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ATTITUDES AND PREFERENCES OF THE MOROCCAN CONSUMER TOWARDS FRUITS:

THE CASE OF THE MIDELT APPLE (MOROCCO)

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Summary:

In this paper, we review and discuss the factors that affect consumer preferences and attitudes towards fruit. The objective is to provide a theoretical framework for an empirical study to identify the factors influencing the Moroccan consumer's purchase decision of the "Midelt" apple produced by farms in the Draa-Tafilalet region.
A survey was conducted on a sample of 343 consumers, to study the factors that influence their attitudes towards local apples and their intention to buy the Midelt apple.

Keywords: Purchase intention, fruits, food choice, consumer attitude.

Résumé :

Dans cet article, nous passons en revue et discutons les facteurs qui affectent les préférences et les attitudes du consommateur vis-à-vis des fruits. L'objectif est de fournir un cadre théorique pour la réalisation d'une étude empirique afin d'identifier les facteurs influençant la décision d'achat du consommateur marocain de la pomme de « Midelt » produite par les exploitations agricoles de la région Draa-Tafilalet.
Une enquête a été réalisée sur un échantillon de 343 consommateurs, pour étudier les facteurs qui influencent leurs attitudes envers les pommes locales et leur intention d'achat de la pomme de Midelt.

Mots clés : Intention d'achat, fruits, choix alimentaire, attitude du consommateur.
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Introduction

With a contribution of about 13% to the gross national product[1] and employing no less than 38% of total employment, agricultural activity in Morocco is an engine of growth and an essential pillar of the economy and society.

In fact, since its independence, Morocco has always multiplied efforts to improve its agricultural performance. Given the importance of the stakes that this sector raises on the social, economic and territorial levels, it has been placed at the center of the country's strategic development choices.

Among the different types of agricultural production in Morocco, fruits and vegetables constitute one of the important sectors. In 2019, and according to the figures of the Food and Agriculture Organization of the United Nations, Morocco is located at the 28ème place at the world level among the main countries producing basic fruits[2] , with a production of more than 6.221.721 metric tons.

In terms of sectors, the fruit arboriculture occupies 5% of the national agricultural area, with a production whose annual average has increased to about 1.57 million tons between 2015 and 2019, of which the apple tree represents 47%[3] , occupying 20% of the surface of the fruit rosacea. This explains the position of Morocco at the global level by occupying the 18ème place in the ranking of major apple producers, with a production of 735,545 metric tons[4] .

Regarding the regions concerned by this production, the Drâa-Tafilalet region has made the apple sector the 3ème fruit species cultivated on its land, after the date palm and the olive tree. The province of "Midelt" generates 90% of apple production in the region. In fact, it is an area that has increased from 8,645 Ha in 2008 to 17,501 Ha in 2020 and a production of 121,384 tons in 2008 to 370,000 tons in 2020, which represents nearly 53% of national production[5] .

With two varieties (Golden and Stark) which occupy more than 95% of the surface area, the apple of "Midelt", with its gustatory qualities, its shape and its best size, is endowed with a distinctive notoriety, making it a local product with a protected geographical indication (apple of Midelt).

As part of efforts to develop this sector, beyond financial incentives and public assistance and other actions under the plan "Green Morocco", a national exhibition is organized (the national exhibition of the apple in Midelt) each year, whose objective is to promote meetings between professionals and other actors in the context of conferences and workshops focused on the

[1] Ministry of Economy and Finance, (2019). Morocco's agricultural sector: structural trends, challenges and development prospects.
[2] (bananas, oranges, tangerines, lemons, mangoes, avocados, pineapples, dates, cherries, apples, pears and many others.
[3] Figures from the Ministry of Agriculture.
[4] Data from the Food and Agriculture Organization of the United Nations.
[5] Data from the Provincial Directorate of Agriculture in Midelt.

possibilities of promoting the apple sector. It should be noted that producers suffer from several shortcomings in terms of marketing and marketing of their products, with a lack of storage units, facing the existence of a multitude of intermediaries.

In this context, if we look at the consumption of fruit by Moroccans, we find that they consume an average of 1 fruit per day[6] and the average number of days per week of fruit consumption is 4.2. Other figures show that fruit occupies the 6ème place in the total food expenditure (7%) of Moroccans, with a basket composed mainly of citrus fruits, followed by melon, watermelon and apples in last place. Despite the abundance of local production and the nutritional recommendations disseminated concerning the benefits of fruit consumption, the share of fruit in Moroccan food consumption remains low. In this sense, the purpose of this article is to identify the determinants of the Moroccan consumer's attitude towards local apples, and to study the impact of these factors on the attitude that influences the consumer's intention to buy apples produced by farms in the Draa-Tafilalet region (Midelt). To do this, we first develop a literature review that will serve as a basis for designing a model and theoretical proposals in the second place. Then, we discuss the methodology envisaged to conduct an empirical study.

1. Literaturereview

1.1.Consumer buying behavior

In the face of competition, open global markets and to meet local demand, gaining a better understanding of what consumers want, their changing preferences and attitudes towards fruit, and the factors influencing their purchase (or consumption) decision is not only a success factor for farmers and food retailers, but also a survival factor.

In the field of consumer behavior modeling, several models have been designed to explain consumer decision and purchase intention. In order to take into account the complexity of eating behavior, different authors have designed integrative models, including several variables.

As Warshaw (1980b) notes, most theoretical models of consumer behavior (e.g., Engel *et al*., 1978; Howard and Sheth, 1969) show purchase intentions as an intermediate variable between consumer attitudes and purchase behavior. These models also predict that purchase intentions will be a stronger predictor of purchase behavior than other measures such as product beliefs or cognitions. The marketing literature in the 1960s and 1970s contains several studies that examined the relationship between consumers' stated purchase intentions and their subsequent behavior, and most of these studies found a significant positive association between purchase intentions and purchase (Adams, 1974; Clawson, 1971; Granbois& Summers, 1975; Pickering & Isherwood, 1974; Taylor *et al.*, 1975). Over time, as evidence has accumulated, across studies (Ryan &Bonfield, 1975; Armitage & Conner, 2001; Kim & Hunter, 1993), empirical evidence confirms that intentions predict behavior. Although in real-world situations, human

[6] The Ministry of Health's epidemiological survey of risk factors for non-communicable diseases conducted in collaboration with WHO (2017-2018).

behaviors are not always under perfect voluntary control, intentions are still generally excellent predictors of subsequent behavior for a wide variety of behaviors.

