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Online grocery shoppers due to the Covid-19 pandemic - An analysis of demographic and household characteristics

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Abstract

As a result of the Covid-19 pandemic, consumers in many countries have increasingly adopted online grocery shopping. This study aims to investigate the demographic and household characteristics of these adopters, by analyzing the data from a large-scale survey (n=2568) in Finland. The results indicate that a typical adopter of online grocery shopping due to Covid-19 is less than 45 years old, and one with some concern over own health or that of a loved one. The more likely adopters also have a higher household size, higher household earnings, and/or they are more likely to live in the capital region of the country. Further, the results indicate that in the older age group (45+), women and those with some degree of worry over own health and/or that of a loved one are a little more likely to be adopters than the rest.

Keywords: online grocery shopping; eCommerce; innovation adoption; consumer behavior; Covid-19

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1. Introduction

Consumer adoption of online shopping has increased substantially in the world in recent years. Within the European Union countries, the average online shopping usage rate, calculated in terms of purchases of products and services in the past three months, was 53% among consumers in 2019, while in 2009 the same rate was 28% [6]. Online grocery shopping has in turn shown quite modest numbers of total grocery sales in countries such as Finland, where the present study was conducted. However, the Covid-19 pandemic seems to have boosted consumer migration from conventional grocery stores towards online food shopping [7, 16]. For example, the share of online grocery sales of a major grocery retail conglomerate on the Finnish market, the K-chain, increased from mere 1% of total grocery sales in January 2020 to 5.9% in April 2020, to drop back to 1.8% in July 2020 and up again to 4.1% in December 2020 [12, based on data from the K-chain]. The online sales curve has, more or less, followed the same path as the Covid-19 incidence rate in the country. Nevertheless, general industry predictions suggest that the online sales numbers will remain significantly higher after the pandemic than before, even if online sales may not completely change the food retail market, the existing business models and/or distribution chains. The market structure in Finland has, however, clearly evolved during the pandemic to include new types of online food service concepts and home deliveries by different types of retailers, wholesalers, restaurants, and logistics companies [7]. Previous studies on consumer adoption and use of online grocery shopping [e.g. 21, 11, 19, 17, 1, 20, 5, 3, 15, 8] have been mainly conducted before the Covid-19 pandemic. Therefore, it seems timely to better understand consumer adoption of online grocery shopping due to the Covid-19 pandemic.

The present study aims to explore demographic and household characteristics as underlying variables for the adoption of online grocery shopping due to the Covid-19 crisis in Finland, based on a survey conducted in the fall of 2020. Understanding the characteristics of an adopter is important for retailers and other types of food providers so that they know whom to target for further online shopping. A critical mass of converters to online grocery shopping is needed before major investments into development of the business models, new infrastructure, and distribution channels can be justified. Furthermore, the study contributes to present knowledge on the adoption of online grocery shopping, complementing prior studies into personal and household characteristics as predictors of online grocery shopping.

First, we will present previous studies on consumer adoption of online grocery shopping, second the method of this study is described, third the results from the survey are presented, and finally the results are discussed and some conclusions are drawn and ideas for future research presented.

2. Consumer adoption of online grocery shopping

Hand et al. [9] categorized shopping for groceries online to be a discontinuous innovation, meaning that the adoption process may be lengthier and perhaps more troublesome than continuous or dynamically continuous innovations. Underlying factors for consumer adoption of online grocery shopping have been quite extensively researched. Many studies have adopted Diffusion of Innovation (DoI) theory [e.g. 21, 11, 20, 8], Theory of Planned Behavior (TPB) [e.g. 10, 3, 15, 18], Technology Acceptance Model (TAM) [e.g. 1, 5, 3, 18] and the Motivation-Opportunity-Ability (MOA) model [e.g. 19] to better understand the adoption. Factors such as time pressure [21], social norms [3, 5], attitudes [1, 3], relative advantage [10], perceived risks [13, 5] and perceived ease of use [5, 11] have been identified as potential factors that influence the adoption and use rates of online grocery shopping in different countries and contexts.

