

6 Importance of Counterfeit information

Counterfeit information should be known be the consumer in general. Information on counterfeit products enable consumer for choosing good products. The statistical analysis of Counterfeit information on products identification on smart tags is 97.74, 2.259 percentage (out of 354 members) in counterfeit information obtained by consumer is higher than not obtained consumers(Figure 4& Table 4).

Table 4. Importance of Counterfeit information

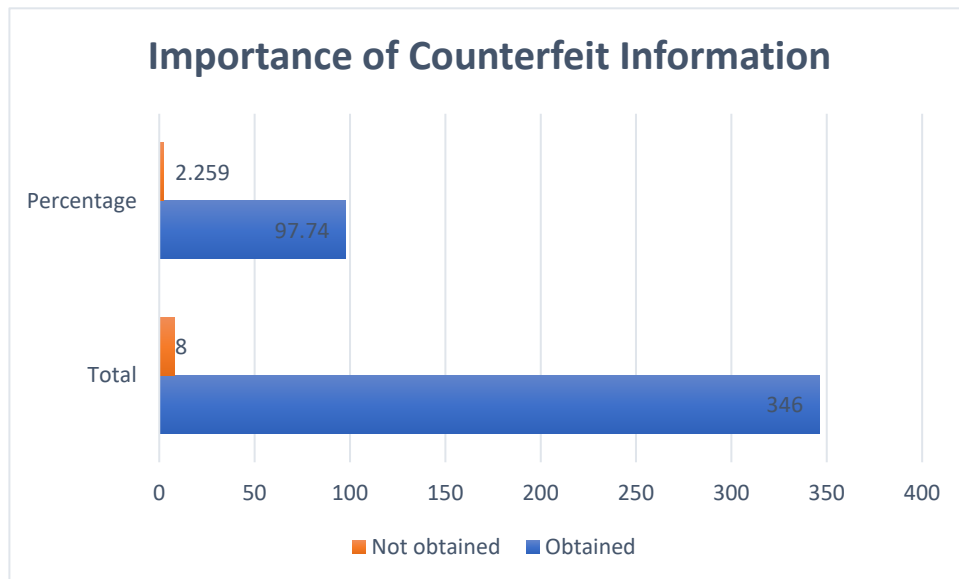|	Total	Percentage
Obtained	346	97.74
Not obtained	8	2.259

Figure 4. Importance of Counterfeit information

7 IoT Smart tags - Benefit percentage

Smart tags benefit percentage is very essential for fast moving consumer good. Information on benefit percentage enable consumer for aware more on choosing good products. The statistical analysis of benefit percentage on products is 94.63, 5.37 percentage (out of 354 members) in benefit percentage is higher than non- obtained consumers(Figure 5& Table 5).

Table 5. IoT Smart tags - Benefit percentage

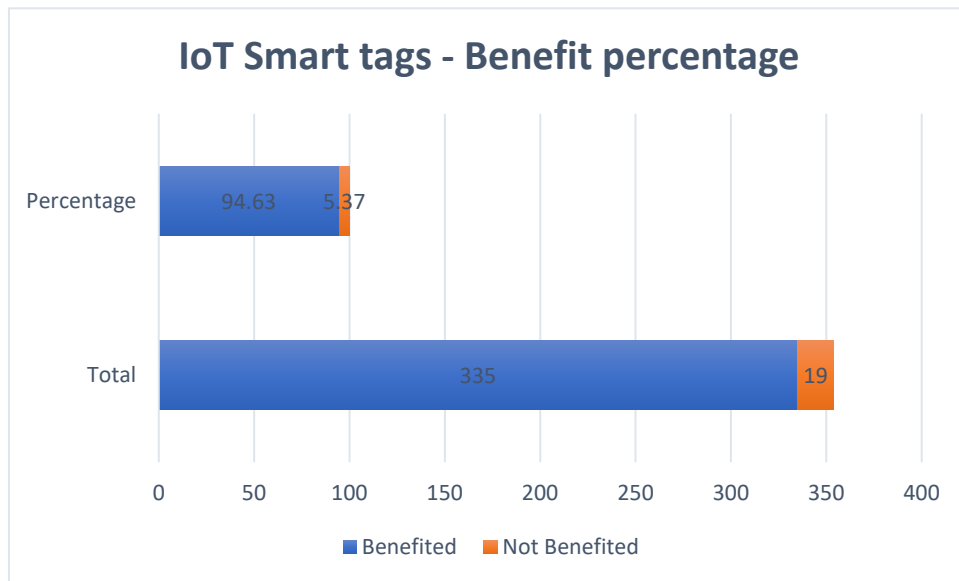|	Total	Percentage
Benefited	335	94.63
Not benefited	19	5.37

Figure 5. IoT Smart tags - Benefit percentage

8 Likeliness of IoT - Smart Tags

Smart tags likeliness percentage is one of essential criteria for fast moving consumer good. Information on Likeliness of IoT - Smart Tags enable consumer for aware more on choosing good products. The statistical analysis of Likeliness of IoT - Smart Tags on products is 76.28, 23.72 percentage (out of 354 members) in interested percentage is higher than not interested consumers(Figure 6& Table 6).

