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LA LOGISTIQUE ET LE SUPPLY CHAIN MANAGEMENT A LA CROISEE DES CHEMINS

END-USER PROFILE AND SENSITIVENESS TO SUPPLY CHAINS: IMPLICATIONS FOR CONSUMER GOODS IN FRANCE

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Summary

Supply chains have been at the core of numerous scandals related to consumer goods. These scandals tend to open the opportunity to investigate the sensitiveness of end-users to supply chains processes. However, if this element has been partially studied by literature, it needs knowledge deepening and updating. This paper examines the sensitiveness of French end-users to the supply chains processes regarding consumer goods sold in French shops. The main research question consists in testing of the influence of end-user characteristics upon sensitiveness to supply chain dimensions.

This study analyses a set of 833 French end-users which were questioned about 24 supply chain characteristics thanks to a 7 points Likert-scale online questionnaire between September 2019 and October 2019. The analysis distinguishes the opinions provided for food and non-food items sold in physical stores (e-commerce has not been considered). It's based upon simple descriptive statistics and 2-sample T-tests.

This paper enriches supply chain management literature by confirming the necessity for supply chain management to consider the sensitiveness of end-users to supply chain characteristics when operating a transition towards greener supply chain management.

Keywords :

Supply chain, End-user, Consumer, Sensitiveness

INTRODUCTION

Supply Chains (SC) have proven to at the core of several scandals related to consumer goods over the past decades ("mad cow" disease, infant milks…). These scandals, as well as the availability problems that some consumer goods are encountering today, tend to open the opportunity to investigate the sensitiveness of end-users to supply chains processes (Wang & Alexander, 2018). Indeed, consumers developed numerous concerns about the supply chains processes, mostly linked to health or environmental impacts. In addition, the design of supply chains could be improved or not if end-users understand or misunderstand them (Szabo & al., 2019, Yan & al., 2020). However, these concerns have been identified in very fragmented and indirect ways through different kinds of researches on consumer's sensitiveness to sustainability or risks. As a very important stakeholder of the supply chain management, consumers' concerns should be addressed directly and need to be understood accurately.

However, there is also a deficit of knowledge on consumer's comprehension of supply chain processes and management that need to be addressed. The aim of our research is to explore the consumer's sensitiveness to supply chain processes trough a quantitative survey. What are the degrees of sensitiveness of end-consumer to SC's processes. Is there end-consumer's characteristics impacting their sensitiveness?

After defining the concept of consumer's sensitiveness and its application to supply chain, our research tested it through quantitative analysis of 833 surveys collected in 2020 on consumer's approach of supply chain in food and non-food physical supply chains in France. This permits us to identify degrees of sensitiveness to different characteristics of supply chains depending on consumer's socio-demographic characteristics.

SENSITIVENESS OF THE END-USERS TO SUPPLY CHAIN: LITERATURE REVIEW AND FOCUS GROUP RESULTS

Sensitiveness is a well-used concept in management researches. However, it is scarcely defined and repeatedly used without being detailed. Moreover, it seems to be used without discrimination instead of other terms or at the same time of other terms like: sensitivity, sensibility or perception for example. This ambiguity should be clarified by defining

sensitiveness of consumer in management, at first, and then sensitiveness applied to supply chain.

Sensitiveness of end-users in management

Sensitiveness of consumer has been largely tested in order to anticipate the variables determining their purchase behaviour at first, but seems to be nowadays used to explore their links to sustainability. In each case, personal characteristics of consumers are moderator variables of their sensibility.

- Definitions of concepts of sensitiveness

Referring to the Cambridge Dictionary, sensitiveness can be defined as “the quality of being easily influenced, changed or damaged, especially by a physical activity or effect”. In management, the concept of sensitiveness is always used in connection with the object of this sensitiveness. Consumer price sensitiveness is the most widely tested concept, especially in marketing, and has been the subject of many researches. All of them are agreeing on one thing, sensitiveness is a construct that is often confused with its consequences (behaviours resulting from sensitiveness) (Froloff-Brouche, 1994). That is why two types of approaches in research tend to measure the sensitiveness directly (psychological approach) or to identify ensuing behaviours (behavioural approach). However, other objects of this sensitiveness have been tested like sensitiveness to: promotion, brand, quality, risk, waste, information (Higie, *et al.*, 1987), etc. Mainly, sensitiveness is evaluated through the role played by the object in question in the purchasing process (either in the whole process or in the final purchasing decision). Thus, if we take up the approach of Kapferer and Laurent (1983), a consumer is sensitive to the brand if it plays a role in the psychological process before the purchase. It is a psychological and individual variable (Kapferer & Laurent, 1983) but also situational (Froloff-Brouche, 1994).