Behavioral intention models have received strong support in many behavioral fields (Ajzen, 2001; Eagly&Chaiken, 1993) and are more widely applied in social psychology (Greve, 2001).In this sense, the Theory of Planned Behavior (TPB) proposed by Ajzen (1991) can convincingly explain consumers' food choice behavior. According to this theory, behavioral intention (i.e., purchase intention) is primarily determined by three factors (Ajzen 1991): the attitude toward the behavior in question, the degree of social pressure the individual feels regarding the behavior (subjective norms), and the degree of control the individual feels he or she has over the performance of the behavior (perceived control over the behavior). The first two factors reflect the perceived desirability of performing the behavior, while the third reflects perceptions of whether the behavior is personally controllable or not. These three factors predict intention, which then predicts behavior. Applying this theory, the results of the study by Wee, Ariff*et al*. (2014), show that consumer perception of organic food attributes (food safety and environment) positively impacts consumer purchase intention. The results also confirmed the existence of differences regarding purchase intention by age, income and education level without considering the effect of variables such as taste and price.

In this same context, the stimulus-organism-response model (Mehrabian and Russell 1974) was also used by several authors. In Lee and Yun's (2015) study, organic food attributes were considered as a stimulus, attitude formed the agency, and purchase intention is considered as a response. Without considering the effect of sociodemographic variables, the results showed that the perception of nutritional values, appearance, environmental benefits, and price, have an effect on consumers' attitude, which in turn influences purchase intention.

Based on Guagnano*et al.*'s (1995) Attitude-Behavior-Context (ABC) Theory that helps explain attitude, as well as Stern's (1999) Values, Beliefs, and Norms (VBN) theory that helps explain behavior, Zepeda and Deal (2009) also developed a remarkable model to explain consumer buying behavior. This model states that knowledge is important in attitude formation and context constraints (price, product availability...etc.) mediate between attitude formation and behavior. In their model, the authors consider the importance of values, beliefs and norms that motivate consumers and shape their attitude towards buying local or organic food.

In general, the theory of reasoned action (Ajzen and Fishbein, 1980) and the theory of planned action (Ajzen, 1991) form the theoretical basis of many authors' models.

Ajzen and Fishbein (1980) proposed the concept of behavioral intention as an intermediary between attitudes and actual behaviors to study the motivations that drive action. Although the importance of subjective norms has been considered by the theory of reasoned action, researchers have primarily focused on the consumer's attitude toward produce as an antecedent of purchase intention. Attitude as an unobservable psychological variable and a strong evaluative component, is defined as a predisposition to evaluate a product or brand in a positive or negative manner (Darpy and Volle, 2007). Thus, to measure consumer attitudes

toward fruits and vegetables, several empirical studies have relied on product characteristics and attributes.

Attitude plays an important role in decision-making processes and has long been a central concept in consumer behavior studies. However, food has several dimensions (gastronomic, environmental, social, and economic), including a cultural dimension (Cook and Crang, 1996), and consumers' attitudes toward food are driven by a variety of variables.

Since the determinants of fruit purchasing and consumption behavior cannot be reduced to the framework of cognition alone (Gurviez and Sirieix, 2010), several antecedent factors involved in attitude construction must be considered. Thus, the determinants of fruit consumption are multifactorial.

1.2. Factors influencing consumers' attitudes toward fruit and their purchase intention:

►Sensory aspects:

The relationship between visual product features and emotional associations plays a prominent role in food-related decisions (Cardello, 2017; King and Meiselman, 2010; Spinelli *et al*., 2014). In their work, Thomson *et al*. (2010) showed how consumers associated specific sensory characteristics of dark chocolate with emotions, a relationship further highlighted by the work of (Jaeger *et al.*, 2018). Based on previous research, Spinelli *et al*. (2019) emphasize the need to go beyond measuring attitudes and the importance of emotional responses in consumer studies.

Food consumption is not only related to nutritional value; for many, it is a source of pleasure, an enjoyable experience and even a comforting activity (Clark, 1998). Food properties such as taste, texture, quality, smell and appearance as sensory factors play an important role in food choices (Pollard *et al.*, 2002). Some consumers may prefer sweet, crisp apples and others may prefer juicy, tart apples.

Consumers have both emotional and sensory connections to foods, which impact their preferences. In their study, Lund *et al*. (2006), state that emotional perceptions of freshness have a significant impact on consumers' evaluations of apples and that consumers trade these emotional perceptions for sensory perceptions in deciding the monetary value and choice of apples. While the concept of freshness generally incorporates a temporal component that can be noticed on some food labels, for fruits and vegetables, freshness is primarily evaluated by appearance. Peneau*et al*. (2006) suggested that optimal sensory quality was the most important factor used by consumers to judge the freshness of apples. They found that sensory attributes (such as texture, juiciness, crispness...etc.) correlated with freshness. These same sensory attributes were found to be the main drivers of consumer preference for apples (Alston *et al*., 1996; Daillant-Spinnler*et al*., 1996; Jaeger *et al.*, 1998). In this sense, other studies (Moser *et al*., 2011; Schreiner *et al*., 2013; Demattè*et al*., 2014) have shown that sensory factors, such as visual appearance, taste, freshness, color, aroma, texture, shape, nutritional quality, and crunchiness (for some products) were important attributes for fruit and

vegetable quality assessment. Visual detection of fruit defects also plays a primary role in consumer attitudes and is correlated with rejection of future purchases (Jaeger *et al.*, 2016).
According to the literature, there are three main categories of factors that consumers consider relevant to the visual appearance of apples: (1) color, (2) shape, and (3) physical form/damage (Seppä*et al.*, 2013; Ceschi, Canavari, &Castellini, 2017). These characteristics affect consumers' purchase intentions, but only if they deviate significantly from the norm and may be perceived as suboptimal (Seppä*et al.*, 2013; Loebnitz*et al.*, 2015; Bolos *et al.*,2019). In a retail setting, consumers desire "optimal" products and avoid "suboptimal" products (Hooge*et al.*, 2017) and abnormal form has been shown to reduce willingness to purchase (Loebnitz, Schuitema, &Grunert, 2015). Even minor changes in external appearance can reduce consumers' sensory and hedonic expectations and promote rejection (Hooge*et al.*, 2017). Product appearance, odor, expiration date, and tactile evaluations are the primary cues that guide consumer decisions to consume or discard the product (Richardson-Harman *et al.*, 1998; Parizeau, Massow, & Martin, 2015)

► **Familiarity and habits:**

Eating habits evolve from experience, leading to the development of attitudes toward food (Pollard *et al.*, 2002). In one study, Bruge*t al.* (1995) found that habit is an important determinant of consumption of boiled vegetables, salads, and fruit. Subjects in the study repeatedly reported that they ate as they had been taught at home in the past and continued to eat according to these habits when they left their parents to live on their own or started their own families. It is in this sense that Pollard *et al.* (2002) view traditional cultures and practices as the foundation upon which all food choice decisions are based. Some of the greatest variation in food choice is due to the boundaries established by cultures and traditions, as they give us values and beliefs about different foods and eating habits.