Some of the studies have also identified different types of online grocery shoppers [e.g. 11, 17, 20, 8, 3]. Frank and Peschel [8] identified Price-oriented, Time optimizers and Cautious shoppers of online groceries. They found that women are less likely to adopt online grocery shopping and that household income plays a role. Likewise, Hansen [11] concluded that adopters have higher household incomes than non-adopters. Young professionals and working mothers were identified by Seitz et al. [17] to be attractive target groups for online food retail. Furthermore, Van Droogenbroeck & Van Hove [19] suggest that personal and household characteristics have an impact on the adoption and use of online grocery shopping. They found that especially households with young children and full-time working parents should be targeted by supermarkets that offer online grocery shopping capabilities. Brand et al. [3] again identified two consumer segments that are clearly attracted to online grocery shopping, the Intensive urbanities and

Online omnivores. Intensive urbanities include more men, younger shoppers, and they live in the city center, often with children. They are highly educated and earn significantly more money than an average shopper. Online omnivores are slightly older with an average income, and have slightly poorer access to a car. Omnivores are spread out in different regions. Dannenberg et al. [4] highlighted that consumers in more rural areas may be provided with poorer online grocery shopping capabilities than those in more urban areas and, thus, the type of region may impact adoption of online grocery shopping. Wang & Somogyi [20] further identified a segment of online-food pioneers, who are more likely to have a higher income, a better job position, be married and belonging to the age bracket 31-40 years.

The current study aims to understand the demographic and household characteristics of Finnish consumers who have adopted online grocery shopping due to Covid-19. Hence, we will in this study focus on the following variables; Gender, Age, Occupation, Region, Number of household members and Household income. As an additional variable we included respondent's perceived worry over their health, or the health of their loved ones, due to Covid-19. It is reasonable to assume that both restrictions and/or strong recommendations from authorities for social distancing and consumers' perceptions of related health risks are likely to influence the adoption of online grocery shopping. With the help of these variables we expect to identify the relevant characteristics of consumers who have been more likely to adopt online grocery shopping amid the Covid-19 crisis.

3. Data collection, measures and data analysis

The survey data was collected during 19.10. - 28.10.2020 from a consumer panel, by the Finnish retail research foundation and the marketing research company Taloustutkimus. The survey data was made available for research purposes (data: [22]) and has thus been used for this study. In total 2568 Finnish consumers were investigated. The sample is demographically representative, according to age, gender and sub-regional quotas, of a Finnish adult population, and therefore ideal for the present study.

The questionnaire included a large set of questions regarding consumers' perceptions of different retail topics. For the purpose of this study we focused on the demographic and household characteristics and the items on respondents' adoption of online grocery shopping due to Covid-19, and related health concerns. The adoption of online grocery shopping due to Covid-19 was measured with a question on whether the pandemic had made them buy groceries online, and measured on a scale from 1 (=completely disagree) to 7 (=completely agree). Of the respondents 268 (10.4%) either completely (= 7) or nearly completely (= 6) agreed with a statement that they had, because of Covid-19, bought groceries online. Of the respondents 1854 (72.2%) reported that they completely or almost completely disagreed (=1 or 2) with the statement that the Covid-19 pandemic had prompted them to buy groceries online. The former we grouped together and refer to as "Adopters due to Covid-19" and the latter we grouped together and refer to as "Non-adopters due to Covid-19". Those responding anything in the mid-range from 3-5, in total 446 (17.2%) we treated as missing values, in order to identify distinct adopters and distinct non-adopters of online grocery shopping due to Covid-19. Health worries were measured with two questions "I have been particularly concerned about my own health" and "I have been particularly concerned about the health of my loved ones", both measured on a scale from 1 (=completely disagree) to 7 (=completely agree). The health worry variables were combined into a composite score (α= 0.74).

The number of household members was measured using eight groups, from "1" to "7 or more" and "can't say". We excluded the last group and divided the variable into two categories, "less than four members" and "four or more members". The rationale behind this was that household sizes are small in Finland and thus a household with four or more represents a larger than an average household. Similarly, we divided household income into two variables "less than 50.000EUR" and "50.000EUR or more". Region was coded according to eight municipality regions, but for the purposes of this study we divided Region into "Capital region" and "Other". The rationale for this was that there is a rich supply of different types of online grocery shopping services available in the capital region and the capital region has throughout the pandemic had the highest Covid-19 incidence rate in the country. Age was grouped into four categories of 18-29, 30-44, 45-59, and 60+. Gender was coded as male or female and Occupation was divided into six groups. See Table 1 for descriptive statistics of the variables.

