

## **Ethical Responsibility in Adopting Barcode Technology in Production and Marketing Processes: An Applied Study on a Sample of Food Products in the Iraqi Market**

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**Abstract:** In recent decades, the world has witnessed a sweeping digital revolution leading to the widespread adoption of modern technologies across various life domains. Among the most prominent of these is barcode technology, which has become a fundamental tool for organizing supply chains, controlling products, and improving service efficiency. However, despite its benefits, this technological advancement raises ethical questions concerning the extent to which institutions and societies adhere to principles of honesty, transparency, privacy protection, and ethical responsibility when implementing this technology.

While barcode systems contribute to enhancing reliability and preventing commercial fraud, they may conversely be exploited to collect user data without consent or to entrench disparities between entities capable of using the technology and those deprived of it. Hence arises the need to study the relationship between technological innovation and ethical responsibility in this field.

Within the context of production and marketing processes in business organizations, particularly manufacturing entities, a fundamental relationship emerges involving the consumer as a key party in the market equation, being the most influential variable in determining supply and demand trends. Although many countries, including Iraq, have taken legislative steps to protect consumer rights through enacting clear laws, this legal protection does not absolve the producer or marketer from bearing ethical responsibility towards the consumer, especially concerning transparency and credibility in presenting product-related information.

**Keywords:** Barcode, Ethical Responsibility, Consumer, Producer.

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**Research Introduction:** Amidst rapid technological development and intensifying competition in business markets, the need has emerged for effective mechanisms ensuring a balance between striving for operational efficiency and profitability on one hand, and adhering to ethical standards on the other. Among these mechanisms, barcode technology has occupied a pivotal position, not only as a tool for simplifying processes and improving accuracy but also as a cornerstone in building a trust relationship between the producer and the consumer.

Many previous studies, both Arab and foreign, have shown clear interest in the technical and functional aspects of barcodes, focusing on their role in improving warehouse inventory management efficiency, accelerating payment processes in the retail sector, and enhancing quality levels in the industrial sector. Despite the importance of these studies, they have overlooked a crucial dimension represented by studying the strategic role of barcodes as a monitoring tool supporting ethical responsibility in business organizations.

From this standpoint, the problem of this study emerges in its endeavor to bridge this research gap by investigating the extended role of barcodes to be more than just a data storage strip. It can be a guardian of ethical values in the product's journey from the production line to the hands of the end consumer. It primarily aims to analyze and clarify how this technology contributes to enhancing transparency, protecting the rights of primary and final consumers, and entrenching principles of ethical responsibility in both production and marketing processes, taking Instruction No. (1) of 2010 as a legal framework to achieve these objectives.

Therefore, this study seeks to present an integrated vision through four Sections. The first was dedicated to the scientific methodology and previous studies, the second addressed the theoretical framework of the research, while the applied aspect occupied the third Section. Conclusions and recommendations were discussed in the fourth Section.

## **Section One**

### **The Methodological Framework of the Study and Previous Studies**

#### **1.1 The Methodological Framework of the Study**

##### **1.1.1 Study Problem**

The study problem revolves around questioning the role and importance of barcode technology in enhancing ethical responsibility within business organizations. The study's problematic can be formulated through the following questions:

1. What monitoring role does the barcode play when placed on goods in supporting and achieving the organization's ethical responsibility?
2. How does the barcode contribute to monitoring production processes and marketing activities, within the context of the organization's ethical responsibility?
3. What benefits accrue to both the consumer (primary and final) and the producing company from using barcodes, in line with enhancing consumer rights protection as stipulated in Instruction No. (1) of 2010?

##### **1.1.2 Study Hypotheses**

The following hypotheses emanated from the study problem:

1. The barcode plays an effective monitoring role when placed on goods, during their circulation journey from the producer until reaching the final consumer, thereby supporting the organization's commitment to its ethical responsibility.
2. The barcode contributes a clear role in monitoring production processes and marketing activities, enhancing the application of social responsibility principles.
3. The barcode achieves substantial benefits for both the primary consumer, the final consumer, and the producing company, in accordance with the requirements of Law No. 1 issued on January 4, 2010, which aims to protect basic consumer rights, ensure they are not exposed to illegal practices, and raise their consumption awareness level. The law obligates all relevant authorities to implement it.