However, more recent management researches have taken up the concept of sensitiveness in a direction towards sustainable development and its impact on consumer behaviour (Desjeux & Moati, 2016; Badot & Moati, 2020). Thus, consumer sensitiveness to environmental and ethical concerns is greatly verified. In this context, what is tested is not only the impact of consumers' sensitiveness to some characteristics of products or brands related to sustainable development on the purchasing process but also the composition of this sensitiveness. Indeed, it is also a question of defining the components of sensitiveness on the consumer's purchasing process. Thus, sensitiveness is composed of both the consumer's conscious awareness of an issue and the importance he or she attaches to it. Some authors prefer to use the term "concern" to define

the importance given by the consumer to an issue, including directly in the term the notion of risk and fear linked to this issue. Environmental concern is especially used to speak about consumer's sensitiveness to waste of food for example (Le Borgne *et al.*, 2015). For Le Borgne (2017), sensitiveness includes both awareness (cognitive) and concern (affective) and can be translated as "giving importance to…" and "to be affected by…" (p.111). Sustainability awareness can have impact on product choice by the consumer (Aguilar & Vlosky, 2007; Cai & Aguilar, 2013) but also on the coordination and demand within supply chain (Zhang *et al.*, 2015). Our definition thus includes these two elements: "the consumer's sensitivity to the supply chain is composed of what he perceives of supply chain's reality (awareness) and the importance he gives to the elements affecting his perception (concern)".

- End-users characteristics impacting sensitiveness

In management, and especially in marketing, consumers'characteristics impacting their sensitiveness to brands, price, promotion… have been identified by numerous researches. Such characteristics are mostly socio-demographic and personal characteristics such as age, experiences… In research on sustainable consumption, socio-demographic factors and psychological factors are identified to impact consumer behaviour (Antil, 1984; François-Lecompte & Valette-Florence, 2006).

In order to further define end-consumer's sensitiveness to SC, it is important to build on previous research that has highlighted the links between end consumers and the supply chain.

Sensitiveness to physical retailing supply chain

Sensitiveness of end-users to supply chains have been partially studied by literature (Lichlé *et al.*, 2002; Garrouch *et al.*, 2011; Esper & Peinkofer, 2017, Szabo *et al.*, 2019) (1). However, it needs knowledge deepening and continuous updating due to evolving environment context. A previous qualitative research based on the study of focus groups (authors, 2020) permitted to participate to a better knowledge of supply chain processes perception by end-consumers (2) and propose a definition of sensitiveness to SC.

- Dimensions identified in literature

The sensitiveness of consumers to the supply chain appears in three different ways. First, it can be linked in the logistical performance of these chains and its impact on in-store distribution logistics. Thus, consumers seem to be more sensitive to logistical non-performance in shops: stock shortages, delays, damaged packaging, etc (Fady et al., 2007; Garrouch et al., 2011).

Lithlé et al (2002) defined it as "*the perception by an individual of the logistical performance (or lack of performance), evaluated before purchase*" (p.5). However, this sensitiveness also manifests itself in connection with ecological or political ideologies, particularly around the appreciation of specific supply chains such as fair-trade circuits, short food supply chains (AMAP, Mundler, 2007), community practices (halal food circuits, Fathi et al., 2016). It can be translated into specific supply chain choices or cases of product/shops boycotts (Braunsberger and Buckler, 2011). Finally, consumer sensitiveness to the supply chain shows up through anxieties: health in the case of food traceability (Giraud and Halawany, 2006), environmental (Maloney et al., 1975).

Among the variables impacting sensitiveness were identified: the type of product (needs covered, differenciation, brand…) and the purchase situation (Litchlé et al., 2002), their participation to the logistics efforts (Bahn *et al.*, 2015; Carbone *et al.*, 2018; Rouquet *et al.*, 2017; Xu *et al.*, 2019), and personal variables (Jimenez-Guerrero *et al.*, 2018, Zemanek & Trang, 2021, Ghosh & Shah, 2015, Esper & Peinkofer, 2017, Aussadavut et al., 2008).

- Dimensions identified with focus groups

For exploratory purposes, focus groups have previously been conducted (Kitzinger, Markova and Kalampalikis, 2004; Farr and Tafoya, 1992) in April 2019 in Paris. The 31 respondents aged between 20 and 60 years old sere characterised at least by a consumption pattern that is interested in something other than the price of the products. They were divided into groups of 7 or 8 by socio-professional category and age. These persons were asked in a very general way to tell which elements of the supply chain may influence their buying habits for food and non-food products. The data collected during the focus groups were subjected to several levels of qualitative analysis, including a lexical analysis of the data using ALCESTE as a software tool to provide an initial overview of the dimensions of consumers' perception of the supply chain, and a content analysis with thematical coding using Nvivo software to examine in greater depth the meaning of the respondents' comments. The main objective was to let respondents talk and debate in order to observe the emergence of supply chain characteristics to which they may be sensitive.

The majority of the findings show an awareness limited to a few actors (distributors and producers), a concern on the product and its quality and, finally, a negative judgment linked to the idea of a complex organisation (many actors and many stages). More importantly, these focus groups confirmed the sensitiveness to 24 supply chain characteristics (for at least one

respondent each) identified in the literature on the supply chain and the green supply chain (table 1). These characteristics will be presented in detail in the following section.

A few respondents have a broader view than the others. They stated that this came either from their acquired knowledge (training, diploma) or from their personal interest linked to the desire to buy ethically. In particular to buy “made in France” or “local production”, thus revealing an important impact of personal moderating variables.

Finally, we define sensitiveness to SC as the awareness and concern of end-consumers to SC dimensions that impact their purchasing patterns depending on individual and situational variables.