Binary logistic regression in IBM SPSS™ 27 was used for statistical analysis, as the dependent variable (Adopters vs. Non-adopters due to Covid-19) is binary whereas the independent variables are both categorial (demographic and household characteristics) and continuous (Health worry).

Table 1. Demographic and household characteristics; the first percentage represents the distribution of all respondents, non-adopters, and adopters, whereas the latter is the ratio of respondents with a given characteristic of all respondents, e.g. non-adopter males of all male respondents

Characteristics	All (N= 2568)	Non-adopters of online food shopping due to COVID-19 (N=1854)	Adopters of online food shopping due to COVID-19 (N=268)
Gender			
Male	1283 (50%)	887 (47.8%; 69.1%)	129 (48.1%; 10.1%)
Female	1285 (50%)	967 (52.2%; 75.3%)	139 (51.9%; 10.8%)
Age			
18 – 29	578 (22.5%)	347 (18.7%; 60.0%)	81 (30.2%; 14.0%)
30 – 44	648 (25.2%)	422 (22.8%; 65.1%)	75 (28%; 11.6%)
45 – 59	774 (30.1%)	616 (33.2%; 79.6%)	62 (23.1%; 8.0%)
60+	568 (22.1%)	469 (25.3%; 82.6%)	50 (18.7%; 8.8%)
Occupation			
Students	468 (18.2%)	302 (16.3%; 64.5%)	57 (21.3%; 12.2%)
Home moms/dads	33 (1.3%)	22 (1.2%; 66.7%)	5 (1.9%; 15.2%)
Part-time working	212 (8.3%)	146 (7.9%; 68.9%)	25 (9.3%; 11.8%)
Full-time working	1173 (45.7%)	855 (46.1%; 72.9%)	112 (41.8%; 9.5%)
Pensioneers	483 (18.8%)	384 (20.7%; 79.5%)	49 (18.3%; 10.1%)
Unemployed	199 (7.7%)	145 (7.8%; 72.9%)	20 (7.5%; 10.0%)
Household income			
< 50.000 EUR	1288 (50.2%)	932 (50.3%; 72.4%)	127 (47.4%; 9.9%)
50.000+ EUR	873 (34.0%)	622 (33.6%; 71.2%)	106 (37.3%; 12.1%)
I don't want to answer (Missing)	407 (15.8%)	300 (16.1%)	35 (13.1%)
Household members			
< 4 members	2184 (85%)	1611 (86.9%; 73.8%)	206 (76.9%; 9.4%)
4+ members	375 (14.6%)	240 (12.9%; 64.0%)	61 (22.7%; 16.3%)
Can't say (Missing)	9 (0.4%)	3 (0.2%)	1 (0.4%)
Region			
Capital region	824 (32.1%)	554 (29.9%; 67.2%)	113 (42.2%; 13.7%)
Other	1744 (67.9%)	1300 (70.1%; 74.5%)	155 (57.8%; 8.9%)
Health worry	M=4.23, SD=1.58	M=4.07, SD=1.61	M=5.17, SD=1.42

4. Results

Logistic regression analyses were performed to investigate the role of demographic and household characteristics, as well as health worry, on consumer adoption of online grocery shopping due to Covid-19. See Table 2. for a model that included all independent variables. The model was statistically significant $\chi 2$ (13, N = 1781) = 198.881, p <. .001, indicating that it is able to distinguish between non-adopters and adopters of online grocery shopping due to Covid-19. The model explained 19.6% (Nagelkerke R^2) of the variance in non-adoption vs. adoption, and correctly classified 87.6% of the cases. In total 1781 (84% of 2122) of non-adopters and adopters were included in the model due to missing values for household income and household members, and we further omitted the category home moms/dads

because of too few observations. Table 2 displays an analysis where all independent variables were simultaneously in the model. The analysis shows that gender and occupation were not significant predictors. The best positive predictors

