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THE ROLE OF LEAN MANUFACTURING IN ADOPTING NEW PRODUCTS APPLICATION STUDY OF A SAMPLE OF EMPLOYEES OF AL-ITTIHAD FOOD INDUSTRIES CO. LTD. IN BABIL GOVERNORATE

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Abstract:

The current research aims at measuring the role of the Lean Manufacturing in the adoption of new products by a sample of workers at Al-Ittihad Food Industries Co. Ltd. in Babil governorate, and therefore the resolution tool was used to measure the availability of search variables. In order to collect the data, the opinions of a sample of the workers of the Federation Food Industries Limited were surveyed (116) and a valid questionnaire form for analysis, and it was also claimed that the nature of the results sought by the research was revealed in order to use a range of statistical tools, namely the Kronbach Alpha coefficient, the arithmetic mean, and the standard deviation. Pearson's correlation coefficient, regression coefficients), The results showed that there is a link and a significant statistically significant influence between the light manufacturing and the adoption of new products, pointing to the company's workers' interest in producing products free of harmful substances and improving the efficiency of its products through the use of production packages that do not harm the environment. The company also recommends that care be taken to improve workers' environmental knowledge by reducing environmental imbalance, hindering environmental pollution and depleting environmental resources as a result of inaccurate use.

Keywords: Lean Manufacturing & Adoption New Products

INTRODUCTION

The new products are the foundation of the organization since they represent specific physical assets, as well as human and organizational determinants of the distinct sales force, which can be used to implement the organization's strategies for creating value added to them. Thus, it includes the local capabilities or capabilities that are the basis for creating the competitive advantage of the organization such as the skills that the organization has in using available technology or in advertising the adoption of new products, and thus, in this way, the Lean industrialization forms the basis for adopting new products in order to create their unique value (Kwon& Kim,2020:1). The need to embrace Lean Manufacturing also contributes to improving the future state of the organization and the need for decisions to be made with the participation of all organization members (Czarnecka et al.,2017:180), and to improve the quality of services and products delivered (kohtamäki& Partanen,2016:2498), which contribute to improving the creativity of employees, delivering, and providing, The application of new ideas within a role, group or organization at work, with a view to benefiting from the performance of the role, group or organization (Amankwaa et al., 2021:2), and the study of the adoption of new products has become an essential necessity today for the success of the organization, especially in light of technological developments and an increase in the volume of financial and human resources. This has affected the organization's performance in some way, so research and interpretation of the fundamentals of Lean Manufacturing contribute to improving the company's ability to adopt new products.

part One: Research methodology

First: The problem of searching

Economic facilities, both international and regional, are developing rapidly, which has created the need to face the major challenges by investing the efforts of the workers in the adoption of new products and developing

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their capabilities to ensure continuous improvement. This would require Itihad Food Industries Limited to use Lean Manufacturing in its operations in order to demonstrate its capacity and suitability for turbulent environmental changes, and from the above, a fundamental question may be raised (Can Al Ittihad Food Industries Ltd. use the mechanisms of Lean Manufacturing to achieve the desired level of adoption of new products?, and what is the relationship between Lean Manufacturing and adoption of new products)

Second: Research objectives

The goals of the research are highlighted in several ways:

1.Measuring the extent of the contribution of the Lean Manufacturing mechanisms to the achievement of the adoption of new products at Al Ittihad Food Industries Co. Ltd.

2.To find out the availability of the concepts and mechanisms of Lean Manufacturing at Al-Ittihad Food Industries Limited.

3.To focus employees at Al Ittihad Food Industries Limited on the mechanisms of Lean Manufacturing in order to ensure the desired level of adoption of new products.

4.To present a set of conclusions, recommendations and proposals that can help Al Ittihad Food Industries Limited to develop its potential to obtain the largest market share possible, attracting the largest number of customers for its products.

Third: The importance of research

The importance of research is highlighted by providing a detailed theoretical framework on the subject of the Lean industrialization and adoption of new products, through which the mechanisms of the Lean industrialization of Itihad Food Industries Limited can be brought into line with the present reality. It also provides a framework on the concept of adopting new products and how this topic can achieve a competitive advantage for the company over its peers in the target market.