Table 6. Likeliness of IoT - Smart Tags

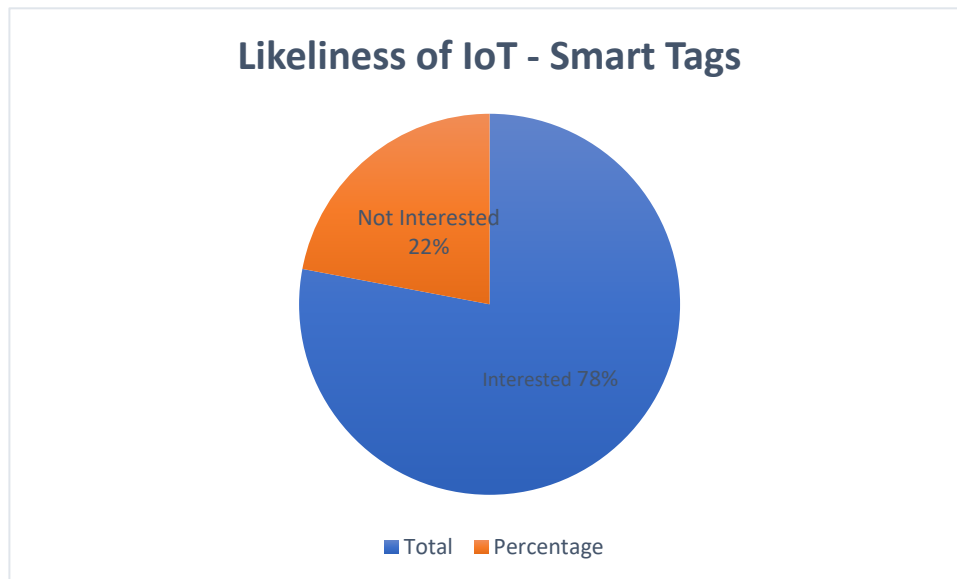|	Total	Percentage
Interested	270	76.28
Not Interested	84	23.72

Figure 6. Likeliness of IoT - Smart Tags

The need to combat counterfeiting in the global manufacturing network is widely recognized and various alternatives and approaches have been proposed to address this issue [1,2]. These processes apply to the product business [2,14]. There are arrangements based on the IOT BASED SMART TAGS label that may be below the lower stage, as IOT BASED SMART TAGS users are less available [15,16]. Then again, preparations based on ink are highly adaptable to the point of execution [17,18], but they are easy to imitate [14]. A few experts suggest the use of preparations based on glittering materials [19] or unusual examples [20], but there is a need for more help with these methods. Product tracking and tracking arrangements based on the use of single product bottle numbers using the OCR method can be considered, but the disadvantage is that the accuracy of the reading and use of different text styles and numerical programs for different product types [21]. Frameworks of object identification and anti-fraud based on the use of QR codes are generally accepted by consumers and often require a camera with a camera [22,23]. The naming of Blockchain similarly finds its use in the production network of application managers [24,25], and its new record recording could allow for the selection of cloud-based frameworks soon.

This paper outlines the implementation of a pilot project that uses a variety of methods to create a product validation framework and false arguments in the product business. This method is powered by IoT, distributed by archiving and investigating information, mobile applications, and randomly labelled based on unique QR codes. The use of awesome labels creates a parallel space, where everything that happens is visible, using the new techniques provided by Horizon 2020 TagItSmart! project [26,27]. If it is not a very common problem, note that the standard standard tags distinguish the type of object that currently does not provide data for the same item [28]. It is worth noting that the GS1 Digital Link Standard has been redesigned in TagItSmart! making and donating marks the use of QR code, (IoT based Smart Tags), closed field communication (NFC), and Bluetooth to transmit information to their customers [29]. The common idea is to provide limited web-enabled provision to

improve consumer purchasing experience, strengthen product reliability, and improve store network availability and efficiency.

Surprisingly the use of smart labels is that the general protests of the massive market that are not considered part of the IoT biological system can be provided by sharp labels that allow them to radically change their individual status by relying on environmental changes [30, 31]. Another important part of this method used to detect human-enabled detection is cell phone access everywhere with their cameras [32].

Conclusion

This data is utilized by the uniquely designed heuristic to help clients and manufacturer recognize issues with singular cases of the item. The framework was carried out as a pilot project that was executed during a time of a half year. End clients showed an incredible interest in the likelihood to carry out such a framework, customers preferred the cooperation with the item utilizing the portable mobile application and smart labels, while product manufacturer communicated their advantage in the arrangement. Other than fake that influences benefit, the advantages of such frameworks incorporate improved brand security and diminished danger of health hazards.

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