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Master of Science in Information Systems: Digital Business Systems

Exploratory analysis of Internet of Things (IoT): revolutionizing the grocery retail industry

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Abstract

This dissertation has investigated the consequences of implementing Internet of Things (IoT) technologies in grocery retailing by analyzing customers' perceptions of eight prominent technologies. The objective was to investigate and explore to what degree implementing these technologies would impact the customer experience. Based on secondary research, this thesis focuses on eight prominent technologies that presumably will encounter an increasing utilization in the visible future; Self-Scanning, Smart Robots, Smart Shelves, Smart Shopping Cart, Smart Fridge, Just Walk Out, Personalized Promotion/Pricing, and Mobile Apps. The technology distribution varies across different stages in the customer journey, and research indicates that IoT has the most significant impact in the pre-purchase stage. A comprehensive exploratory survey was conducted through Amazon mTurk with a wide range of respondents (n=204), giving valuable insight into demographic differences' influence on each technology perception. The investigation uncovered vast differences in several areas such as age, attitude, and privacy. Among other findings, the age segment 35-44 is more confident towards IoT technology than the age segment 55+, and shoppers with a positive attitude towards grocery shopping have higher confidence towards the technologies than shoppers with a negative attitude. On a widespread basis, the findings revealed that all eight technologies would positively affect customer experience to a certain level.

Keywords: Internet of Things, Grocery Retailing, Customer Journey, Customer Experience, Autonomous Retail.

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We certify that the work presented in the thesis is our own unless referenced

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1.0. Introduction

The Internet of Things (IoT) is changing whole industries by connecting devices and creating automated processes. The anticipation of massive changes and improvements utilizing IoT technology is imminent in the retail sector. By transforming operating processes, improving marketing, and selling connected products, IoT will impact the retail industry significantly (Stanley 2014). Further, an Accenture report by Gregory (2015) states that IoT will impact customer experience, supply chain, and new channel revenue streams in the retail industry. Based on these findings, it is reasonable to presume that developing a great customer experience is one of the most crucial operations to sustain and ensure competitive advantage. According to Fagerstrøm, Eriksson, and Sigurssonc (2017), IoT will have a $14 billion economic effect by 2022 and hesitating to accept these changes and postponing IoT implementations are likely to cause loss of customers and market shares (Gregory 2015).

The expected market adoption of IoT is accelerating, and by 2030, each person will own 15 connected devices (Samani 2020), which provides retailers whit a unique opportunity to re-design the ecosystem and engage with consumers in real-time, both inside and outside the shop. Understanding consumers' preferences will increase as data received from mobile apps, online behavior, beacons, and RFID allows retailers to tailor personal promotion/pricing. In addition, Smart Fridge technology unlocks the possibility for seamless interaction with grocery retailers (Hoyer et al. 2020). Nevertheless, Bill Gillispie, the IBM Global Team Leader, mentions that retailers have yet to figure out how to efficiently map customer behavior, send personalized promotions, and intercept customers' planned processes (Bonderud 2020).

Moreover, research reveals that in-store technologies like Smart Shelves, Smart Robots, Smart Shopping Carts, and Self-Scanning technologies have a high probability of improving customer experience and engagement towards the retailer (Inman and Nikolva 2017). The most invasive technology explored in this dissertation is a completely automated store model without employees called "Just Walk Out." These stores utilize various technologies such as camera vision, face recognition, and smartphone applications.

One of the most significant challenges in IoT is privacy management. The IoT market is expanding expeditiously, and the expansion of objects connected to the network enhances the risk for malicious attacks. Challenges related to IoT implementations of existing infrastructures

and network elements, data analytics, selecting sensors and devices, value chain collaboration, dashboard & monitoring & consulting services is extensively covered by researchers. The research reveals that most attacks are related to incompetence or laziness among staff and the absence of security controls of systems (Caro & Ramin, 2019; Dlamini & Johnston, 2016; Kaushik & Dahiya, 2018; Kosha & Singar, 2020; Bansal 2020, p237).