DATA AND RESEARCH DESIGN

This research conducts a quantitative analysis based on a set of 24 supply chain characteristics identified through green supply chain management literature and focus groups analysis (authors, 2020, see previous section). The 24 supply chain characteristics that emerged from this analysis may potentially influence end-user habits, but this analysis cannot indicate in which proportion (need for quantitative research). These characteristics, described in table 1, have been submitted to a panel of 833 French end-users living on the French territory thanks to an online questionnaire. For each supply chain characteristic, the end-users were asked how strongly they felt concerned by the supply chain characteristic of the product. The products considered are only products sold in physical shops (e-commerce was not considered in this research due to its specificities regarding delivery and customer information).

The answers had to be provided thanks to a 7-step Likert scale, which makes it possible to get a numeric answering result.

The end-users had to fill two different questionnaires: one concerning food products and another one concerning non-food products. This dual questioning process is due to our willingness to discover if different end-user behaviours exist between food and non-food products. In addition, this follows the path of our previous research, which different end-user sensitiveness to food and to non-food products.

Table 1: List of the supply chain characteristics considered on the Lickert scale (authors, 2020, Jimenez-Guerrero *et al.*, 2018, Zemanek & Trang, 2021, Esper & Peinkofer, 2017, Ghosh & Shah, 2015, Aussadavut *et al.*, 2008, Taghikah *et al.*, 2019)

Code°	**Supply chain characteristic**
NtrCertif	Neutrality of certification attribution
SubCtr	Use of subcontracting
ProcMth	Procurement methods
NbIntermed	Number of intermediaries
StorageCond	Storage conditions
ShortgRsk	Shortage risk
Miles	Miles done all along the supply chain
PrdcSize	Producer size
Origin	Origin
PlstConsum	Plastic consumption for packaging
Waste	Wasting of materials and products in the supply chain
NbControSubst	Number of controversial substances used in the product
ProcessInfo	Information about the manufacturing process
Ctrl	Number and type of controls carried out on the supply chain
TraceTrk	Existence of tracing/tracking
Shoptype	Type of shop / distribution point
LocalProd	Use of local production
PrvdTime	Providing time
DirectCt	Direct contact with the producer
Recyclability	Recyclability of the product and its packaging
WorkCond	Work conditions in the companies involved
ProfitRep	Repartition of the profit margin between the companies involved
PollutGHG	Pollution and greenhouse gas emissions
NatResConsum	Consumption of natural resources

While filing the questionnaire, each end-user had to fill a form related to his/her own personal variables (wealth, job category, age, diploma, family status… see table 2). These variables were chosen according to previous researches (Jimenez-Gurrreo & al., 2018, Zemanek & Trang, 2021, Gohsh & Shah, 2015, Esper & Peinkofer, 2017, Aussadavut & al., 2008; Authors, 2020). The results from the Likert questionnaire were analysed through these characteristics, which served as discrimination criteria in the analysis of the Lickert-scale results, in order to know how different categories of persons react to supply chain characteristics on the Lickert scale. Each supply chain characteristic listed in table 1 (studied on the Lickert scale) was observed though each discriminative criterion listed in table 2 (binary criterion) in order to know if consumers presenting differences regarding this criterion react differently to the supply chain characteristic considered.

Every discrimination factor was converted into a binary factor if not already binary (e.g: younger vs older, higher Income vs lower Income, higher level studies vs lower level studies,

single vs family…). The levels of the splitting border were defined according to the current standards of the INSEE (French national institute of statistics) regarding wealth, studies and socioprofessional category. For instance, concerning studies, we considered the bachelor's degree is the border since the INSEE considers studies to be long studies from this degree (INSEE, 2019). Regarding family status, we made de choice to analyse singles separately since they live alone, without having to consider the existence of someone else at home when they buy something.

For every supply chain characteristic studied thanks to the Lickert scale, our research aims at choosing between two hypotheses:

- H0: The discriminating criterion (end-user personal variable) studied is not significantly discriminating (consumers from both levels of the criterion react the same way on the Lickert scale to the supply chain characteristic studied)
- H1: The discriminating criterion studied is significantly discriminating (consumers from the two levels of the discriminating factor react differently to the supply chain characteristic studied)

Statistically speaking, the analysis of the Lickert-scale results was conducted in two steps:

- Step 1: For a given supply chain characteristic and a given discrimination criterion, the average values and standard deviations were calculated for the part of the sample corresponding to the higher value of the discrimination criterion and for the part corresponding to the lower value.
- Step 2: Differences observed in average values were submitted to a statistical check thanks to an independent 2-sample T-test in order to confirm the actual existence of a significative difference (at a 95% confidence level) between the Lickert values obtained by the samples. The 2-sample t-test is intended to compare two samples in order to know whether two average values can or can't be considered as similar with a given confidence level (by accepting or rejecting the hypothesis that the average values are similar). In our case, the two samples used for testing were the samples corresponding to the two possible values of each discrimination criterion. The testing process was repeated for each end-user profile discrimination criterion and each supply chain characteristic. The same process was applied to the cases of food and non-food supply chains. The result of this testing makes it possible to accept the H0 hypothesis or to

reject it in favour of H1 for each supply chain characteristic studied thanks to the Lickert scale.

The results of this data analysis process are presented and discussed in the findings section.