Fourth: Research and hypotheses development plan

The search schema can be constructed from two hypotheses:

hypothesis 1: The increased interest of Itihad Food Industries Ltd. in the light of the Lean Manufacturing process contributes to building a strong connection with the adoption of new products (emotional commitment, effort, product advantage, product modernity, personal standards, Target orientation, regulatory system, and customer-conscious participation) in their production processes.

hypothesis 2: The increased interest of Itihad Food Industries Ltd. in the Lean Manufacturing process contributes to the adoption of new products (emotional commitment, effort, product advantage, product modernity, personal standards, The goal-oriented approach, the regulatory system, the customer-aware participation) and the figure (1) show the hypothfunction of the research.

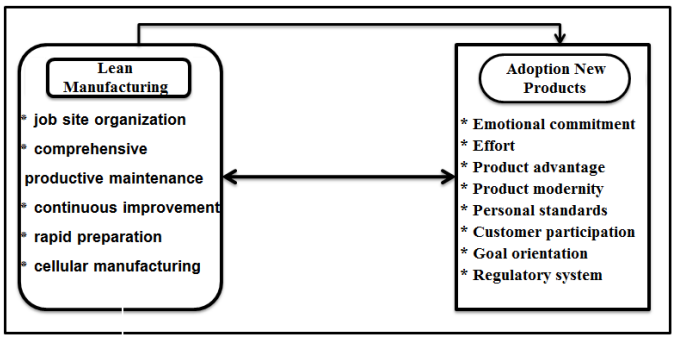

Figure 1 the hypothesis of search

Fifth: Description of the search sample

The research sample consisted of a group of workers at Al-Ittihad Food Industries Co. Ltd. in Babil Governorate, where (130) questionnaire forms were distributed. After collecting and tabulating the data, the number of forms valid for analysis was 116, which is equivalent to a response rate of 89%, a significant level below (0.05), a confidence rate (95%), and a Kronbach Alpha stability rate exceeding 70% (Hair et al., 2010).

Sixth: The criteria for research

The research based on the measurement tool used the questionnaire in order to measure the availability of the search variables at Al-Ittihad Food Industries Co. Ltd. in Babylon governorate, as the Lean Manufacturing was measured by 5 dimensions (job site organization, comprehensive productive maintenance, continuous improvement, rapid preparation and cellular manufacturing) distributed in 4 paragraphs for each dimension. By adopting a scale (23) Mohamed& Omar, 2018). The adoption of new products was measured by (8) dimensions distributed by (5) paragraphs for (emotional commitment, effort, product advantage, product modernity, personal standards, Customer-aware participation), (7) paragraphs for the goal orientation dimension, and (6) paragraphs for the regulatory system dimension, through the adoption of the (Jansens, 2015). As shown in Table 2.

Table (2) Lookup variable axes

Variables	Dimensions	No.	Cod	Cronbach Alpha	
Lean Manufacturing (LM)	job site organization	4	LWS	0.749	0.949
	comprehensive productive	4	LCP	0.794	

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	maintenance				
	continuous improvement	4	LCI	0.782	
	rapid preparation	4	LQS	0.763	
	cellular manufacturing	4	LCM	0.831	
Adoption New Products (ANP)	emotional commitment	5	AEC	0.866	0.975
	effort	5	AEF	0.869	
	product advantage	5	APF	0.849	
	product modernity	5	APN	0.866	
	personal standards	5	APC	0.884	
	Customer participation	5	ACE	0.873	
	goal orientation	7	AGO	0.940	
	regulatory system	6	ARS	0.811	

The results of the above table show that the management of the questionnaire is consistent with the responses of the employees of Al Ittihad Food Industries Limited, indicating that the measurement instrument has stabilized with the studied sample and a stability factor (0.949, 0.975) respectively for the Lean Manufacturing and adoption of new products.