##### **1.1.3 Study Objectives**

This study aims to achieve the following:

1. Revealing the role and importance of barcodes in enhancing organizations' ethical responsibility and their impact on the commodity circulation relationship between producer and consumer.
2. Demonstrating the impact and effectiveness of barcodes in monitoring and improving production processes in all their stages, and the role of that in supporting social responsibility, through:
  - Providing accurate information about product components.
  - Enhancing inventory process efficiency through accurate product tracking, facilitating inventory operations and reducing human errors, stemming from ethical responsibility towards the consumer.
3. Clarifying the role of barcodes in protecting the rights of consumers (primary and final), as follows:
  - **Primary consumer (e.g., distributor or trader):** Accurately tracking goods movement and inventory levels, enhancing inventory control and monitoring operations.
  - **Final consumer:** Providing transparent and necessary information to the final consumer, such as production and expiry dates, components (like the amount of fats and salts in food products), thereby preserving their health and rights.

##### **1.1.4 Study Importance**

The importance of the study is manifested in the following points:

1. Shedding light on the role of one of the important marketing technologies – barcodes – in entrenching principles of ethical responsibility in the business environment.
2. Demonstrating the positive and effective impact of barcode technology in protecting consumer rights and ensuring market transparency.

##### **1.1.5 Study Population and Sample**

The framework in which the study was conducted can be clarified as follows:

- **First: Study Population:** The study population consists of all consumer goods produced by manufacturing business organizations and circulated by marketing business organizations, which are subject to the provisions of Consumer Protection Law No. (1) of 2000.
- **Second: Study Sample:** The study relied on a non-probability (purposive) sampling method, where a sample represented by basic food commodities consumed by individuals daily was selected. This sample was chosen because these materials are closely linked to barcode technology, in terms of their role in tracking production processes, monitoring supply and marketing chains, and ensuring transparency of information provided to the final consumer, making them a clear model for measuring the impact of barcodes in achieving the study's objectives.

### **Research Terms:**

- **Ethical Responsibility:** The commitment of individuals and institutions to standards of upright behavior that respect values in technical practice.
- **Barcode:** A digital or visual code used to store information about products and facilitate electronic identification.

## **1.2 Previous Studies**

### **1.2.1 Arab Studies**

Previous studies form a fundamental pillar in building the theoretical framework of this study, as they review a group of Arab research that addressed barcode technology applications in multiple contexts. A study (Al-Fadl et al., 2025) clarified the importance of the linear barcode in monitoring processes which have an impact indicating commodity circulation between producer and consumer. In Al-Awadi's study (2019) titled "The Role of Barcode Technologies in Improving Warehouse Management in Commercial Institutions," the focus was on the operational and logistical aspect, highlighting how this technology contributes to raising inventory management efficiency by accelerating inventory processes and enhancing data accuracy, positively reflecting on saving time and cost, and also recommending the necessity of training workers on optimal use of this technology.

Moving to the health sector, Al-Harbi's study (2021) "Analyzing the Effectiveness of Barcode Use in Hospitals" provided an in-depth analysis of the role of this technology in enhancing health safety and care quality. The study confirmed that barcode applications contributed significantly to reducing medical errors and improving the management of supplies and medicines, supporting the efficiency of medical processes and protecting patient health, and called for generalizing their use as part of quality improvement and technological integration strategies in the health system.

Regarding user experience and financial services, Al-Zahrani's study (2017) on "The Role of Barcode Technologies in Accelerating Electronic Payment Procedures" revealed how this technology brought about a qualitative shift in facilitating the pace of financial transactions, whether in traditional stores or through electronic platforms. It explained how using barcodes reduced payment completion time and improved user experience overall, highlighting its role in enhancing the efficiency of services provided to customers.

In a broader framework linking technology, responsibility, and ethics, the study "Ethical Responsibility in Marketing Tourism Services" (Al-Fadl, 2020) addressed the value dimension in service provision, focusing on religious tourism in the holy cities of Najaf and Karbala. Although this study did not directly address barcodes, it shed light on the importance of ethical practices in conveying information accurately and transparently to the consumer, opening the door to questioning the role of modern technologies like barcodes in enhancing transparency and credibility in various sectors, including the production and services sector.