►**Motivations and beliefs:**

Purchase motivation has also been the subject of many studies. For example, most studies have indicated that the primary reason for purchasing fruit is health. For some, health may be an important consideration when choosing foods to eat. One survey found that a belief in the health benefits of fruits and vegetables may well increase consumption and found that an individual's concern about nutrition is positively related to their eating behavior (Dittus*et al.*, 1995).
Like availability (ease of purchase) in stores and outlets (see Godwin and Tegegne, 2006), perceptions of health benefits as well as convenience are specific issues that appear to underlie fruit choice.
Choices between apples and other fruits are often based on perceptions of utility (Jack *et al.*, 1997) as well as taste. Consumers differentiate between fruits based on convenience (including how well they can be eaten while traveling, at home, and/or at work) and the ability to share them with friends and family (Jack *et al.*, 1997). In one study, Harker *et al.* (2003), state that apples and bananas were rated highly for convenience compared to kiwis and oranges.

Personal ideologies can also influence food choice decisions, particularly those of more affluent consumers (Holt, 1993). Questions about food safety issues, organic products, genetically modified foods, the type of packaging used, can influence an individual's food choice decisions (Frewer*et al.* 1998).
Personal ideology also incorporates any political beliefs or concerns that individuals may hold and use to choose which foods to purchase. For example, individuals may boycott certain manufacturers because of their business policies (Burger, 1997). Many consumers, for example, will only buy local products to support local industry and agriculture.
Despite the increase in consumer demand and production of locally grown food, it has not yet reached its full potential in the mainstream, in part due to limited marketing and supply chain infrastructure. Direct-to-consumer sales of local food depend on proximity to farmers' markets and nearby small farms. Onozaka et al. (2010) and Kumar and Smith (2017), stated that those who buy from farmers and farmers' markets support local economies, indicating a relationship between concern for the local economy and local food consumption. Previous research indicates that consumers are motivated to purchase local food in part for the support of local producers, businesses, and economies (Thilmany, Bond, & Bond, 2008).

► **Emotional and Social Aspects:**

Shiv and Fedorikhin's (1999) study showed the influence of affective aspects in the formation of consumer attitudes and decision making. In an experiment (choice between a fruit salad and a chocolate cake), in which situational variables were controlled, it was found that it is the affective aspects that have an impact on the consumer's food choices in the case where the resources needed for the rational decision process are limited (Cited in Gurviez and Sirieix, 2010).

Food is also a major focus of social interactions. In a German study, it was found that enjoyment of food was only partially determined by the sensory aspects of the food. Factors such as atmosphere, mood, and people were all important aspects of the pleasure derived from eating occasions (Westenhoefer&Pudel, 1993). Many eating occasions occur in company and eating in this way can affect the types and amounts of food consumed. It has also been found that being married is associated with increased consumption of fruits and vegetables, whereas being single, separated, or divorced may be associated with lower consumption (Billson *et al.* 1999).
Studies have concluded that a greater proportion of men's energy consumption comes from meat, animal products, and alcohol, while women's energy consumption comes from plant products and fruit (O'Doherty& Holm, 1999). This dietary "ideology" may explain some of the differences in fruit and vegetable consumption patterns between men and women.
Food is also a social act (a marker of social status) through which people may seek to differentiate themselves from others, or alternatively, convey their membership in a particular social group through their food consumption (Germov and Williams, 1999).

The growing importance of health and the environmental impact of food production in food consumption trends indicate that today's consumers are demanding not only healthy but also environmentally sustainable food products (Baker and Crosbie, 1993; Grunert and Juhl, 1995; Magnusson *et al.,* 2001; Rozin, Fischler, Imada, Sarubin and Wrzesniewski, 1999). It is believed that when consumers are more concerned about their health and environmental protection, they are more likely to have positive attitudes toward organic and local foods and fruits.

► **Monetary aspects:**

Price is recognized as a key variable in consumers' fresh food choices (Jaeger, 2006; Scheibehenne, Miesler, & Todd, 2007). It has been shown to be the most important attribute in the decision to purchase fresh food products such as carrots or sweet cherries (Dagupen, Tagarino, Gumihid, Gellynck, &Viaene, 2009; Koutsimanis, Getter, Behe, Harte, &Almenar, 2012). According to other studies, price has been found to be the most influential factor on the food choice of people from lower socioeconomic groups, e.g., students, retirees, and the unemployed (Reicks*et al.* 1994; Lennernas*et al*. 1997; Johansson & Andersen, 1998). It has also been found that people in lower socioeconomic groups consume less fruit and vegetables than those in higher socioeconomic groups (Anderson and Morris, 2000).

► **Information (product and label knowledge):**

In this sense, the availability of information is a very important factor that influences the instrumental value of fruit. A study in this context (Moreau-Rio, 2002) has shown that the lack of knowledge of fruit in terms of origin, terroir and type can create a distance between products.

It is commonly accepted that consumers' awareness and knowledge of organic food plays an important role in their organic purchase decisions (Yiridoe et al, 2005). Several researchers identify lack of knowledge about organic foods as a barrier to organic food purchases (de Magistris and Garcia, 2008). Organic food knowledge involves what consumers know about organic foods and their ability to judge the quality and unique characteristics of organic food products. These authors also suggest a causal relationship in that objective knowledge enhances subjective knowledge, which in turn enhances attitudes toward the purchase and consumption of organic products.

In this framework it is also important to say that food generally contains a variety of nutrients that are highly necessary for the optimal functioning of the body, and it is mentioned that the decision that consumers make before buying or consuming a food product is based on the quality of food, price, packaging and labels (Mohd Daud *et al.,* 2011). Therefore, the label, which is one of the essential media for customers to know what is in the food, allows the consumer to make the right decisions on the one hand, and also provides all the necessary information about the healthful and hygienic character and the origin of the food product.