Table 2: List of discriminating criteria used for end-user categorisation

Criterion	**Values (Lower level / Higher level)**
Socio-professional category	Milder-skill / Higher skill
Age	Younger (<35) / Older (>45)
Wealth	Lower Income (< 2000€/month) / Higher Income (> 4000€/month
Diploma	Lower (< bachelor) / Higher
Family status	Single / Family (including couples)

FINDINGS

The statistical analysis conducted produced lots of raw results, which are shown in tables 3 and 4, respectively for food and non-food products. The figures, which show the average rating for each end-user category and each supply chain characteristic, are coloured in grey if the two-samples T-test identified average rating differences as being significant. The ratings are on a 7-step scale, ranking between 1 to 7. In some cases, the T-test indicated a significant difference in ratings, but it many cases, it didn't, thus indicating the presence of a consensus among end-users regarding their consideration of the studied supply chain characteristic.

Regarding age and wealth criteria, the data considered went through a pre-treatment. Indeed, these data are on a numeric base, which caused the appearance of an "intermediate" category for these criteria. This "intermediate" category (people aged between 35 and 45 for the age criterion and people earning between 2000 and 4000€ a month for the wealth criterion) was cut off from the data since it appears to be difficult to objectively position it on one side or the other (for instance, it's difficult to objectively classify people between 35 and 45 on the younger side or on the older side). The other discrimination criteria did not have this problem since the criterion levels were strictly qualitative, which avoids the appearance of this "intermediate" category.

Table 3: Average Lickert-scale scoring results for food supply chains

Supply chain characteristic (Values in grey when H0 is rejected according to the T-test)	**Discrimination criteria (**									
	Socio-professional category		*Age*		*Wealth*		*Diploma*		*Family status*	
	Milder skill	Higher skill	Young	Old	Low	High	Low	High	Single	Family
NtrCertif	4,74	4,23	4,32	4,51	4,33	4,66	4,67	4,38	4,31	4,68
SubCtr	4,25	3,71	4,93	4,12	4,28	3,96	4,39	3,57	4,42	4,65
ProcMth	4,64	4,67	4,49	4,65	4,65	4,57	4,78	4,69	3,22	3,68
NbIntermed	4,84	4,58	4,59	4,64	4,62	4,63	4,68	4,69	4,43	4,8
StorageCond	4,62	4,34	4,37	4,51	4,63	4,25	4,75	4,01	4,09	4,19
ShortgRsk	3,6	3,26	3,36	3,5	3,74	3,34	3,78	3,1	5,64	5,7
Miles	4,92	4,64	4,7	4,76	4,62	4,75	4,76	4,87	4,86	5,33
PrdcSize	4,3	4,16	4,14	4,22	4,22	4,4	4,09	4,41	4,65	4,84
Origin	5,77	5,6	5,63	5,78	5,53	5,72	5,75	5,83	5,02	5,39
PlstConsum	5,3	5,16	5,13	5,25	5,01	5,49	5,31	5,29	4,69	4,84
Waste	5,03	4,66	4,71	4,83	4,81	4,71	4,96	4,74	4,40	4,68
NbControSubst	5,44	5,37	5,13	5,25	5,01	5,54	5,31	5,34	4,95	5,09
ProcessInfo	4,72	4,98	4,66	4,8	4,81	4,88	4,94	4,73	4,9	5 ,09
Ctrl	4,7	4,6	4,38	4,6	4,53	4,66	4,80	4,46	5,51	5,6
TraceTrk	5,06	5,14	4,82	5,1	4,88	5,09	5,23	5,01	4,49	4,61
Shoptype	5,1	5,01	4,86	5,1	5,03	5,03	5,23	4,96	4,74	4,91
LocalProd	5,6	5,55	5,43	5,64	5,35	5,79	5,63	5,58	5,16	5,22
PrvdTime	4,88	4,36	4,55	4,63	4,72	4,37	4,92	4,37	4,67	4,4
DirectCt	5,02	4,95	4,78	4,89	4,76	5	4,95	4,98	4,67	4,6
Recyclability	5,31	5,1	5,07	5,23	5,1	5,16	5,3	5,02	4,4	4,84
WorkCond	4,68	4,18	4,13	4,46	4,58	4,26	4,62	4,29	4,77	4,95
ProfitRep	4,69	4,73	4,34	4,67	4,66	4,5	4,71	4,5	4,80	4,88
PollutGHG	4,97	4,58	4,53	4,74	4,55	4,65	4,88	4,49	5,3	5,38
NatResConsum	5,08	4,79	4,71	4,89	4,73	4,9	4,7	5,01	5,18	5,06