### **1.2.2 Foreign Studies**

Foreign studies complete the picture by highlighting the impacts of barcode technology in diverse contexts globally. In the study (Smith, 2018) titled "The Impact of Barcode Chaos on Warehouse Operations," the fundamental role of this technology in achieving order and efficiency within warehouse environments was analyzed. The results confirmed that adopting barcode systems leads to tangible improvements in the speed and accuracy of processing operations, especially in goods receipt and shipping, contributing to lowering overall operational costs. The study also highlighted the ethical dimension of application, recommending the importance of developing inventory management systems while considering ethical responsibility requirements towards all workers in the logistical chain.

In the retail sector context, the study (Evans, 2020), which adopted a case study approach, provided a practical analysis of how barcode systems contribute to smoothing daily operations. It showed how standardizing these systems accelerated payment and inventory processes, positively reflecting on the final customer experience by reducing

pricing errors and simplifying the purchasing process. The study emphasized the need to generalize the use of this technology in all retail stores to ensure achieving these gains.

Regarding the industrial sector, the study (Repartee, 2021) traced the historical and applicative evolution of barcode technology in manufacturing industries. It focused on the pivotal role of this technology in raising quality control standards and simplifying manufacturing processes, as it effectively contributed to reducing human error rates and accelerating accomplishment pace. Through analyzing the impact of barcodes on supply chain management in leading German factories, the study concluded the necessity of integrating these systems into all production stages to ensure quality and efficiency, emphasizing the importance of investing in advanced barcode systems that meet the dynamic requirements of modern industry.

### **1.2.3 Distinguishing the Current Study from Previous Studies**

This study distinguishes itself from previous studies (such as Smith, 2018 and Evans, 2020) which focused on the technical aspects and operational efficiency of barcode technology (like speed and cost). It presents two new essential dimensions: a strategic and ethical perspective. The study delves into the strategic role of barcodes as a monitoring mechanism supporting the organization's ethical commitments, not merely a neutral tool. Also, an expanded application scope: it is not limited to improving internal operations (like inventory control) but extends to evaluating the impact of this monitoring in protecting final consumer rights.

Thus, the study presents an integrated vision linking internal efficiency with external ethical responsibility, emphasizing that barcodes are a means to fulfill obligations towards all stakeholders, not just a tool for achieving profitability.

## **Section Two**

### **The Intellectual Framework of the Study**

#### **2.1 Barcode: Concept and Importance**

Barcode represents a technology for visually representing data in the form of lines or geometric symbols that can be read automatically by optical scanners. This technology has revolutionized data management operations across various sectors, contributing to raising operational efficiency, data accuracy, and exchange speed. This research focuses on analyzing the role of barcode technology in improving the performance of business organizations, with a particular focus on production and marketing processes, and how this technology can support the organization's ethical responsibility.

##### **2.1.1 Concept and Types of Barcodes**

Amid rapid technological development, information technology tools have become a fundamental element for improving business processes. Barcode is defined as a visual representation of data using lines or geometric patterns readable by dedicated devices, enabling the storage and retrieval of information with high speed and accuracy. Barcode types are primarily divided into:

1. **One-Dimensional Barcode (1D):** The traditional type that uses a series of parallel vertical lines of varying lengths and spaces, commonly used in consumer products.
2. **Two-Dimensional Barcode (2D):** Relies on arranging data in a square form containing a pattern of squares or dots (like QR Code), characterized by its ability to store more complex data.
3. **Variable Barcode:** An advanced type capable of storing dynamic and updated data, such as logistical or detailed historical information.

##### **2.1.2 Role of Barcode in Production Processes**

Barcode plays a pivotal role in raising the efficiency of production processes through:

1. Accelerating inventory and monitoring operations: Tracking raw materials and products during different production stages, and reducing human errors in manual data recording.
2. Improving quality control: Instantly tracking defects in products or materials, enabling quick corrective actions.
3. Efficiently managing the supply chain: Providing accurate information about inventory and material levels, improving supply chain flow and reducing waste.
4. Reducing operational costs: Reducing reliance on manual processes in tracking and storage, lowering costs associated with errors and logistical problems.