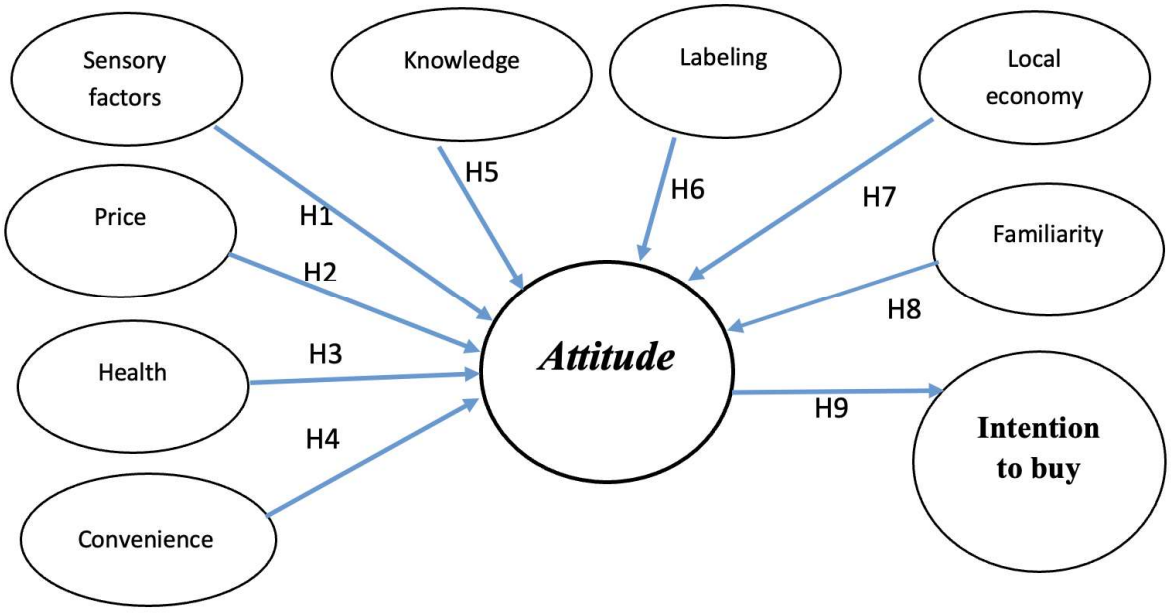
2. Research model

Based on the literature review, we propose a research model, in the form of hypotheses that encompass the most relevant factors to explain the purchase intention of the Moroccan consumer towards the local apple of Midelt:

H1: Sensory factors significantly influence consumer attitude towards local apples;
H2: Convenience significantly influences consumer attitude toward local apples;
H3: Price significantly influences consumer attitude towards local apples;
H4: Health is a factor that significantly influences the consumer's attitude towards the local apple;
H5: Concern for the local economy significantly influences consumer attitudes toward local apples;
H6: Familiarity significantly influences consumer attitude towards local apple;
H7: consumer knowledge about apples as a fruit significantly influences their attitude toward local apples;
H8: Consumer sensitivity to food labels significantly influences their attitude toward local apples;
H9: Consumer attitude toward local apples significantly influences purchase intention.

The following figure illustrates these research hypotheses:

Figure1 : Theoretical proposals and relational diagram



Source : Authors' elaboration

Although the influence of price, origin, and other attributes included in our model has been studied by researchers in the field of food choice (Aertsens*et al*., 2009; Brunso*et al*., 2009; Iop*et al*., 2009), these elements have generally been studied separately, with a few exceptions. This makes it difficult to know how they interact with each other (Holdershaw and Konopka, 2017; Thøgersen, Pedersen, Paternoga, Schwendel, and Aschemann-Witzel, 2017). It is also important to see how the influence of these factors plays out in the Moroccan context.

3. Methodology:

3.1.Instrument development and data collection

The research used a survey questionnaire with concepts and items derived from previous related studies in a quantitative research design. The questionnaire includes demographic characteristics, general apple questions, and measurement items:

The health, familiarity, convenience, and price scales were adapted from Steptoe et al. (1995) and Chen (2007). The sensory scale was adapted from Chen (2007) and Meike, Dean, and Baird (2022). The one for local economic concerns was adapted from the study of Paswan, Pineda, and Ramirez (2010) and Kumar and Smith (2017). Knowledge of apples as a fruit was measured by items adopted from Nguyen et al. (2019). Items measuring consumer sensitivity toward food labels were adopted from Wong and Tzeng (2021). As for the measurement scale regarding attitude toward local apples, it was adapted from Chen's (2007) study, and for purchase intention, the items are adapted from Ariff's (2014) study. The measures were selected to closely match our research objective and were modified for the research context. Five-point Likert scales were used to assess the question statements. Prior to administering the survey, we pilot tested the data collection instrument to confirm its validity and reliability. During pilot testing, we used the convenience sample technique to collect 60 full questionnaires to calculate Cronbach's alpha for the constructs and conduct exploratory factor analysis. In addition, we interviewed professionals and researchers, asking them to review and comment on the questionnaire. Based on the interviewers' comments and pilot testing of the data and factor analysis on the basis of the exploratory sample, we removed items from the initial items.

For the translation of the scales into English, we adopted the method of back-translation or reverse translation (Whiting, 1968).

Our structured survey questionnaire was used to collect data from targeted respondents. This study focuses on Moroccan consumers. After collecting responses for three months (April to June 2022) using online surveys, we received responses from 360 respondents. However, in the end, we identified 343 valid questionnaires. The remaining questionnaires were not properly completed. To ensure geographic coverage of the population, the questionnaire is posted in some popular Facebook groups and on other social networks.

3.2.Data analysis

First, we conducted exploratory factor analyses. We first checked whether the variables follow a normal distribution by observing that no skewness coefficient is greater than 1 and no kurtosis coefficient is greater than 1.5. The second step is to check the Bartlett sphericity test and the KMO index to see if the items are suitable for factor analysis. After the principal component analysis, we carried out the reliability study in order to verify if the groups of items each refer to a latent variable. Afterwards, we performed the Cronbach's alpha test.
Although the variables must be cross-correlated with each other, variables that are too highly correlated can cause problems of multicollinearity that may affect the regression results. By checking the correlation matrix between explanatory variables, multicollinearity can be visually identified. Our analysis in this sense indicates that there are no strong correlations exceeding the threshold of 0.70 (Jolibert and Jourdan , 2006) (0.80 based on the work of Gujarati, 2004). Two other indicators were analyzed in this sense, namely the Variance Inflation Factor (VIF) and tolerance. According to our analyses, no tolerance level is lower than 0.2 and no VIF is higher than the threshold of 4 (Evrard*et al.,* 2003) or 10 (Myers, 1990).
Through a data analysis via SPSS software, we conclude that all the selected scales are adequate for a confirmatory factor analysis. Secondly, we perform an analysis with structural equation modeling (with AMOS software) which is a multivariate statistical analysis technique used to analyze structural relationships. Commonly used in marketing research, this technique allows for the analysis of the structural relationship between observed variables and latent constructs, while incorporating measurement errors (Bagozzi and Yi, 2012). As Hair *et al*. (1998) explain, structural equation modeling is the most appropriate analysis technique when multiple relationships between dependent and independent variables are studied. This step, which has the objective of confirming existing relationships between variables, estimating the weight of each variable, and testing hypotheses, will be done by starting with a confirmatory factor analysis with the design and testing of the overall structural model second