Table 2. Impact on adoption of online grocery shopping due to Covid-19

Independent variables	B (S.E.)	*p*	Odds ratio (OR)	95% CI for OR Lower – Upper
Gender				
Male	0.19 (.15)	.208	1.21	0.90 – 1.64
Female	Ref.			
Age		<.001		
18 – 29	1.34 (.32)	<.001	3.83	2.04 – 7.20
30 – 44	0.95 (.30)	.001	2.60	1.45 – 4.66
45 – 59	0.32 (.28)	.261	1.37	0.79 – 2.38
60+	Ref.			
Occupation		.376		
Students	-0.22 (.35)	.532	0.80	0.40 – 1.60
Home moms/dads	Omitted, too few observations			
Part-time working	0.15 (.39)	.701	1.16	0.54 – 2.47
Full-time working	-0.27 (.32)	.402	0.76	0.41 – 1.43
Pensioneers	0.33 (.38)	.390	1.38	0.66 – 2.91
Unemployed	Ref.			
Household income				
< 50.000 EUR	Ref.			
50.000+ EUR	0.46 (.17)	.008	1.58	1.13 – 2.23
Household members				
< 4 members	Ref.			
4+ members	0.68 (.21)	.001	1.97	1.31 – 2.96
Region				
Capital region	0.49 (.16)	.002	1.63	1.20 - 2.23
Other	Ref.			
Health worry	0.59 (.05)	.001	1.80	1.62 – 2.01
Constant	-5.79 (.50)	<.001	0.00	
Model summary				
Nagelkerke R^2	0.196			
Goodness of fit				
Hosmer and Lemeshow	$\chi 2 = 5.699$	$p = .681$		
Classification	Observations Predicted	% Correct	Overall %	
Non-adopters	1550 11	99.3	87.6	
Adopters	231 21	9.1		

were the age groups 18-29 (*OR* 3.83) and 30-44 (*OR* 2.60) in reference to the group 60+, whereas the group 45-59 was not statistically significant. Overlapping confidence intervals suggest, however, that we cannot clearly distinguish the groups from each other. Health worry (*OR* 1.80), a higher number of household members (*OR* 1.97), higher household income (*OR* 1.58) and living in the capital region (*OR* 1.63) all predicted adoption of online grocery shopping independently.

We also tested a model, where we excluded gender, occupation as non-significant, and household income and household members due to a high number of missing values. The model was statistically significant $\chi 2$ (5, N = 2118) = 177.103, $p <$ .001, indicating that it was able to distinguish between non-adopters and adopters. The model explained 14.9% (Nagelkerke R^2) of the variance in non-adoption vs. adoption, and correctly classified 87.5% of the cases. In this equation the age groups 18-29 (*OR* 2.71) and 30-44 (*OR* 2.42) continued to be the best predictors. Living in the capital region (*OR* 1.58) and health worry (*OR* 1.69) remained almost the same.

In our further analysis we only included older (45+) respondents in order to better understand what prompted this group to adopt online shopping. In this group a total of 112 (8.4%) respondents were adopters and 1085 (80.8%) non-adopters. We included the same independent variables as before (save for age) in the analysis. The regression model was statistically significant $\chi 2$ (10, N = 1000) = 38.073, $p <$ .001 explaining 7.9% (Nagelkerke R^2) of the variance in non-adoption vs. adoption, and classified correctly 90.2% of the cases. The only two significant predictors were health worry (*OR* 1.42, $p <$.001) and gender (*OR* 0.58, p=0.015), suggesting that women were more likely adopters of online grocery shopping than men, and those with health-related concerns were more likely adopters than those who were less concerned.

5. Discussion and conclusion

In this study we were able to identify characteristics of adopters of online grocery shopping due to Covid-19. The model with all independent variables explained 19.6% of the variance in adoption vs. non-adoption. This indicates that demographic and household characteristics, and health-related worries, were reasonable identifiers of adopters of online grocery shopping due to Covid-19. This is in line with Van Droogenbroeck & Van Hove [19] that sociodemographic variables are fair predictors of online grocery adoption. Nevertheless, adding other types of adoption variables such as relative advantage, complexity, social norm and perceived risks, to the equation could increase the coefficient of determination.