To generate value, grocery retailers must enhance organizational productivity and improve customer service. IoT technology can be the solution by providing specialized applications rather than a generalized adoption, especially for large-scale grocery's retailers (Bonderud 2020). Based on demographic variables, it is expected that the participant's responses would vary as grocery retailers interact with vast differences of people. However, by analyzing the consumers' perceptions of each prominent technology, a common determinator revealed that age segment 35-44 had higher adaptability than the age segment 55+ on each technology. Also, the dissertation reveals a significant correlation between customer attitude towards grocery shopping and their perception of each technology.

To master the customer experience, retailers need to acquire knowledge from the need or demand until fulfillment. The customer journey inaugurates long before the store entrance, in a pre-purchase stage (Lemon & Verhoef 2015). In this stage, IoT technology has the most considerable influence. The customer receives a desire/requirement and evaluates diverse methods/stores to satisfy their requirements, all of which interact with the brand, environment, and category before the purchase. In the second stage, purchase, the customer executes any transaction with the retailer and is an all-in-store shopping experience. Finally, in the post-purchase stage, the customer evaluates and interacts with the retailer after the transactions (Lemon & Verhoef 2015). Along these stages, the customer experiences complex touchpoints that are different sub-carriers to a potential transaction. It is significantly relevant to understand what touchpoint influences the customer the most and what the retailer can improve for future customers (Lemon & Verhoef 2015; Stein & Ramaseshan 2016).

Based on a comprehensive literature review, it is reasonable to believe that IoT will be a force in future grocery retailing and play a significant part in customers' perception of individual grocery stores. Thereby, this thesis investigates eight prominent IoT-based technologies that have or will enter the market combined with the various stages in the customer journey. The objective is to investigate how the different technologies will impact grocery retailing

throughout the customer journey by analyzing shoppers' perceptions and determine their adaptability. The following research question guides the objective.:

How can retailers benefit by implementing IoT in grocery stores to enhance customer experience?

With limited attention given to how shoppers perceive IoT technology, there is a need to contribute to more knowledge on the future of IoT in grocery retailing as current research primarily focuses on IoT related to architecture, security, and data management/privacy (Fagerstøm, Eriksson, and Sigurðssonc 2017). Therefore, by investigating this area, the goal is to contribute reliable insight into customer perceptions towards prominent IoT technologies on this topic.

The remaining part of this paper is organized through 5 sections. In the first section the literature review is presented. In the second section the research methodology is presented. In the third section, the analysis and results are presented. In the fourth section, the discussion is presented, and in the final section the conclusion.

2.0 Literature Review

The literature is solely based on secondary data gathered through a concept-centric literature review. The articles were published in various outlets, involving journals, conferences, book chapters, e-book chapters, articles, reports, and patent documentation. Several articles were on the subject, and we chose the literature that we found to be most relevant and rigid. These articles both indirectly and directly address the proposed research question.

The first search was prepared through Google Scholar, and the search option was limited to articles' titles. The keywords used were; IoT, Internet of Things, Retail, Grocery, Literature Review, Evolution, Challenges, Possibilities, Adoption, Customer Experience, Customer Journey, and Customer Perception. These keywords were combined in different phrases and combination to find relevant research. The review includes studies published within the years 2000-2020.

Furthermore, an additional search in EBSCOhost was executed due to their high relevance in IS research. The keywords were the same as used in google scholar to keep the same searchable approach. However, the search phrases and combinations had been incorporated in the search and not solely the title area. Moreover, a thorough search was conducted through the most prominent IS journals to secure that no articles were absent from the previous searches with the same approach. Finally, we performed a secondary search investigating references from the selected articles to recognize additional possible literature sources.

In total, we reviewed over 100 articles. We read through all the abstracts and conclusions of these articles and chose those articles we found to be most relevant for this review. These articles both indirectly and directly address the objective of this thesis.