Part Two: Theoretical background

First: Lean industrialization

The good industrialization represents an alternative model to traditional manufacturing models, which brings benefits to the Organization and limits the waste of time and effort. The efficient production emphasizes the elimination of unutilized materials and the need for a continuous flow of production that allows the customer to purchase products in large quantities, as well as performance excellence and improved flow of materials and information throughout the organization, This boosts mass production and improves workers' efforts to produce high-quality products (Thuranira,2016:16-17). (MAO & ZHang, 2008:371) argued that Lean Manufacturing is an entry point for manufacturing products in the right quantities through the use of damage-free resources and maintaining flexibility to adapt to the different production requirements of the organization. "We are very excited to be able to develop the best products, build positive customer relationships and agile supply chains and develop waste-free products and processes (Eiro& Torres-Junior,2015:846). he added that Lean industrialization is a strategy for the organization to deliver the best products, build positive customer relationships, agile supply chains, and develop waste-free products and production processes." (Eiro& Torres-Junior,2015:846). According to (Mohammad & Omar, 2018:6), Lean Manufacturing can be measured in five dimensions:

1. **Job Site Organization**: Reaching the true benefit of Lean Manufacturing cannot succeed in a chaotic and clad workplace, or even in a less organized workplace. The lack of organization of the workplace will inevitably lead to waste through excessive movement to avoid obstacles and waste time searching for materials, equipment and other endless examples. Random workplaces will lead to delays in production due to errors and machine downtime due to frequent accidental accidents (WAEL, 2021:6), job site organization is a prerequisite for Lean Manufacturing as a systematic entry point for workplace organization and management to improve efficiency and reduce waste.
2. **Comprehensive productive Maintenance**: Comprehensive productive maintenance aims to improve the efficiency of equipment and improve the efficiency and effectiveness of maintenance and the participation of workers in these activities in order to avoid holidays and waste in production processes (Gajdzik, 2009:138). Al-Azab&Al-Shinti, 2016:429 argued that comprehensive production maintenance means maintenance continues through collaboration among workers, engineers and technicians, resulting in comprehensive production maintenance to deliver operating costs, reduce downtime, use machines and equipment well, and deliver quality products.
3. **Continuous improvement:** Continuous improvement represents new and ongoing improvements in the organization (Vencatesch, 2007:14), and Al-Azab&Al-Shinti, 2016:429 argued that continuous improvement is one of the important ways used to ensure the orderly flow of raw materials needed for production, as special labels (Kanban) are used to indicate the location of the work and production process points in the organization.
4. **Quick Setup:** Rapid manufacturing reduces unnecessary downtime of position and result by configuring and configuring machines or changing product samples (Mohammad & Omar, 2018:7).
5. **Cellular Manufacturing**: In addition to maintaining competitive advantage, today's companies are facing major challenges in terms of reducing cost, providing quality products that meet the needs of customers, and maintaining competitive advantage, so these companies

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are beginning to apply cellular manufacturing because of its role in meeting these challenges, especially when it is partnered with other elements of agile production (WAEL, 2021:9). Cellular manufacturing is an input used to produce different products with minimal waste (Bhat, 2008: 271).

The importance of Lean Manufacturing

1- Increase staff productivity and direct support to administrators.

2- Improve quality and flexibility.

3- Reduce storage levels and reduce defect.

4- Reduce waiting time and increase output.

5- Reduce the use of space and efficient use of equipment and machinery.

6- Take precedence over the handling table (Gargri,2014: 458).

Second: Adoption of new products

The adoption of new products represents the organization's ability to produce a new product by adopting new technologies and designs (Fang& GE,2012:170), as well as improving the ability to make a decision to purchase a product as a result of regulatory effort and creating awareness, interest and desire for the product (Walugbe et al., 2017:69). Mcamis & Forbes, 2017:539 argued that the adoption of new products guides the organization toward new products in order to create a competitive advantage through product improvements and development. Ofori& El-Gayar,2020:43) explained that one of the factors in improving the organization's ability to adopt new products is the knowledge of the customer as it is a major resource for organizations because it is often sufficient to manage and support research and development for new products. Continuous customer interaction allows the organization to analyze and understand the customer's own knowledge of the organization, its products, services, suppliers and markets, and that this knowledge is necessary for continuous improvements in the organization's business model and services and for the development of new products.