##### **2.1.3 Role of Barcode in Marketing Activities**

Barcode contributes to enhancing marketing strategies and the organization's relationship with the customer through:

1. Improving customer experience: Enabling customers to easily access detailed product information (like production date, usage instructions) by scanning the code using their smartphones.
2. Increasing marketing campaign effectiveness: Using barcodes in promotional offers and loyalty programs, where customers can obtain discounts or rewards.
3. Analyzing consumer behavior: Collecting accurate data on purchasing patterns and best-selling products, supporting informed marketing decisions.
4. Linking with digital systems: Integrating barcodes with Customer Relationship Management (CRM) systems and other digital platforms to enhance customer interaction and provide customized offers.

## **2.2 The Comprehensive Role of Barcode in Business Organizations**

The role of barcode transcends being a tracking tool to become a pillar for improving the organization's overall performance through:

1. Improving inventory management: Raising the accuracy of daily and periodic inventory operations and continuous monitoring of inventory levels.
2. Accelerating operational processes: Reducing manual data entry, speeding up receipt and shipping operations, and enhancing productivity.
3. Ensuring quality and traceability: Tracking products across the supply chain and quickly detecting defective products, supporting compliance with quality standards.
4. Supporting strategic decisions: Providing accurate data on product movement helping in financial and marketing planning and strategic decision-making, such as order timing or identifying most in-demand products, enhancing financial and marketing planning based on actual market data, and integrating with other technological systems. Barcodes also integrate easily with Enterprise Resource Planning (ERP) systems and inventory management systems, giving the organization a comprehensive view of all operations.

## **2.3 Role of Barcode in Improving Customer Experience**

Barcode works to directly enhance the customer experience through:

1. Facilitating purchasing processes: Reducing waiting time at point of sale and ensuring price accuracy.
2. Increasing transparency: Providing clear information about the product (like its components and expiry dates) to enhance customer trust.
3. Enhancing digital interaction: Using QR codes to provide additional content (instructions, offers, links) and integrating them with loyalty programs.
4. Reducing service errors: Ensuring the accuracy of entered data regarding prices and product specifications.

## **2.4 Shared Benefits of Barcodes**

Barcode achieves mutual benefits for the organization and customers alike, represented in:

1. Enhancing efficiency and effectiveness: Supporting integration between internal processes and customer interactions, reducing errors and lowering costs. It also leads to improved customer satisfaction.
2. Improving brand reputation: Building a positive image of the organization as a modern entity oriented towards customer service.
3. Supporting e-commerce: Facilitating order tracking and shipping processes, increasing service transparency and customer trust.

## **2.5 1D Linear Barcode and Its Applications**

The 1D linear barcode is one of the most common types, used primarily in:

1. Improving customer experience: Instantly accessing product information.
2. Dynamic marketing: Linking barcodes to variable promotional campaigns.
3. Supporting loyalty programs: Tracking customer purchases and granting rewards.
4. Analyzing customer behavior: Collecting data to improve marketing strategies.
5. Online marketing: Directing customers to websites or social media platforms.



**Figure (1) Barcode**

### **2.5.1 Monitoring Benefits of Linear Barcode**

Linear barcode achieves significant monitoring benefits, including:

1. Reducing errors: Avoiding errors that may occur during manual data entry. This reduces waste.
2. Increasing efficiency: Accelerating processes, whether in inventory or sales. Products can be scanned at high speed, leading to faster processes and reduced wasted time.
3. Enhancing traceability capability: The ability to accurately track products through barcodes enables improving inventory management and organizing supply chains, leading to reduced costs and increased efficiency.
4. Supporting product marketing: Contributing to improving interaction with customers and raising their loyalty level, ultimately leading to increased sales.
5. Improving operational efficiency: By accelerating inventory and monitoring processes, and reducing errors that may occur when using manual systems, contributing to accelerating the production cycle.
6. Enhancing data accuracy: Reducing errors in data recording thanks to automatic reading technologies, leading to fewer errors in invoices and accurate product identification.
7. Enhancing integration with other systems: The barcode system can be integrated with Enterprise Resource Planning (ERP) systems or inventory management systems, enhancing integration between all processes within the organization.
8. Improving customer interaction: Through using barcode technologies like QR Codes, organizations can provide an interactive and rich experience for customers, contributing to building long-term relationships.

### **2.5.2 Challenges Facing Barcode Use**

Despite the many advantages, implementing a barcode system faces some challenges, such as:

1. High initial cost of systems and devices.
2. Need to train employees on using the technology.
3. Printing quality problems that may hinder code reading.
4. System complexity, especially when using multiple barcode types.