Overall, the results indicate that a typical adopter of online grocery shopping due to Covid-19 is less than 45 years old. Not surprisingly, those with some concern for own health or that of a loved one were more likely adopters. Furthermore, a more likely adopter in Finland has a higher than average household size (4+ members), higher household earnings (50.000EUR+) and/or is more likely to live in the capital region. These characteristics can inform retailers and other food providers who wish to fuel online buying, and target their marketing efforts. The results further indicate that in the older age group (45+ years), women more than men and those worried about own health and/or that of a loved one may be more likely adopters of online shopping than the rest. Occupation, household income, household size, and region did, however, not seem to matter for 45+ adopters.

Gender has been found to both predict [8, 3] and not predict [20, 19] online grocery shopping adoption. In the present study gender had no impact on online grocery adoption due to Covid-19, except for in the older group of 45+ consumers, in which women were slightly more likely adopters. Thus, gender may be differently predictive in different age groups. Younger shoppers [3] and younger professionals [17] have been identified as more likely to shop for groceries online, which the present study supports. The results indicated that younger shoppers were the most likely adopters due to Covid-19. Occupation again was not a significant predictor in this study.

Households with higher income have also been found by other studies to separate adopters and non-adopters [11, 20, 3] and this study is no exception. Likewise, a larger household size has, like in this study, been found to predict online grocery shopping, especially families with young children have been identified as likely adopters [19, 3]. This may mean that families with parents' working remotely, and with school children studying from home, have been an important group for adoption amid the pandemic. Also, urban living has been identified in previous studies as a predictor [3], and here living in the capital region indicated higher adoption compared to other regions in the country. This may, as discussed earlier, result from rich opportunities for online grocery shopping in the capital region and/or

the higher Covid-19 incidence rate in the region throughout the pandemic. As a result, increased urban online shopping may not only reconfigure the urban residents' shopping behavior but also the urban landscape, where van-based grocery deliveries and food couriers on cycles are becoming a visible part of the city landscape, thereby helping to "normalize" new ways of shopping groceries, potentially attracting new customers and changing the market further [2].

Health worry was, as expected, identified as a predictor of adoption amid the Covid-19 pandemic, but it did not stand out as the most influential predictor. This could indicate that when fears over Covid-19 ease, many of the adopters may stay with their online shopping routines, especially if these have been in place for a longer time, and especially if online shopping has entailed positive experiences and unforeseen benefits. This may, however, not apply to all customer segments. As suggested in the literature [17] elderly shoppers (65+) may perceive conventional grocery shopping to be a free-time activity and a way to see people and may therefore revert to their prior shopping routines. According to Hand et al. [9] the adoption of online grocery shopping seems to be situational and may end when the triggering conditions change. As there are substantial benefits involved in online shopping and switching costs involved in reverting to old routines, we could see more of a hybrid shopping behavior evolving post pandemic, where both online and offline, rather than in a single channel are used, in line with Melis et al. [14].

5.1. Conclusions, limitations and future studies

The first conclusion from this study is that demographic and household characteristics, and health worries, are reasonable drivers of online grocery shopping adoption due to Covid-19. Secondly, the underlying factors for the adoption have largely followed the same underlying demographic and household characteristics as before the pandemic. Nevertheless, some differences in comparison to earlier studies were found. Occupation did not matter and gender only mattered in the older age group (45+). Our third conclusion is that health worry was a significant driver of adoption, but not the only one and not even the most important one. This suggests that we may see a higher level of online grocery shopping, and an online grocery market that continues to develop, after the pandemic.

This study is limited to a Finnish context. Online grocery shopping in Finland is still in early stages, even if it has clearly evolved during recent years and especially amid the pandemic. Its infancy may explain why the adopters due to Covid-19 are primarily of similar characters as those identified in studies conducted before the pandemic. In more mature online grocery shopping markets this may be different and, therefore, studies on different markets with different market characteristics would be of value. We used a data set collected by the Finnish retail research foundation and the market research company Taloustutkimus, from which we selected pre-defined variables for the purpose of this study. There were missing values in the data set, especially for household income. The sample was, nonetheless, large and the logistic regression models were statistically significant showing good classification capabilities and goodness of fit, and, therefore, this has unlikely affected the overall result. The sample was also representative for a Finnish adult population and the demographic and household characteristics and adoption items were collected using high quality survey standards.

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