The organization's adoption of new products enhances the quality of these products by improving the ability of the new product to deliver the expected performance including reliability, durability, accuracy, ease of operation, ability to attract and create value for customers (Yulisetiarini et al., 2017:215), and delivering benefits to customers in the form of goods and services (Tiasantito,2019:197). The adoption of new products creates a conviction among customers about accepting the features of the products offered, and therefore acceptance is an important indicator of the adoption of new products because it relates to the technology used to develop the products and their compatibility with customer tastes. Acceptance is the acknowledgment of the pretenor and the willingness to buy the product as a result of the benefit he adds (Faraji-rad et al., 2017:6). The adoption of new products can be measured in the following dimensions:

1. **Emotional commitment:** Refers to emotional feeling where the customer is influenced by the degree to which they are aware of the characteristics that distinguish the product from the jealousy (Sadiq, 2018:155). Aslam& Lee et al., 2017:131) argued that emotional engagement is one of the important ways in which customer loyalty can be enhanced, customer credibility enhanced by addressing psychological stress and improving customer engagement for as long as possible
2. Effort: The approved allocation of mental resources to overcome obstacles in the pursuit of the organization's goals (Koelewijn et al., 2018:106). According to Panach et al.,2015:164), the effort represents the number of workunits required for sales representatives to deliver the organization's products to customers and audiences.
3. **Product advantage**: The extent to which a new product offers unique advantages over competing products (Heimonen& kohtamäki,2019:163). (Wangbenmad& Rashid,2014:227) explained that the product feature indicates the benefit of using the product to the customer compared to other similar products, in terms of quality, usefulness and functionality (TSAI& Huang, 2012:336).
4. **Product novelty**: Product novelty refers to a process that positively correlates with new product performance and continues to improve sophistication (Vossen,2014:1), where product modernity contributes to understanding the contexts for new product adoption by learning the new design and suitability to customer tastes (Marinakis et al., 2016:776).
5. **Personal criteria**: Personal criteria are the pressure on others to ensure that desired behaviors are applied and that they influence others directly or indirectly (Hasbulah et al., 2016:493). Wong et al., 2012:26) argued that personal standards refer to an individual's perception of social pressure whether or not on his or her behavior, being influenced by the assessor and normative beliefs, and being motivated to comply with these values, reflecting a feeling either positive or negative on an individual's behavioral intent

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6. **Target orientation**: Driving toward marketing objectives is about the organization's culture more effectively and the efficiency of the behaviors required to create superior value for buyers, where moving toward the organization's marketing objectives is important to obtaining and using market information effectively and efficiently (Ibrahim et al., 2018:1222).

7. **Regulatory system**: The regulatory system indicates the extent to which the organization can place restrictions on resource flow and balance within the system (Yamashita et al., 2019:27542). [Yusof et al., 2020:118] found the regulatory system to be a collaborative system consisting of a set of actions that help the organization make decisions about product design and address limitations

8. Customer participation: Customer aware participation represents the customer's relevance, compatibility, value and interest of the product (Fang et al., 2020:2).

The importance of adopting new products

1- Achieving the objectives of the company, both financial and non-financial.

2- A necessary requirement for the company to stay and grow in the market.

3- Maintain the image and position of the company by providing the best products to customers.

4- Increase the customer's desire to choose and choose between alternatives available.

5- Customer impacts through identification, type and characteristics of the product as well as developments in consumer tastes (Jalul,2011:28)

Part Three: The practical aspect of research

3-1 Description of the search sample

The results of the research sample in Table (3) show the interest of Al Ittihad Food Industries Limited in improving the Lean Manufacturing process with an arithmetic mean of (4.01) and a standard deviation of (0.481), pointing to the trend of Al Ittihad Food Industries Limited to improve its rapid preparation capabilities to meet market requirements, which was demonstrated after the rapid preparation with an estimated arithmetic mean (4.05) and a standard deviation equal to (0.501).

The results of the table (3) show the interest of Al Ittihad Food Industries Limited in adopting new products at a rate of (4.07) and a standard deviation of (0.491), indicating the interest of Al Ittihad Food Industries Limited in developing its capabilities toward the target by encouraging employees to develop their abilities to achieve the company's objectives and to achieve the same arithmetic mean of (4.19). Standard deviation (0.634).