4. Results

4.1.Characteristics of the sample

Regarding the study sample, the following table presents the socio-demographic profile of the participants:

Table 1: Characteristics of the sample

Features	Frequency	%	Income[7]		
Gender			Less than 2000 MAD	9	2 ,62
Male	160	46,65	From 2000 to 4000 MAD	28	8,18
Woman	183	53,35	From 4000 to 6000 MAD	123	35,86
Total	343	100%	From 6000 to 8000 MAD	147	42,85
Age			8000 MAD and more	36	10,49
18-20 years old	8	2,3	**Total**	343	100
21-25 years old	10	2,8	**Family situation**		
26-30 years old	26	7,6	Single	65	18,96
31-35 years old	96	28	Married	225	65,59
36-40 years old	99	28,9	Divorced	33	9,62
41-45 years old	76	22,2	Widower	20	5,83
45-50 yearsold	28	8,2	**Total**	343	
Total	343	100	**Family size**		
Level of education			02-mar	105	30,63
Primary school	10	2,9	04-mai	135	39,35
High School	100	29,15	06-juil	98	28,57
Superior short type	105	30,6	More than 7	5	1,45
Superior long type	128	37,35	**Total**	343	100
Total	343	100			
Profession					
Unemployed	74	21,6			
Privateemployment	135	39,34			
Public servant	125	36,44			
Contractor	9	2,62			
Total	343				

Source: Self (SPSS data)

4.2.Knowledge of the Midelt apple

According to the results of our survey, we note that 107 respondents do not know the apple of Midelt, against 236 people who know it. These results show that it is necessary to provide even more efforts in terms of communication, whether from public operators or producers to

[7] MAD *=0.93 EUR ; 50* MAD *= 4.64 EUR.*

improve the awareness of this local apple at the national level and make known its protected geographical indication.

4.3.Variety awareness and consumer preferences

By integrating photos to our questionnaire about the different varieties of apples, to get an idea about the awareness of the existing varieties and the preferences of the consumers in this sense, we obtained the following results:

Table 2: Aided awareness of apple varieties and consumer preferences

Assistedvarietyawareness		
Varieties	**Frequency**	**%**
Pink Lady	20	5,8
Kidney Queen	4	1,2
Stayman	8	2,3
Ozark Gold	8	2,3
Fuji	12	3,5
Red Chief	8	2,3
Straking	35	10,2
Starking delicious		
Red delicious		
Starkrimson	36	10,5
Granny Smith	23	6,7
Golden Delicious	23	6,7
Gala/Royal Gala	73	21,3
No	93	27,1
Total	**343**	**100**

Preferredvarieties		
Varieties	**Frequency**	**%**
Gala/Royal Gala	109	31,8
Golden Delicious	7	2
Dorset golden	28	8,2
Golden Smoothee	4	1,2
Granny Smith	16	4,7
Starkrimson	40	11,7
Red Chief	16	4,7
Anna	4	1,2
Gloster	8	2,3
Ozark Gold	43	12,5
Stayman	36	10,5
Queen of the Kidneys	4	1,2
Pink lady	28	8,2
Total	**343**	**100**

Sources: Authors' elaboration

According to these results, we note that the variety Gala/Royal Gala benefits from a good assisted notoriety on behalf of the Moroccan consumer, followed by the Starkimson and the Straking
Starking delicious or Red Delicious. In terms of preferences, the Moroccan consumer prefers the Gala/Royal Gala variety, followed by the Ozark Gold variety, the Starkimson variety, the Stayman and then the Pink Lady with the Dorset Golden. It should be noted that most of these varieties are grown in the region of Midelt, and that it is just necessary to improve communication in this direction, in order to improve consequently, the notoriety of the apple of Mideltas a product and protected geographical indication.
It should be noted that Moroccans consume apples several times a week and several times a month, as shown by the results of our survey:

Table 3: Frequency of apple consumption

Frequency of consumption of apples		
	Frequency	**Percentage**
every day	4	1,2
1 or 2 times a week	77	22,4
2 or 3 times a month	120	35,0
1 time per month	67	19,5
Less often	75	21,9
Total	**343**	**100,0**

Source: Self (SPSS data)

If we ask the participants in the survey about where they buy apples, we find that the majority (30%) buy them from a retailer specializing in fruit and vegetables, 27% buy them from street vendors, 12% in a supermarket, and the rest go to the souk or a general food store and rarely from farmers directly. It should be noted that the informal channel remains the most dominant, with the multiplication of intermediaries, which can impact the price of apples but also their development.

4.4.Results of the confirmatory factor analysis

To investigate the pattern of purchase motive measures that may influence consumer attitudes toward local apples, we began with the factor contributions, as well as their SMCs (*Squared Multiple Correlations*) which correspond to the individual reliability of the items. From the AMOS data, we find that all the factor contributions of the items (>0.5) and their SMC (>0.3) indicate very acceptable values.

Table 4: Confirmatory factorial statistics for measurement models

Items	**Scale**	**Factor contributions (Lamdas)**	**SMC**
It is important that the apples I buy have an attractive smell	Sensoryfactors	,825	,681
It is important that the apples I buy have a soft texture		,805	,648
It is important that the apples I buy are free of visual defects		,759	,576
I know a lot about how to judge the quality of apples	Knowledge	,818	,669
Compared to the average person, I know a lot about apples		,898	,806
People who know me consider me an apple expert		,807	,651
Organic labels help identify the differences between organic and non-organic fruit		,879	,773

Organic labels can guarantee the safety of fruit	Labeling	,800	,640
Organic labels can guarantee the quality of fruit		,795	,632
Buying local fruit supports local business	Local_Economy	,760	,578
Buying local fruit supports local agriculture		,849	,721
It is my duty to buy local fruits		,771	,595
The apple is a fruit that I usually eat	Familiarity	,799	,638
The apple is a fruit that is familiar to me		,979	,772
The apple is a fruit that I have eaten since my childhood		,780	,609
Local apples are cheap	Price	,818	,670
The price of local apples is an affordable price		,876	,768
Local apples are good value for money		,797	,-635
Apples are a fruit that contains many vitamins and minerals	Health	,707	,499
Eating apples keeps me healthy		,872	,760
Apples are rich in fiber		,742	,550
The apple is an easy fruit to prepare	Convenience	,816	,665
The apple is a fruit that can be eaten on the road, at the office and at home		,823	,678
The apple is a fruit easily available in stores		,816	,524
Local apples have superior quality	Attitude towards local apples	,705	,775
Local apples are tastier		,850	,723
Local apples are more attractive		,880	,498
I would buy the apples from Midelt in the near future	Intention to buy the apple of Midelt	,865	,749
I plan to buy the apples from Midelt		,785	,617
I intend to buy the apples of Midelt		,705	,498

Source: Authors' elaboration(AMOS data)

Following a confirmatory factor analysis of the explanatory variables (purchase motives) measurement model, all fit indices show satisfactory values and indicate the good fit of the model.