### **2.6 Quick Response Barcode (QR Code)**

The term Quick Response Code, or QR Code, all refer to the trademark name of a two-dimensional matrix barcode system, first used in the automotive industry. Recently, this system has spread outside the industrial scope due to easy and fast readability and high storage capacity.

The code consists of black modules arranged in a square on a white background. The encoded information can be any type of data (e.g., binary numbers, numerals, or Kanji characters). It was invented by "Denso Wave," a subsidiary of Toyota, in 1994 to track vehicle spare parts during the manufacturing process.

QR Code is one of the most common types of two-dimensional barcodes. It was designed for high-speed decoding. The use of this technology has become widespread in Japan; the United Kingdom is considered the seventh largest consumer of QR Codes. In this regard, the following should be recognized:

**First: Structural Composition:**

The internal structural composition of the Quick Response Code varies from one version to another, but its reading relies on several basic elements and components as shown in Figure (2).



Figure (2) would be inserted here: The Structural Composition of QR Code]

**Second: Storage Capacity:**

Storage capacity varies from one version to another, as the amount of data that can be stored in a QR Code depends on the number of characters or symbols, version, and error correction level. It reaches its maximum capacity in version (40) with error correction level (L).

The storage capacity of QR Code can be divided according to the nature of stored data as follows:

1. Numeric only: Maximum 7,089 characters.
2. Alphanumeric: Maximum 4,296 characters.
3. Binary (8-bit): Maximum 2,953 bytes.
4. Kanji/Kana: Maximum 1,817 characters.

**Third: Different Versions:**

The structural composition of QR Code differs from one version to another, as does storage capacity as mentioned earlier. The following are some forms of codes in different versions and the storage capacity for each as shown in the following figures:



Figure (3) shows the shape of version 1, size 21×21, quantity 10-15, character/digital code.



Figure (4) shows the shape of version 2, size 25×25, quantity 20-47, character/digital code.



Figure (5) shows the shape of version 3, size 291×29, quantity 77-35, character/digital code.



Figure (6) shows the shape of version 4, size 33×33, quantity 50-114, character/digital code



Figure (7) shows the shape of version 10, size 5757, quantity 174-395, character/digital code.

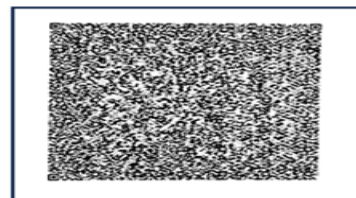


Figure (8) shows the shape of version 40, size 1778177, quantity 1852-4296, character/digital code.

QR Codes have several other features, the most important being error correction capability. Sometimes when part of it is damaged, it still works well, as shown in the following figure where part of the code is cut but it still works correctly due to the error correction feature.

You can verify by scanning the code as shown in Figure (9) and find that it opens the stored link correctly. This is because the length of encoded words is 8 bits using the Reed-Solomon error correction algorithm with four error correction levels. The highest error correction level has lower storage capacity. While the exact number of errors that can be corrected depends on the code size and error locations, approximately:



Figure (9) shows the code is corrupted, yet it still works and opens the following link:  
<http://en.m.wikipedia.org>

1. Level Low (L): Can recover 7% of encoded words.
2. Level Medium (M): Can recover 15% of encoded words.
3. Level Quartile (Q): Can recover 25% of encoded words.
4. Level High (H): Can recover 30% of encoded words.

In addition to the aforementioned error correction feature, it is possible to add graphics and create different artistic designs of QR Code as shown in Figure (10). Artistic designs can also be obtained by manipulating the basic mathematical structure of the code.



Figure (10) illustrates some of the artistic forms of the QR code.

#### Fourth: Positive Notes on QR Code:

There are many positive points that prompted researchers to use Quick Response Codes, as follows:

1. It can contain many data within it.
2. It continues to work even if some parts are damaged correctly.
3. Possibility of formulating it in different artistic images that attract the consumer and sometimes help in marketing the product if the code is formulated in youthful prints that can be added to clothing items as shown in the research applications.
4. Enables the producer to add sufficient images and instructional guidelines.
5. Enables the producer to add videos explaining to the user how to care for the clothing item.

6. Enables the producer to add links to web pages or download attached files for complete care of the clothing item.
7. Reducing costs consumed in traditional work by printing it directly on the clothing item in an area not exceeding 3x3 cm, making the product environmentally friendly due to less waste and saving operational materials harmful to the environment during manufacturing.