Table 4: Average Lickert-scale scoring results for non-food supply chains

Supply chain characteristic (Values in grey if H0 is rejected according to the T-test)	**Discrimination criteria**									
	Job category		*Age*		*Wealth*		*Diploma*		*Family status*	
	Milder skill	Higher skill	Young	Old	Low	High	Low	High	Single	Family
NtrCertif	4,35	4,31	4,24	4,61	4,24	4,51	4,56	4,14	3,98	4,43
SubCtr	4,1	3,99	4,05	4,39	4,25	4,1	4,35	3,81	3,85	4,13
ProcMth	4,19	4,34	4,43	4,83	4,61	4,71	4,66	4,28	4,32	4,53
NbIntermed	4,24	4,21	4,24	4,65	4,43	4,44	4,6	4,12	4,06	4,4
StorageCond	4,2	3,65	3,99	4,35	4,18	4,06	4,6	3,55	3,66	4,19
ShortgRsk	3,8	3,4	3,31	3,93	3,72	3,58	4,02	3,19	3,04	3,71
Miles	4,36	4,64	4,59	4,98	4,71	4,73	4,7	4,55	4,6	4,61
PrdcSize	4	3,89	3,84	4,22	4,11	4,01	4,2	3,81	3,94	4,02
Origin	5,22	5,33	5,26	5,49	5,13	5,76	5,46	5,21	5,08	5,35
PlstConsum	4,94	5,05	5,08	5,32	5,24	5,41	5,23	5,17	5,04	5,23
Waste	4,55	4,56	4,49	4,95	4,9	4,81	4,98	4,48	4,6	4,76
NbControSubst	4,83	5,21	5,1	5,22	5,09	5,54	5,01	5,29	5,15	5,12
ProcessInfo	4,41	4,33	4,42	4,72	4,5	4,8	4,76	4,28	4,29	4,56
Ctrl	4,39	4,26	4,23	4,74	4,55	4,55	4,79	4,14	4,26	4,53
TraceTrk	4,56	4,49	4,41	5,05	4,64	4,91	4,94	4,41	4,21	4,87
Shoptype	4,78	4,86	4,93	5,13	4,98	5,06	5,11	4,91	4,89	4,99
LocalProd	5,11	5,45	5,31	5,49	5,15	5,75	5,43	5,43	5,15	5,45
PrvdTime	4,19	3,86	4,02	4,21	4,28	4,04	4,5	3,82	3,73	4,16
DirectCt	4,68	4,33	4,61	4,75	4,69	4,78	4,88	4,35	4,24	4,76
Recyclability	4,98	5,06	5,13	5,39	5,14	5,51	5,2	5,29	5,05	5,29
WorkCond	4,52	4,74	4,47	4,94	4,65	5,04	4,89	4,57	4,5	4,81
ProfitRep	4,31	4,28	4,27	4,56	4,52	4,63	4,62	4,17	4,27	4,46
PollutGHG	4,56	4,73	4,55	5,03	4,8	5,04	4,99	4,79	4,63	4,85
NatResConsum	4,76	4,89	4,76	5,12	4,88	5,28	5,08	4,9	4,85	4,95

A first element that we observed in this paper is the fact that the average of the scoring values provided by the responding end-users remain quite close to the middle of the response scale. Indeed, on a 7-step scale which ranks from 1 to 7, average response values are never inferior to 3 nor superior to 6, thus showing an average consumer interest that is significant in most cases but without a general consensus towards very high or very low ratings. However, these average ratings prove that end-users show a significant sensitiveness to most indicators.

Secondly, we should notice that some supply chain characteristics studied are generating a complete consensus among all end-user categories, without any significant clash between end-

user categories being observed through the T-test for every discrimination criterion. These consensual characteristics are presented as follows:

- Some of these characteristics get a total consensus for both food and non-food supply chains. These supply chain characteristics are producer size, product recyclability and the consumption of natural resources. The consensus regarding recyclability and natural resource consumption is a consensus of high rating since average ratings provided are ranging between 4.40 and 5.39. The average ratings for producer size are lower, with average ratings ranging from 3.81 to 4.84, with lower ratings for non-food supply chains (3.81 to 4.02 vs 4.14 to 4.84 for food). As a matter of fact, end-users consensually pay more attention to this factor in food supply chains than in non-food ones.
- Other supply chain characteristics that generate consensus among all end-user categories generate it for only one type pf supply chain (only for food or only for non-food supply chains). In the case of food supply chains, these consensual characteristics are the number of supply chain intermediaries, the origin of the product, the information about the manufacturing process and the direct contact between producer and end-user. All these supply chain characteristics show a consensus of high rating since average ratings range from 4.43 to 5.09, which means that all end-user categories care significantly about these elements.
- Regarding supply chain characteristics that create a general consensus only for non-food supply chains, these are plastic consumption, use of controversial substances, type of shop and the repartition of profit margins between supply chain actors. All these supply chain characteristics have recorded high ratings, with average ratings ranging from 4.17 to 5.54.

As a third finding step, we will examine the sensitiveness clashes of end-users corresponding to each criterion for the various supply chain characteristics in a synthetic way.

Socio-professional category

The socio-professional categories were defined according to the French national grid (“categories socioprofessionnelles”), designed by the national institute for statistics and economic studies. We simplified this grid by gathering the numerous categories that it defined

into two aggregated categories: jobs requiring mild skills (workers, employees…) and those requiring high skills (managers, company owners, teachers…).

As a matter of fact, we observed more T-test-based clashes between high-skilled and mild-skilled people for food supply chains than for non-food supply chains. Indeed, for food supply chains, clashes indicate that mild-skilled people pay more attention than high-skilled ones to certification neutrality, use of subcontracting, providing time and work conditions, which may sound a bit counter-intuitive for certification neutrality. For non-food supply chains, mild-skilled people tend to show more interest in storage conditions than high-skilled people, while a general consensus appears for all other supply chain characteristics. All clashes indicate a more important focus of mild-skilled people to the supply chain characteristics considered.