Table 5: Overall model fit indices for the measurement of explanatory variables

Absolute indices						**Incremental indices**			**Parsimonious indexes**		
Chi² (χ^2)	**ddl**	**GFI**	**AGFI**	**MRS**	**RMSEA**	**NFI**	**TLI**	**CFI**	**χ2/ddl**	**AIC**	**PNFI**
392,630	224	0,912	0,882	0,357	0,047	0,914	0,951	0,961	1,751	544,630	0,742

Source: Authors' elaboration (AMOS data)

For the attitude and purchase intention variables, we find that all the fit indices of the model show ideal values. Both the absolute fit indices, the incremental indices and the parsimony indices show that the scales fit the data well.
Having presented the CFA results, we now turn to the reliability and validity of the measures. We begin by calculating Jöreskog'sRhô (ρξ), which we will compare to the Cronbach's alpha obtained in the exploratory factor analysis, and then the Rhô of convergent validity (ρvc).

Table 6: Results of the test of reliability and validity of the measurement models

Variables	Rhô of Jöreskog (ρξ)	Rhô of the convergent validity (ρvc)	Cronbach's Alpha
Health	0,819	0,604	0,815
Sensory factors	0,839	0,635	0,838
knowledge	0,879	0,709	0,877
Labeling	0,865	0,682	0,863
Local economy	0,836	0,631	0,836
Familiarity	0,860	0,673	0,860
Price	0,870	0,691	0,868
Convenience	0,831	0,622	0,830
Attitude towards local apples	0,855	0,665	0,851
Intention to buy	0,830	0,620	0,826

Source : Authors' elaboration

From these data, we see that all scales have good reliability and validity, with Jöreskog'sRhô above 0.7 and Convergent Validity Rhônow above 0.5, as well as Cronbach's alpha above 0.7 (George & Mallery, 2003).
The results of the T-test attest to the convergent validity of all the items selected, since all the values of the T-test are greater than 1.96 with a probability of less than 0.05.
The Rho test of convergent validity allowed us to verify that the variance of the construct is more explained by its items than by the error and the T-test allowed us to verify that the variable/factor correlations are significantly non-zero and the items representing the dimensions of the same component are well correlated.
Discriminant validity is checked by calculating the CR (*Composite Reliability*), MSV (*Maximum Shared Variance*), ASV (*Average Shared Variance*) and AVE (*Average Variance Extracted*) indices. Hypothesis testing
In order to move to structural equation modeling, the hypothetical model was converted to a global structural model through the construction of relationship graphs, the accuracy of the latent variable measurement models as well as the measurement errors of the estimation, while specifying the relationships between the different latent variables in the research.

After specifying the hypothesis relations, we move to the identification of the structural model with the study of the degrees of freedom. A model is identified when it converges to a unique

solution (Baumgartner and Homburg (1996). This identification implies the verification of two conditions: the order condition and the rank condition. The first one depends on the degree of freedom[8] and the second condition allows to have only one solution and it is satisfied when the variance/covariance matrix is positive and its determinant is non-zero. Thus, after the identification of the model, comes the phase of the estimation of the parameters by opting for the technique of the estimation by the maximum likelihood (LISREL) because all our constructs are reflexive. We then present the fitting indices for the assessment of the quality of the global model, before moving on to the results of the hypothesis tests based on two indicators:

- Student's t-test[9] : whose value must be greater than 1.96 with a probability of error less than 0.05 for the relationship to be statistically significant.
- The standardized regression *weights,* which are similar to the R2 of the regression to evaluate the intensity of the relationship;

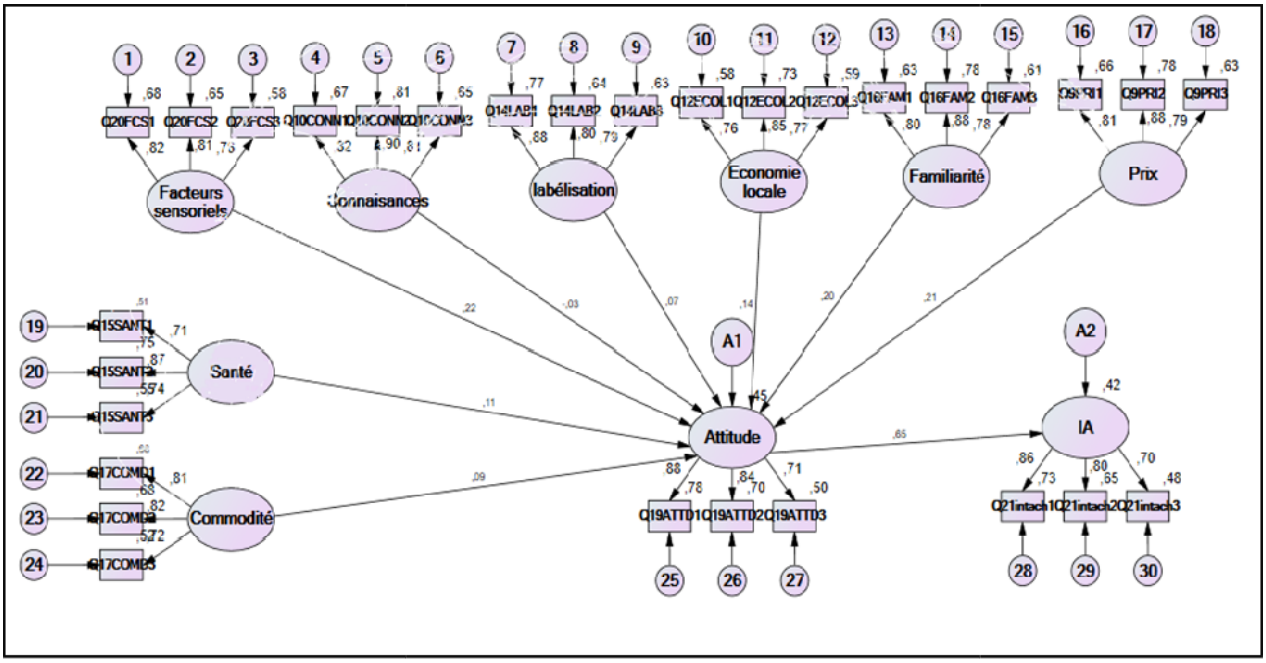
Before presenting the results of the hypothesis testing, we first check the fit of the overall measurement model by taking into account the set of clues mobilized during the confirmatory analysis phase.