### 2.7 Forms and Patterns of Barcode's Monitoring Role

These forms and patterns can be as follows:

First: Specifying certain numbers for the country name so the customer can know where this commodity came from, specifically in which country, as clear in the following forms:

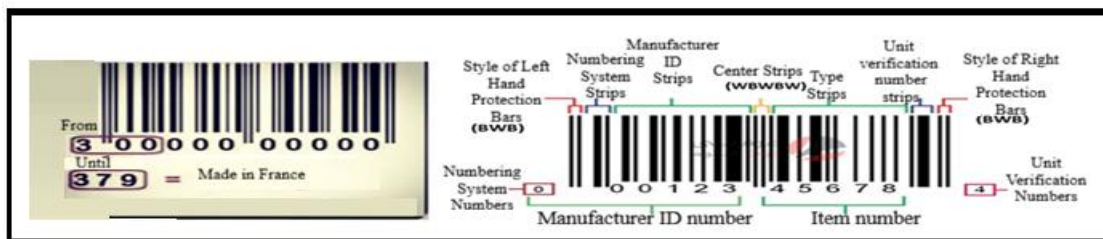


Figure (11) Barcode showing country name

Second: Detecting manipulation carried out by some countries to bypass the boycott system, as is the case with what these countries do by changing the numbers indicating the country name in the number system below the barcode, as clear in Figure (12) below:

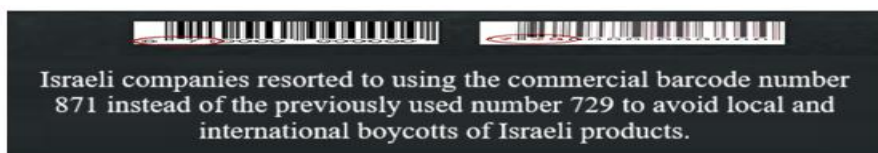


Figure (12) shows the barcode before and after the change in the number used in the Zionist entity.

Third: Specifying certain numbers for the country name, company name, and commodity type:



Figure (13) shows the barcode that indicates the country name, company name, and type of product.

This matter will enhance monitoring at the broader strategic level and prevent manipulation or breaking the boycott system imposed by different countries.

## Section Three:

### The Applied Aspect of the Research

#### 3.1 Study Population and Sample

The study relied on a sample designed to represent the production organizations sector, with the possibility of generalizing its results more broadly to this sector. Food sector products were chosen to apply the study to due to their direct impact on the consumer, and included main product categories as follows:

1. Dairy products and derivatives (like cheeses and milk).
2. Meats of all types (red and white) canned or packaged.
3. Fruits and vegetables, especially canned ones.
4. Various beverages and liquids.

The focus was on these products due to their exposure to risks of unethical practices including counterfeiting or manipulation, which contradict ethical responsibility requirements towards the consumer. Three main forms of these practices were identified:

- **First:** Manipulation of production dates or expiry dates.
- **Second:** Counterfeiting country of origin, as in cases of changing the barcode of products from Israeli settlements in occupied Palestinian territories to avoid international boycott.
- **Third:** Changes in basic components of food materials, such as:
  - Fat percentages.
  - Sugar and salt percentages.
  - Preservative substance percentage and quantity.

### **3.2 Study Tool and its Preliminary Test**

A questionnaire was designed to collect data through a pilot study to measure opinion trends (agree / neutral / disagree) for two main categories:

1. **Customers:** (Primary and final consumers) to measure their perceptions regarding the extent of ethical commitment declared by marketing organizations.
2. **Marketers:** (Representatives of business organizations) to survey their viewpoint on their ethical responsibility towards the consumer, and its reflection on product identity as represented by the barcode.

This survey aims to assess the clarity and reliability of the research tool before final application.

### **3.3 Problem Data**

This Section emphasized the monitoring role of barcodes according to ethical responsibility, whether related to linear barcode (1D Barcode) or Quick Response Barcode (QR), relying on opinion survey forms based on the three answers (agree, neutral, disagree). These forms were directed to both (production business organizations as well as customers) according to the number of distributed questionnaires, which were about (30) forms for each of the parties in this study.