In both supply chain types, shortage risk appears to be lowly rated for both job categories, which shows a general low sensitiveness to this supply chain characteristic. This element seems counter-intuitive in comparison to the growing focus that supply chain managers tend to develop today regarding shortage risk management. However, we should notice that the data was gathered before the covid crisis, which caused shortages to appear in a more visible way than before.

Age

Numerous clashes appear concerning age, both for food and non-food supply chains. These clashes are not similar for food and non-food supply chains.

Regarding food supply chains, the clashes show that older people tend to care much more about certification neutrality, controlling, tracing & tracking, shop type, local production, work conditions, profit repartition and greenhouse gas emissions, in each case with average ratings being superior to 4.13 and reaching up to 5.64. All other supply chain characteristics create consensus.

Regarding non-food supply chains, some clashes appeared to be similar: certification neutrality, controlling, tracing & tracking, work conditions and pollution show a significantly higher interest for older people, like in the case of food supply chains. Other clashes appear to be specific to non-food supply chains. These are concerning shortage risk, miles and wasting, with older people paying more attention to these supply chain characteristics than younger people. In the case of shortage risk, ratings appear to be low but the rating provided by older people is very close to 4, which is the medium value of the rating scale.

In both cases (food and non-food), the only supply chain characteristics that shows low values (both age categories under a rating of 4) is shortage risk. This indicates that people seem not to be very sensible to this risk. The highest ratings (over 5 for both age classes) concern recyclability, local production, number of controversial substances, plastic consumption and origin in both food and non-food supply chains.

Wealth

The wealth criterion only shows a few clashes (3 for food supply chains and 2 for non-food supply chains), meaning that this criterion is not really discriminating from a general point of view. Like before, low values appear only for shortage risk and with general consensus.

For food supply chains, clashes appear for plastic consumption, controversial substances and local production, with wealthier people rating these three supply chain characteristics more than less wealthy people. All other characteristics show a general consensus with rather high ratings (over 4), apart from shortage risk (general consensus for a low rating).

For non-food supply chain, the clash concerning local production also appears. The other cash concerns origin. In both clashes, average ratings are higher for wealthier people than. Regarding ratings for consensual supply chain characteristics, things appear to be similar for food and non-food supply chains (high ratings except for shortage risk).

Diploma

The diploma criterion shows huge differences between food and non-food supply chains, with few clashes for food supply chains, showing a high level of consensus, and lots of clashes for non-food supply chains.

For food supply chains, three supply chain characteristics show ratings that are higher for people with lower studies than for people with higher studies. These are providing time, shortage risk and storage conditions. One clash, which concerns the use of subcontracting, appeared to show a significantly higher rating for people with higher studies than for people with lower studies.

In the case of non-food supply chains, clashes concern certification neutrality, use of subcontracting, number of intermediaries, storage conditions, shortage risk, wasting, process information provided to the end-user, controlling, tracing & tracking, providing time and direct contact with the producer. All these clashes show a higher rating for people with lower studies than for people with higher studies.

Clashes concerning storage conditions, shortage risk and providing time appear similarly in the cases of food and non-food supply chains while the clash concerning the use of subcontracting appears differently in food and non-food supply chains. People with lower studies rate this factor higher than people with higher studies in the case of non-food supply chains, while the contrary occurs in the case of food supply chains. This shows a tendency for people with higher studies to prefer shorter supply chains for the food that they buy but not really for other products.

Like before, shortage risk is rather lowly rated, but in the case of non-food supply chains, a rating superior to 4 appears for people with lower studies, showing that they care significantly about this for non-food products.

Family status

Clashes are rare in the case of family status, which means that this criterion is not really discriminating. Indeed, we can observe only two clashes for food supply chains and three for non-food supply chains.

In the case of food supply chains, procurement methods and product miles are the only clashes, with family rating these supply chain characteristics much more than singles. Procurement methods are lowly rated by both singles and families, with ratings of 3.22 and 3.68 respectively (but the clash between both categories exists and was actually measured).

Concerning non-food supply chains, clashes concern other supply chains characteristics (no shared clash between food and non-food supply chains). These are storage conditions, shortage risk and tracing and tracking, with families rating these characteristics more than singles. Regarding shortage risk, both end-user categories gave a low rating (inferior to 4), with singles providing a significantly lower rating. This means that, despite the clash, this supply chain characteristic doesn't draw much attention from the end-users.

DISCUSSION

The end-users are sensitive to almost all the characteristics of supply chain.

Firstly, consumers seem not to be really sensitive to shortage risk even if supply chain management literature stresses on it. It has been a main concern of producers and retailers for

a long time. However, if consumers with higher diploma, Socio-professional level and being single do not care much about shortage risks, costumers with family and lower diploma tends to be influenced by it. Level of income is also less relevant than other criterion to explain sensitiveness to supply chain. Therefore, it is really important for producers and retailers to integrate such sensitives. Especially, for those actors that are the main focus of end-consumer's attention. Some characteristics are really sensitive: origin of products and local production for non-food products and origin, number of controversial substances local production, direct contact to producer, recyclability and consumption of natural resources. Their sensitiveness is greater when it comes to food supply chain than non-food supply chain.