The following figure shows the output of the AMOS software which consists of the results of the global structural model:

[8] Degree of freedom (ddl) = (P (P + 1) / 2) - N (P is the number of measurement indicators in the model and N is the number of coefficients to estimate in the model).

[9] Critical Ratio under Amos.

Figure 2: Results of the global structural model



Source: Authors' elaboration (AMOS)

With factorial contributions above 0.50, the model has a good fit, which was confirmed by the parsimonious index analysis; $\chi 2/dll$ = at 2.101 and thus much lower than the admissible threshold of 5. The absolute indices of the model are verified by the GFI (0.868), the AGFI (0.834), the SRMR= 0.0500 < 0.08. For its part, the RMSEA (0.057), which is lower than the admissible threshold (< 0.05 and if possible < 0.08), ensures the low error of the estimate and confirms the good fit of the model. Incremental indices (NFI, TLI, CFI) considered less sensitive to the sample size are acceptable. The results of these indices are presented in the following table:

Table 7: Global adjustment indices of the global structural model

Model	KHI 2	(χ^2/ddl)	GFI	AGFI	RMSEA	NFI	CFI	TLI	MRS
Global	773,100	2,101 (ddl=368)	0,868	0,834	0,057	0,873	0,928	0,915	0,0500

Source: Authors' elaboration (AMOS data)

It is important to remember that the overall model fit indices should be analyzed as a whole and not separately.The internal consistency of all constructs was checked through Cronbach's alpha, which shows values above 0.80. We also present the matrix of squared high correlations between the constructs with, in bold, the Rhô of convergent validity.

The following table displays satisfactory indices (MSV<AVE, ASV<AVE, CR>AVE, AVE>0.5, CR>0.7) through which reliability, convergent and discriminant validity have been demonstrated, with all T-test values being greater than 1.96, with probability less than 0.05.

Table 8: Overall Structural Model - Reliability and Validity

	CR	AVE	MSV	ASV	1	2	3	4	5	6	7	8	9	10
1. Attitude	0,855	0,666	0,391	0,19	**0,816**									
2. Awards	0,87	0,691	0,184	0,09	0,418	**0,831**								
3. Familiarity	0,86	0,673	0,311	0,13	0,445	0,266	**0,82**							
4. Economy Local	0,837	0,631	0,176	0,11	0,42	0,328	0,334	**0,794**						
5. Labeling	0,865	0,682	0,333	0,13	0,385	0,254	0,256	0,285	**0,826**					
6. Knowledge	0,879	0,709	0,214	0,12	0,321	0,429	0,463	0,355	0,194	**0,842**				
7. Sensory factors	0,839	0,635	0,379	0,11	0,431	0,206	0,267	0,334	0,38	0,223	**0,797**			
8. Health	0,819	0,603	0,333	0,15	0,427	0,35	0,224	0,315	0,577	0,233	0,465	**0,777**		
9. Convenience	0,831	0,623	0,311	0,16	0,424	0,208	0,558	0,355	0,436	0,392	0,408	0,332	**0,789**	
10. Intention to buy	0,829	0,619	0,391	0,17	0,625	0,293	0,271	0,323	0,335	0,281	0,616	0,381	0,402	**0,787**

Source :Authors' elaboration

Examination of these indices shows us that all Rhôs of convergent validity are greater than the squared high correlation coefficients. On the other hand, all MSV values are lower than the AVE index values, with all ASV values lower than the AVE, attesting to good discriminant validity. These results provide strong evidence that the latent variable items measure their respective constructs well. Also, these results help to demonstrate construct reliability (CR > 0.7), as well as convergent validity (CR > AVE, with AVE > 0.5).

5. Discussion of the results of the research hypothesis test

For a complete presentation of the research results, the following table shows the results of the tests of the relationships between the different variables according to the standardized regression coefficients and the calculation of the T-index.

Table 9: Results of the global structural model test: all links

Assumptions			Regression coefficient standardized	C.R. (T)	P	Conclusion
Attitude	<---	Price	,052	3,482	***	Validated
Attitude	<---	Familiarity	,064	2,974	,003	Validated
Attitude	<---	labelling	,054	1,011	,312	Rejected
Attitude	<---	Health	,071	1,534	,125	Rejected
Attitude	<---	Convenience	,082	1,162	,245	Rejected
Attitude	<---	Knowledge	,051	-,441	,659	Rejected
Attitude	<---	Sensory factors	,061	3,366	***	Validated
Attitude	<---	Local economy	,058	2,319	,020	Validated
Intention to buy	<---	Attitude	,072	8,845	***	Validated

Source:Authors' elaboration(AMOS)

From the results we find that consumers' attitude towards local apples has a significant impact on their purchase intention, and attitude is significantly influenced by sensory factors, price, familiarity, and local economy concerns. We also find that the construct retained in our model as an antecedent of purchase intention has good predictive power since it explains 45% of the variance of the construct (R2 or *Squarred multiple correlation*), as do the other explanatory variables which explain almost 45% of the variance of attitude.

The results show that sensory factors (smell, texture, absence of defects) are the first factor influencing the Moroccan consumer's attitude towards local apples. Indeed, sensory aspects of food have been shown to be the most important factor in food choice in several studies (Magnusson *et al.,* 2001; Torjusen, Lieblein, Wandel, & François, 2001; Wandel and Bugge, 1997). It must be said that food production involves several challenges, ranging from meeting the basic nutritional needs of consumers to satisfying the complex requirements associated with the sensory characteristics of foods. It is in this sense that Behrens *et al,* 2017 and Jaeger, 2006 reported that the perception of food is affected by intrinsic factors such as taste, smell, texture, among others, which play a fundamental role in the acceptance and purchase intention of the consumer. Kramer (1965) stated that product appearance generally determines whether a product is accepted or rejected; therefore, it is one of the most critical quality attributes. We eat with our eyes. The shape, size, shine, and vibrant color of a fruit or vegetable attracts us to pick it up with our hands or fork. Once we are attracted to the appearance and color of a product or its smell, we put it in our mouths, where the aroma and taste take over. Just as an attractive product can stimulate impulse purchases, an unattractive look, smell or texture can steer a consumer away from a planned purchase. Inappropriate colors, for example, that indicate a loss of freshness or suggest a lack of ripeness, can negatively impact a consumer's attitude.