#### **Statistical Analysis:**

The analysis relied on percentages, arithmetic averages, standard deviations, and relative importance as a basis for interpretation, as they are powerful descriptive tools in such cases. Therefore, answer trends were compared between the two groups (business organizations versus consumers) to reveal points of agreement and disagreement, which are the core of analysis in this study.

#### **Comprehensive Interpretation of Results:**

Overall, the results show a stark contradiction between business organizations' perceptions and the reality of consumer experience. While organizations show high confidence in the barcode system and its ethics, consumers show relative ignorance and indifference towards the same system.

- **First: Analysis of "Business Organizations" Results (Table No. 1)**

**General Trend:** Very high confidence from organizations in the barcode's ability to achieve ethical responsibility.

1. **High level of confidence in the system:** Questions like Question 6 (availability of reading devices, 25/30 agree), and Question 8 (security measures against counterfeiting, 25/30 agree) get the highest agreement ratios (83%). This indicates that management is confident in the infrastructure and technology it provides.
2. **Awareness of digital identity and accountability:** Question 10 (digital identity, 18/30 agree) and Question 2 (barcode containing all data, 20/30 agree) show that organizations are aware of the barcode's role as a tool for accountability and providing information.
3. **Potential weaknesses:** Question 3 and Question 4 (entering component data, only 5/30 agree for each) are the critical focal point. This indicates that the largest gap in ethical responsibility lies in not entering data related to commodity components completely and clearly, which is extremely important for the consumer. (This point was built upon in the recommendations.)

**Partial Conclusion:** Organizations trust the barcode system technically (security, delivery) but there is clear negligence in the informational aspect related to full transparency about components.

**Table No. (1)**

#	Paragraph	Arithmetic Mean	Standard Deviation	Relative Importance
1	X1	2.33	0.74	77.67%
2	X2	2.50	0.74	83.33%
3	X3	1.50	0.76	50.00%
4	X4	1.50	0.76	50.00%
5	X5	2.50	0.76	83.33%
6	X6	2.77	0.56	92.33%
7	X7	2.50	0.76	83.33%
8	X8	2.73	0.63	91.00%
9	X9	2.17	0.90	72.33%
10	X10	2.27	0.93	75.67%

• **Second: Analysis of "Consumers" Results (Table No. 2)**

• **General Trend:** Contradiction between indifference and negative trust, with a large knowledge gap.

1. **Indifference and blind trust (worrying):** Question 1 (20/30 do not check date) and Question 7 (20/30 do not care about barcode due to ignorance) are the most indicative of a problem, indicating that a large segment of consumers make purchasing decisions without sufficient information, relying on the "assumption" that ethical responsibility is available. This "blind trust" or "indifference" poses a danger to their health and rights.

2. **Low trust in basic information:** Question 4 (only 10/30 identify country of origin) and Question 5 (only 10/30 are reassured by company code) show that actual trust in barcode content itself is very low. Consumers do not rely on barcodes to give them this basic information.

3. **Awareness of market negatives (realism):** Question 8 (25/30 agree that the prevailing culture is lack of interest) shows that consumers realize they are part of a broader cultural problem. They are aware of their ineffective consumption environment.

4. **Desire for better use (positive):** Question 9 (18/30 see barcode ensures their right) and Question 10 (20/30 want devices for price monitoring) indicate a latent desire to use barcodes correctly if tools and knowledge are provided.

**Partial Conclusion:** There is a huge gap between the theoretical value of barcodes and their practical value in the consumer's view. Consumers are either ignorant of it, do not trust its content, or do not care about it, despite their awareness of its potential importance.

**Table No. (2)**

#	Paragraph	Arithmetic Mean	Standard Deviation	Relative Importance
1	X1	2.50	0.76	83.33%
2	X2	2.00	0.82	66.67%
3	X3	2.27	0.93	75.67%
4	X4	1.73	0.93	57.67%
5	X5	1.73	0.93	57.67%
6	X6	2.27	0.93	75.67%
7	X7	2.50	0.76	83.33%
8	X8	2.77	0.56	92.33%
9	X9	2.27	0.93	75.67%
10	X10	2.43	0.84	81.00%