The research highlights the fact that wealthier people are sensitive to different characteristics of supply chain depending if it is food or non-food supply chains. For food supply chains, they are sensitive to plastic use, local production and controversial substances and for non-food supply chain they are sensitive to origin and local production. Such dimensions are particularly important to higher income consumer. Finally, the main discriminating criteria are age and diploma., as it impacts consumer sensibilities in many ways. Older people are overly more sensitive to many characteristics of supply chain than younger ones (8 criteria for food supply chains and 10 criteria for non-food supply chains). Their awareness of the supply chain complexity and the concern about it is higher expressed by people older than 45 years old. Higher diploma level, however, decreases the sensitiveness of people on many characteristics of supply chains, especially of non-food supply chain, such as use of subcontracting, number of intermediaries, storage conditions, shortage risks providing time. A lot of those characteristics were qualified as complex, complicated, unpractical by respondents during focus group. Knowledge on SC's processes seems to decrease the negative judgment on such complex organisation. Therefore, transparency and information's sharing on SC could be a way for SC's actors to accompany the change of public opinion rather than endure it.

RESEARCH PERSPECTIVES

Providing an evaluation of consumer sensitiveness to supply chain should permit to identify his level of sensitiveness on different aspects of supply chain and identify the shifting toward such or such aspects. Our research clearly identified importance of the origin of products but also on local and direct supply chains, health concern and environmental concerns (recyclability and natural resources). It will be now important to explore the capacity of end-consumers to act on such sensitiveness first by research or asking for more information on supply chain, then by

adapting their purchase behaviour. Moreover, consumer sensitiveness surely evolved during the COVID-19 crisis period where supply chains and logistics were highlighted to public through several examples of successes and difficulties, thus appearing more clearly to the customer. A second set of surveys should be addressed to consumers in order to compare and actualise it. Furthermore, sensitiveness also depends on cultural characteristics of SCs and cultural characteristics of end-consumers and their consumption behaviours. A comparative research including questioning different countries consumer would be beneficial to research.

Finally, this paper emphasizes the necessity for supply chain managers to consider end-user opinions while designing new supply chains generally speaking, as we observed that end-users tend to pay attention to many of the 24 supply chain characteristics that were tested. Therefore, studies should be carried out on how to design labelling systems that would be clear while considering the numerous supply chain characteristics that end-users focus on.

REFERENCES

Aguilar, F.X., Vlosky, R.P., 2007. Consumer willingness to pay price premiums for environmentally certified wood products in the U.S. Forest Policy and Economics 9, 1100–1112. https://doi.org/10.1016/j.forpol.2006.12.001

Antil, J.H., 1984. Socially Responsible Consumers: Profile and Implications for Public Policy 22, 19–39.

Aussadavut, D., Ming, F., Apurva, J., Moinzadeh, K., 2008. A supply chain model with direct and retail channels. European Journal of Operational Research 187, 691–718. https://doi.org/10.1016/j.ejor.2006.05.044

Badot, O., Moati, P., 2020. Utopies et consommation, Éditions EMS.

Bahn†, K.D., Granzin, K.L., Tokman, M., 2015. End-User Contribution to Logistics Value Co-Creation: A Series of Exploratory Studies. Journal of Marketing Channels 22, 3–26. https://doi.org/10.1080/1046669X.2015.978694

Borgne, G.L., 2017. Sensibilité du consommateur au gaspillage alimentaire : conceptualisation, antécédents, et conséquences. Thèse de doctorat. Université de Montpellier.

Borgne, G.L., Sirieix, L., Costa, S., 2015. La sensibilité du consommateur au gaspillage alimentaire : proposition d'une échelle de mesure, in: 31e Congrès international de l'Association Française de Marketing, AFM. Presented at the 31e Congrèsinternationaldel'Association Française de Marketing, AFM, Marrakech, Maroc, p. 23.

Braunsberger, K., Buckler, B., 2011. What motivates consumers to participate in boycotts: Lessons from the ongoing Canadian seafood boycott. Journal of Business Research 64, 96–102.

Cai, Z., Aguilar, F.X., 2013. Meta-analysis of consumer's willingness-to-pay premiums for certified wood products. Journal of Forest Economics 19, 15–31. https://doi.org/10.1016/j.jfe.2012.06.007