Table (3) arithmetic means and standard deviations of search paragraphs and variables

No.	Mean	S.D
LWS1	4.06	0.636
LWS2	3.96	0.665
LWS3	4.17	0.726
LWS4	3.97	0.645
LWS	4.04	0.505
LCP1	4.01	0.666
LCP2	4.1	0.69
LCP3	3.82	0.68
LCP4	3.9	0.638
LCP	3.96	0.526
LCI1	4.04	0.739
LCI2	4.04	0.665
LCI3	3.94	0.676
LCI4	4.02	0.659
LCI	4.01	0.533
LQS1	4.06	0.594
LQS2	4.12	0.674
LQS3	3.97	0.678
LQS4	4.03	0.672
LQS	4.05	0.501
LCM1	4.12	0.7
LCM2	3.91	0.618
LCM3	4.03	0.733
LCM4	4.02	0.734
LCM	4.02	0.568
LM	**4.01**	**0.481**
AEC1	4.12	0.771
AEC2	3.94	0.701
AEC3	4.03	0.745
AEC4	3.86	0.558
AEC5	3.91	0.627
AEC	3.97	0.552
AEF1	3.99	0.666
AEF2	4.02	0.791
AEF3	4.12	0.712
AEF4	4.03	0.709

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AEF5	4.06	0.676
AEF	4.04	0.577
APF1	4.05	0.683
APF2	4	0.544
APF3	4.01	0.639
APF4	4.11	0.755
APF5	4.09	0.672
APF	4.05	0.523
APN1	4.01	0.704
APN2	3.91	0.632
APN3	3.96	0.69
APN4	4.1	0.715
APN5	4.07	0.682
APN	4.01	0.553
APC1	4.16	0.654
APC2	4.06	0.676
APC3	4.09	0.78
APC4	4.08	0.724
APC5	4.05	0.708
APC	4.09	0.587
ACE1	4.15	0.676
ACE2	4.14	0.721
ACE3	4.05	0.696
ACE4	4.03	0.665
ACE5	4.12	0.7
ACE	**4.1**	**0.564**
AGO1	4.19	0.745
AGO2	4.17	0.689
AGO3	4.18	0.753
AGO4	4.21	0.692
AGO5	4.2	0.76
AGO6	4.11	0.755
AGO7	4.16	0.776
AGO	4.17	0.634
ARS1	4.28	0.741
ARS2	4.18	0.68
ARS3	4.15	0.701
ARS4	4.03	0.728
ARS5	4.09	0.698
ARS6	4.09	0.698
ARS	4.14	0.508
ANP	**4.07**	**0.491**

3-2 Test hypotheses

1. Hypothesis Of Correlation

The results of the table (4) indicate the existence of a statistically significant correlation between the Lean Manufacturing and the adoption of new products at a rate (0.917) and at a moral level below (0.01), indicating the required qualifications of Al-Ittihad Food Industries Limited to apply the requirements of the Lean Manufacturing in order to achieve improvement in the adoption of new products. This proves the initial premise that Al-Ittihad Food Industries Ltd.'s increased interest in the light of the Lean Manufacturing process contributes to building a strong connection with the adoption of new products (emotional commitment, effort, product advantage, product modernity, personal standards, Target orientation, regulatory system, customer conscious participation (in their production processes)

The results also show a statistically significant correlation between the dimensions of Lean Manufacturing and the dimensions of adoption of new products.

Table (4) correlation matrix

	AEC	AEF	APF	APN	APC	ACE	AGO	ARS	ANP
LWS	.799**	.783**	.761**	.743**	.719**	.735**	.733**	.421**	.819**
LCP	.742**	.744**	.769**	.736**	.722**	.702**	.687**	.429**	.794**
LCI	.806**	.767**	.815**	.792**	.768**	.790**	.757**	.328**	.838**
LQS	.809**	.774**	.808**	.805**	.768**	.766**	.727**	.489**	.853**
LCM	.823**	.790**	.849**	.828**	.803**	.830**	.788**	.408**	.880**

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LM	.871**	.845**	.877**	.856**	.829**	.838**	.809**	.453**	.917**

2. hypothesis of influence

Figure 2 shows that the research standard follows the criteria set by hair et al.,2010 (CMIN/DF=1.837, GGGFI=0.913, AGFI=0.905, CFI=0.971, RMSea=0.061), which indicates that the research model is consistent with the opinions of employees of Union Food Industries Ltd.