**Final Summary and Comprehensive Interpretation:**

- Hypothesis confirmation with reservation:** Yes, there is an important monitoring role for barcodes (as mentioned), but this role is effective only from the organizations' perspective, and is disabled or unexploited from the consumers' perspective. The hypothesis is partially correct.
  - The real problem:** The problem is not in barcode technology itself, but in the culture of use by the consumer, and incomplete transparency by some organizations (especially in component data).
  - Missing monitoring role:** The consumer's monitoring role – which is supposed to be the cornerstone of any ethical responsibility system – is completely absent due to ignorance and indifference. Current monitoring is internal (organization monitoring itself) not external (consumer monitoring the organization).
- In short, barcode as a tool for ethical responsibility works well "from the source's perspective" (organization) but suffers from a serious malfunction "from the recipient's perspective" (consumer). Any future recommendations must target these two points together: forcing organizations for more transparency (especially in components), and awareness campaigns for consumers to transform them from passive consumers to active monitors.

**Section Four:**

**Discussion of Results and Study Recommendations**

**First: Discussion of Results**

- The results showed that informational transparency is the weakest aspect in organizations' performance (Questions 3 and 4 in the organizations' questionnaire), while consumers showed lack of trust in this information (Questions 4 and 5 in the consumers' questionnaire). Organizations' confidence was high in this aspect (Question 8), and this advantage must be maintained and enhanced to build a solid foundation for consumer trust. However, actual linkage with supply chains goes beyond the concept of "database" (Question 9) to the concept of "traceable digital identity" (Question 10), increasing the value and credibility of barcodes.
- The results revealed great ignorance and indifference among consumers (Questions 1, 7, 8), preventing them from performing their monitoring role. Consumers showed a clear need for barcode devices (Question 10) but they may not be sufficiently available or known.

- To ensure solutions are practical and meet the needs of all parties (producers and consumers). These applications can be the bridge connecting complex technology and the ordinary consumer, effectively bridging the knowledge gap.

**Second: Study Recommendations**

Based on careful analysis of the results, here is a set of prioritized recommendations aimed at bridging the gap between organizations' perceptions and consumers' behaviors, and enhancing the monitoring role of barcodes as a tool for ethical responsibility.

**First: Recommendations directed to producing and marketing organizations:**

1. **Enhancing informational transparency (addressing the critical weak point):**

- **Recommendation:** Organizations must commit to entering all basic and critical components of the commodity within barcode data mandatorily, clearly, and in an easily readable manner, not just basic data like price and expiry date.

2. **Unifying and developing security standards:**

- **Recommendation:** Apply advanced and unified security standards in barcode design (like using Secure QR Codes that are difficult to counterfeit) and transition from the traditional linear system to more secure coding systems with higher information storage capacity.

3. **Actual linkage with supply and production chains:**

- **Recommendation:** The barcode must be a real window for the consumer into the supply chain, where they can track main stages of production and distribution by scanning the code.

**Second: Recommendations directed to awareness and monitoring bodies (government, civil associations):**

1. **Launching expanded awareness campaigns for consumers (addressing the knowledge gap):**

- **Recommendation:** Design and implement intensive media campaigns explaining to the ordinary consumer – in simple language – how to read the barcode and benefit from it to verify:

- Real country of origin.
- Production and expiry dates.
- Basic components.

2. **Legislation and enforcement:**

- Work on issuing legislation obligating organizations to place barcode scanners clearly and easily accessible at all points of sale (retail and large stores), and also obligating them to full transparency in barcode data.

3. **Unifying efforts between public and private sectors:**

- Form a joint committee between representatives of government regulatory bodies and food industry unions to develop unified national standards for the barcode system, focusing on ethical responsibility and transparency requirements.

**Third: Recommendations directed to the future and upcoming research:**

1. **Expanding the study scope:**

- Replicate this study on larger and more diverse samples (to include sectors other than food, and companies from different private sectors) to generalize results.

2. **Studying the impact of smart applications:**

- Conduct a future study to measure the impact of smartphone applications dedicated to reading barcodes – which provide simplified and interpreted information – on changing consumer behavior and raising their awareness and consumption culture level.

**Final**

**Summary:**

The aforementioned recommendations form a practical roadmap for transforming barcodes from mere pricing and storage tools into effective tools for accountability and ethical responsibility. Success in achieving this requires integrated effort from three parties:

1. **Organizations:** Through adopting transparency and development.
2. **Awareness and monitoring bodies:** Through legislation and awareness.
3. **The consumer themselves:** Through learning and demanding their right.

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