Table 1 - Overview of the articles

Title	Year	Outlet
Retail 4.0: The Future of Retail Grocery in a Digital World	2018	McKinsey & Company
Understanding Retail Experiences and Customer Journey Management	2020	Journal of Retailing
Towards the identification of customer experience touch point elements	2016	Journal of Retailing and Consumer Services Volume
Understanding Customer Experience Throughout the Customer Journey	2016	Journal of Marketing
That 'internet of things' thing	2009	RFID journal
Overview of the Internet of things	2012	International Telecommunication Union
The EPC Sensor Network for RFID and WSN Integration Infrastructure	2007	Fifth Annual IEEE International Conference on Pervasive Computing and Communications Workshops
The use, benefits and challenges of using the Internet of Things (IoT) in retail businesses: A literature review	2016	2016 International Conference on Advances in Computing and Communication Engineering (ICACCE)
Implementing IoT-Adaptive Fuzzy Neural Network Model Enabling Service for Supporting Fashion Retail	2020	ICMLSC 2020: Proceedings of the 4th International Conference on Machine Learning and Soft Computing
Iot in supply chain management: a narrative on retail sector sustainability	2020	International Journal of Logistics Research and Applications
IoT Applications in Retail	2020	(Book Chapter) Designing Internet of Things Solutions with Microsoft Azure
Iot in retail	2020	(Book Chapter) Smart Technologies
The Internet of Things (IoT) in retail: Bridging supply and demand	2019	Business Horizons
Security and privacy in IoT based e-business and retail	2018	2018 International Conference on System Modeling & Advancement in Research Trends (SMART)
Design of Smart Unstaffed Retail Shop Based on IoT and Artificial Intelligence	2020	IEEE Access (Volume: 8)
Intelligent Communication Between IoT Devices on Edges in Retail Sector	2018	(e-Book) Future of Information and Communication Conference
Design of Smart Retail Shopping Guide Using IoT and Cloud	2018	International Journal of Advanced Research in Computer Science
IOT Based Comprehensive Retail Malpractice Detection and Payment System	2020	IOT Based Comprehensive Retail Malpractice Detection and Payment System
An IoT-based electronic price-tag for food retail	2019	2019 26th IEEE International Conference on Electronics, Circuits and Systems (ICECS)
A smart unstaffed retail shop based on artificial intelligence and IoT	2018	2018 IEEE 23rd International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD)
EMOMETRIC: An IOT integrated big data analytic system for real time retail customer's emotion tracking and analysis	2017	International Journal of Computational Intelligence Research

Recommendation from robots in a real-world retail shop	2010	International Conference on Multimodal Interfaces and the Workshop on Machine Learning for Multimodal Interaction
The Internet of Things: revolutionizing the retail industry	2015	Accenture Strategy
Shopper-facing retail technology: A retailer adoption decision framework incorporating shopper attitudes and privacy concerns	2017	Journal of Retailing
Smart Shopping Trolley	2020	Dept. of Computer Technology, Priyadarshini College Of Engineering, Nagpur, Maharashtra, India
Robotic retail facility	2005	U.S. Patent Application 10/832,383
Service robot	2017	U.S. Patent Application 29/591,704
IoT applications on secure smart shopping system	2017	IEEE Internet of Things Journal
Smart shelves for retail industry	2016	U.S. Patent 10,318,919
Transforming the customer experience through new technologies	2020	Journal of Interactive Marketing
Smart refrigerator: A next generation refrigerator connected to the IoT	2016	2016 8th International Conference on Electronics, Computers and Artificial Intelligence (ECAI)
Amazon Go: Disrupting retail?	2019	Journal of Information Technology Teaching Cases
Just Walk-Out Technology and its Challenges: A Case of Amazon Go	2018	2018 International Conference on Inventive Research in Computing Applications (ICIRCA)
Determinants and outcomes of customers' use of self-service technology in a retail setting	2007	Journal of Service Research
Shoppers perception of retail service quality: supermarkets versus small convenience shops (Dukas) in Kenya	2012	Journal of Management and Strategy
Mediating effect of program loyalty on the relationships between value perception and relationship investment on customer loyalty	2008	Proceedings of Australian and New Zealand Marketing Academy conference 2008
Defining consumer satisfaction	2000	Academy of marketing science review
Understanding customer experience	2007	Harvard Business Review
Customer experience management in retailing: An organizing framework	2009	Journal of retailing
Understanding retail experiences and customer journey management	2020	Journal of Retailing
The Power of Personal	2020	Journal of Retailing
A review of technology acceptance by older adults.	2011	Journal of Gerontechnology
Retail fairness: Exploring consumer perceptions of fairness towards retailers' marketing tactics.	2013	Journal of Retailing and Consumer Services 20

2.1 Evolution of Grocery retailing

In 2019, McKinsey conducted a comprehensive study analyzing the future of retail grocery (Desai, Potia & Salsberg 2019). According to the authors, it is essential to recognize whether today's innovations express seismic industry changes; it is valuable to recognize the three preceding "ages of modern retail," referred to as Retail 1.0, Retail 2.0, Retail 3.0, and Retail 4.0.