The results reviewed in Table 5 show that the Lean Manufacturing has achieved a level of influence of 0.910 with Al-Ittihad Food Industries Ltd. in order to encourage the adoption of new products. Noting that increasing the Lean Manufacturing by one standard weight will result in an improvement of (0.954), a standard error of (0.038) and a critical value of (25.105). The company's aim is to encourage employees to achieve their goals through developing the capabilities of employees, personal standards and regulatory systems to ensure that competitors are superior in the market, this proves the second hypothesis and its effect (The increased interest of Itihad Food Industries Ltd. in the Lean Manufacturing process contributes to the adoption of new products: Emotional commitment, effort, product advantage, product modernity, personal standards, Target orientation, regulatory system, and customer-conscious participation).

Table (5) Standard Results of the impact of Lean Manufacturing on the adoption of new products

path			Estimate	S.E	C.R	R^2	P
LM	--->	ANP	0.954	0.038	25.105	0.910	0.001

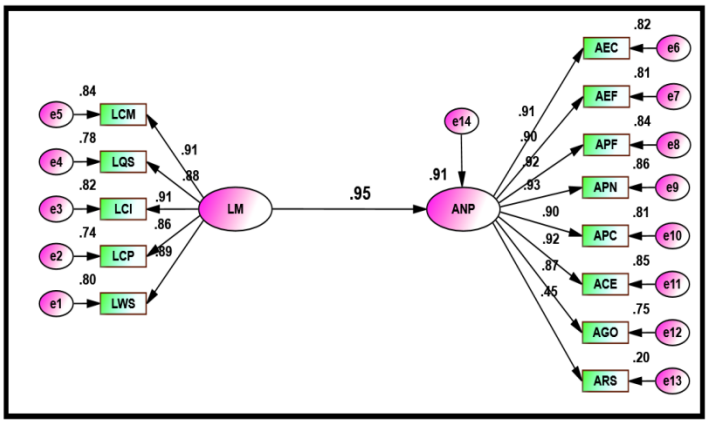

Figure 2 Standard Model for the impact of Lean Manufacturing on the adoption of new products

Part Four: Conclusions and recommendations

First: Conclusions

1. There is a statistically significant correlation between the Lean Manufacturing and adoption of new products, pointing out that Al Ittihad Food Industries Ltd. is interested in improving its capabilities in developing its ability to adopt new products in order to compete with companies in the market.
2. The company has a significant impact on the adoption of new products in its dimensions, noting that Al Ittihad Food Industries Limited is interested in coordinating its capabilities to enhance its capabilities to meet the requirements of customers in the market.
3. The results of the research show a range of key points that can benefit Itihad Food Industries Ltd. for negative employee reactions, which explains a positive relationship between Lean Manufacturing and adoption of new products.
4. Al Ittihad Food Industries Ltd. is interested in developing new products, noting that it calls for improving the company's ability to adopt new products through the development of the capabilities of its employees, which has contributed to explaining (0.910) the reasons that limit the company's ability to implement its Lean Manufacturing mechanisms.
5. Al Ittihad Food Industries Limited is interested in improving its comprehensive and productive maintenance through the use of comprehensive quality in its manufacturing processes to ensure a premium for the products it uses and to motivate customers to participate in product design.

II. recommendations

1. The need to invest the necessary efforts, resources and policies to encourage workers to implement the mechanisms of Lean industrialization.

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2. The need for Al Ittihad Food Industries Limited to develop their capabilities toward identifying new products, considering that there is a significant and positive impact on the handling of customer complaints.
3. The relatively strong influence of Lean Manufacturing on the adoption of new products is an opportunity to help Al Ittihad Food Industries Ltd. develop its potential to compete with companies in the market.
4. Al Ittihad Food Industries Limited's need to use modern mechanisms and techniques to manufacture its products in rapid numbers and to use appropriate cell manufacturing communications to build a strong base of managers to achieve these objectives.
5. Al Ittihad Food Industries Limited is committed to providing the appropriate communication with the clients in order to identify and satisfy their needs and tastes as much as possible.

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