Carbone, V., Rouquet, A., Roussat, C., 2016. « Emporté par la foule »: Quelles logistiques pour la consommation collaborative ? Revue Française de Gestion 42, 105–122. https://doi.org/10.3166/rfg.2016.00055
Desjeux, D., Moati, P., 2016, Consommations émergentes. La fin d'une société de consommation ?, Bord de l'eau (Le), Paris.
Esper, Peinkofer, 2017. Consumer-Based Supply Chain Management Performance Research: A Structured Literature Review. Transportation Journal 56, 395-428. https://doi.org/10.5325/transportationj.56.4.0395
Fady, A., Renaudin, V., Vyt, D., 2007. Le merchandising, 6e éd. ed, Collection Gestion. Vuibert, Paris.
Farr, R., Tafoya, L., 1992. Western and Hungarian representations of individualism: A comparative study based on group discussions and social dilemmas. Unpublished manuscript.
Fathi, E., Zailani, S., Iranmanesh, M., Kanapathy, K., 2016. Drivers of consumers' willingness to pay for halal logistics. British Food Journal 118, 464–479. https://doi.org/10.1108/BFJ-06-2015-021
François-Lecompte, A., Valette-Florence, P., 2006. Mieux connaître le consommateur socialement responsable. DM 41, 67–79. https://doi.org/10.7193/DM.041.67.79
Froloff-Brouche, L., 1994. L'influence de la promotion des ventes sur le consommateur : Un essai de conceptualisation. Recherche et Applications en Marketing (French Edition) 9, 45–64. https://doi.org/10.1177/076737019400900303
Garrouch, K., Mzoughi, M.N., Slimane, I.B., Bouhlel, O.B., 2011. An Investigation into the Consumers' Sensitivity of the Logistics Efficiency. International Journal of Business Administration 2, 2, 114-128. https://doi.org/10.5430/ijba.v2n2p114
Ghosh, D., Shah, J., 2015. Supply chain analysis under green sensitive consumer demand and cost sharing contract. International Journal of Production Economics 164, 319–329. https://doi.org/10.1016/j.ijpe.2014.11.005
Giraud, G., Halawany, R., 2006. Consumers' perception of food traceability in Europe, in: 98 Th EAAE Seminar 'Marketing Dynamics within the Global Trading System: New Perspectives', Chania, Crete, Greece as in: 29 June – 2 July, 2006. Presented at the 98 th EAAE Seminar 'Marketing Dynamics within the Global Trading System: New Perspectives', Chania, Crete, Greece as in: 29 June – 2 July, 2006, Crete, Greece.
Higie, R.A., Feick, L.F., Price, L.L., 1987. Types and amount of word-of-mouth communications about retailers. Journal of Retailing 63, 260–278.
INSEE, 2019, « France, Portrait social », Editions de l'INSEE, 212-213
Jiménez-Guerrero, J.F., Pérez-Mesa, J.C., de Burgos-Jiménez, J., Piedra-Muñoz, L., 2018. Considering the consumer in the design of a supply chain of perishables. International Food and Agribusiness Management Review 21, 525–542. https://doi.org/10.22434/IFAMR2017.0019
Kapferer, J.-N., Laurent, G., 1983. Comment mesurer le degré d'implication des consommateurs (No. hal-00786802), Post-Print, Post-Print. HAL.
Kitzinger, J., Markova, I., Kalampalikis, N., 2004. Qu'est-ce que les focus groups ? Bulletin de psychologie - Groupe d'étude de psychologie 57, 237–243.
Lichtlé, M.C., Manzano, M., Plichon, V., 2000. La sensibilité du consommateur à la logistique : mise en évidence des variables déterminantes. Actes des 3èmes Rencontres Internationales de la Recherche en Logistique, Trois-Rivières.
Maloney, M.P., Ward, M.P., Braucht, G.N., 1975. A revised scale for the measurement of ecological attitudes and knowledge. American Psychologist 30, 787–790. https://doi.org/10.1037/h0084394

Mundler, P., 2007. Les Associations pour le maintien de l'agriculture paysanne (AMAP) en Rhône-Alpes, entre marché et solidarité. Ruralia. Sciences sociales et mondes ruraux contemporains, 20, 1-24.

Rouquet, A., Goudarzi, K., Henriquez, T., 2017. The company-customer transfer of logistics activities. International Journal of Operations & Production Management 37, 321–342. https://doi.org/10.1108/IJOPM-01-2015-0049

Szabó, I., Lehota, J., & Magda, R. (2019). Purchase of fresh fruits and vegetables through box schemes in Hungary–opportunities and hindering factors on the way to sustainability. Visegrad Journal on Bioeconomy and Sustainable Development, 8(1), 37-41.

Taghikhah, F., Voinov, A., & Shukla, N. (2019). Extending the supply chain to address sustainability. Journal of cleaner production, 229, 652-666.

Wang, S., & Alexander, P. (2018). The factors of consumer confidence recovery after scandals in food supply chain safety. Asia Pacific Journal of Marketing and Logistics 30-5, 1379-1400

Xu, L., Wang, C., Miao, Z., Chen, J., 2019. Governmental subsidy policies and supply chain decisions with carbon emission limit and consumer's environmental awareness. RAIRO-Oper. Res. 53, 1675–1689. https://doi.org/10.1051/ro/2018094

Yan, B., Chen, X., Cai, C., & Guan, S. (2020). Supply chain coordination of fresh agricultural products based on consumer behavior. Computers & Operations Research, 123, 105038.

Zemanek, J.E., Tran, T.P., 2021. Two decades of the Journal of Marketing Channels' research: Providing direction for the future of inter-organizational research. Journal of Inter-Organizational Relationships 27, 2–14. https://doi.org/10.1080/26943980.2021.1973850

Zhang, L., Wang, J., You, J., 2015. Consumer environmental awareness and channel coordination with two substitutable products. European Journal of Operational Research 241, 63–73. https://doi.org/10.1016/j.ejor.2014.07.043