Regarding the second hypothesis, price was found to be the second factor (β= 0.52) that significantly influences consumer attitude towards local apples. In all food categories, price has traditionally been one of the most important factors, influencing consumers' purchase decisions (Matanda*et al.,* 2000, Maxwell, 2001). Results of some studies have shown that the most important criteria considered when purchasing fresh fruits and vegetables are quality and price respectively (Akpinar*et al.,* 2009). These initial results are consistent with other studies that have shown that consumers value freshness, appearance, and price more than other characteristics (Mahaliyanaarachchi, 2007). It is worth noting that currently available information shows that local apples are cheaper than imported ones (4 to 8.5 dhs/kg for local apples versus 11 to 17 dhs/kg for imported ones).

After sensory attributes and price, familiarity (β= 0.64) is the third factor significantly influencing consumer attitude towards local apples. As demonstrated by several studies, familiarity is a complex concept related to individual experiences with a product, a key driver in the purchase and consumption process (Nacef*et al.,* 2019), and an important factor in the acceptability of food products. Familiarity reduces the uncertainty associated with a product

and ensures that consumer expectations and actual product characteristics are synchronized (Deliza &Macfie, 1996).

A consumer's degree of familiarity with a product influences his or her perception of its sensory properties , and lack of familiarity with a product is related to a mender involvement with it (Jamir *et al.,* 2020). Familiarity can affect the types of everyday descriptors and sensory properties that individuals use (Jamir et al ., 2020). Furthermore, due to negative responses to unfamiliar foods, including risk fear and suspicion, unfamiliarity has been shown to have an adverse effect on hedonic responses, openness to new foods, and purchase intention (Lee *et al.,* 2020). This was further demonstrated by our survey results showing that nearly 80% of respondents purchase apples more often.

The results of this study also show the impact of local economic concerns as a factor that significantly influences consumer attitudes toward local apples. Despite the increase in consumer demand and production of locally grown food, it has not yet reached its full potential in the mainstream, in part due to limited marketing and supply chain infrastructure, which is particularly the case for Midelt apples. Direct sales to consumers of local foods depend on proximity to farmers' markets and small farms nearby. Studies have shown that those who buy from farmers, at farmers' markets, and seek out local produce support local economies, indicating a relationship between concern for the local economy and local food consumption (Onozaka*et al.,* 2010). Previous research indicates that consumers are motivated to purchase local food in part to provide support to local producers, businesses, and economies (Rushing and Ruehle, 2013, as cited in Kumar and Smith, 2017; Thilmany, Bond, and Bond, 2008).

As for the rejected hypotheses, concerning the influence of label knowledge, consumer information (about apples), convenience and health on consumer attitudes, this can be explained for several reasons.

For labeling, it has been shown that the demand for labeled local products in developing countries is not as high as in developed countries (Weatherell*et al.,* 2003). This may be related to the Moroccan consumer's unfamiliarity with food labels and their perception of local products as being of good quality, whether or not they are labeled. This is the effect of inherited trust, combined with familiarity with the product (from the countryside), rather than an unknown label. This reasoning may also explain the lack of significant influence of health and consumer information on their attitude towards local apples, as it is a choice explained by familiarity and eating and buying habits rather than a health concern. It is totally obvious to say that not all consumers are knowledgeable about the food they buy in terms of composition and health benefits, this can be explained by a lack of nutritional education.

Concerning convenience, apples are certainly a product that has this characteristic, but they are not the only ones (bananas, strawberries...). The non-significant influence of this variable on consumer attitudes can be explained by eating habits and preferences for other fruits, but also by price and other factors that need to be analyzed.

Conclusion

Since the 2000s, the global apple industries have been experiencing a period of intense competition and some economists have described them as being in a state of hyper-competition (Axelson and Axelson, 2000). In this sense, some consider that this competition is also related to the abundance of supply, to the point that some producers are forced, in some cases, to destroy their stocks when the harvest of a new season begins. However, it must be said that there is still untapped capacity. In Morocco, despite an increase in fruit and vegetable consumption, it remains insufficient compared to international recommendations (Allali, 2017). The link between low fruit consumption and public health problems has been raised by several researchers (Krebs-Smith *et al*., 1996; van der Pol and Ryan, 1996). In this framework, despite the fact that attributes such as texture, taste and flavor are difficult to evaluate experimentally, and that the studies carried out are generally far from the usual context and environmental situations associated with fruit consumption, it is important to continue research in this direction, diversifying the methodologies and contextualizing the research for a better understanding of the determinants of fruit consumption and purchase by the consumer.
Our study in the Moroccan context showed that sensory factors, price, familiarity, and concern for the local economy are the primary factors that determine consumers' positive attitude toward local apples, which influences their purchase intention. As a result, they can serve as useful promotional appeals for consumers to improve their perception of the benefits of local apples.

The government and relevant institutions should succeed in reducing the inconvenience to consumers of buying local apples by helping farmers to expand their growing areas and productivity and helping traders to expand their distribution channels and undertake their sales promotions. In this sense, it is necessary to improve the infrastructure of production and storage and to ensure the protection and improvement of the sensory aspects of apples so that they can remain attractive, keep their good texture and attractive smell and remain without damage and visual defects. Certainly the production of apples in the region of Midelt has experienced a clear increase in recent years with the multiplication of efforts of the Ministry of Agriculture and several local actors, nevertheless, the lack of refrigerated storage units remains one of the problems that can impact the quality of apples but also their price. Under these conditions, farmers liquidate their production by seeking to minimize delays due to a lack of adequate storage infrastructure, which reduces their income. The multiplication of intermediaries, which is added in this context, has an impact on the selling price and considerably reduces the farmers' income, which can negatively influence their investment efforts to improve the quality of their production.

It is also a question of organizing training for producers, encouraging the formation of cooperatives, clusters, and clusters of competitiveness, to help farmers develop their crops and

ensure a good level of quality by remaining competitive with imported products for better support to the local economy.

Concerning the factors related to health and labeling, the government, at the level of the Ministry of Agriculture and Health, must lead to the development of national programs for a good nutritional education and to make known more food labels that exist in Morocco. This is to improve the perception of consumers towards these labels, to know them, but also to have a good culture concerning the importance of fruit consumption and their benefits for a good national health.

In spite of the development of the apple sector, whose production is increasing, the farmers suffer from several problems without being able to make more margins. It is important not to ignore the importance of marketing and commercialization techniques, in order to achieve the implementation of strategies that must take into account the reasons for purchase and consumer preferences. It is also necessary to improve communication around this product (Midelt apple) and promote its protected geographical indication and organize the distribution channels to reduce the number of intermediaries while developing the downstream of the sector.

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