Retail 1.0 represented the beginning of the 20th century (1916) when an American store named Piggly Wiggly was the pioneer and most prominent innovator, attempting the first self-service grocery store. Piggly Wiggly was also the first modern grocery retailer to implement open shelves and checkout stations and price-mark all items. Besides, Piggly Wiggly was the first to implement employee uniforms, designed standardized layouts, fixtures, equipment, and independent franchise grocers to operate under the self-service method.

Retail 2.0 represented the middle of the 20th century (1963) when the area of modern hypermarkets began. Hypermarkets' fundamental concept was to have everything under one giant roof, which was considered a radical step ahead in space utilization, cost, efficiency, productivity, and management. As a result, customer value expanded forcefully through lower prices and a more desirable choice, in addition to countless incremental innovations such as multi-format offerings, private label products, and category killers.

Retail 3.0 represented the end of the 20th century (1995) when modern e-commerce transactions accelerated along with Amazon.com founder - Jeff Bezos. Amazon.com generated millions of dollars in revenue, and e-commerce became a buzzword that ushered in a new retail era. The evolution of Retail 3.0 continued as the era created giants such as online category killers (Zappos), e-auctions (eBay), and big data analytics. E-grocery, on the other hand, is a different story consisting of both successes and failures. Since the collapse of the largest dot-com flop in history, the e-grocery store Webvan, it has taken some time to get the e-grocery model functional right. The future of grocery retailing in a digital world and successful firms in this area are a mix of traditional brick and mortar players like Meny and start-ups like Kolonialen. Not more than a decade after e-commerce became mainstream, it is evident that there are sustainable business models in e-grocery firms that accurately manage their pricing, logistics, and customer loyalty.

Retail 4.0 represents the era of now. There is no direct blueprint of what shape Retail 4.0 will take, nor which firm(s) get(s) credit for proclaiming this new age. Nevertheless, McKinsey has picked several trends to watch in this domain, focusing on grocery retailing, which play toward the sharp change the inevitable future role technology will allow in retail. Among these trends is IoT, and the physical store will possess equivalent analytical intelligence as the online store thanks to proximity technologies. Consequently, retailers will be granted more information about the customer through IoT, severely impacting the customer experience.

2.2 Customer journey

There is a great misunderstanding that some retailers believe the customer starts their experience at the retail store entrance. Grewal & Roggeveen (2020) mention how customer journey insight benefits from predicting and influencing customers' actions in stores, reviews, and social media platforms. Understanding the journey is critical to ensure customer satisfaction and sustain a competitive advantage (Stein and Ramaseshan 2016). Lemon & Verhoef (2015) pinpoints that the customer journey has been more complex to influence because customers interact through a myriad of touchpoints on multiple platforms. In a retail setting, the customer journey is categorized through three stages; pre-purchase, purchase, and post-purchase. The customer can experience emotional, behavioral, and cognitive responses with impacts on each step. There should also be considered external factors such as social, political, and cultural impacts that might influence the customer journey. There are also factors customers' might experience that can be affected by the retail store, such as atmospheric, merchandise, numerical information, and package cues (Grewal & Roggeveen 2020).

- **Pre-purchase** includes the customers' interaction with the brand, environment, and category before any purchase transaction. In other words, this stage is where the customer experiences specific needs or goals and does research, considerations, and recognitions to fulfillment (Lemon & Verhoef 2015).
- **Purchase** is the stage where the consumer executes a transaction. In a retail setting, there is a focus on the consumers' shopping experience. According to Lemon & Verhoef (2015), the literature has focused on how marketing activities, atmospherics, environment, and the service environment influence purchase decisions.
- **Post-purchase** is the final stage that is all about customer interaction with the brand after the purchase. This stage focuses on consumer experience, a potential return of product, repurchase, or a willingness to vary in the next purchase. One of the best

outcomes is a possible loyalty loop, which leads to customer loyalty (Lemon & Verhoef 2015).

Retailers must have a clear vision and understanding of their firm and their customers' perspective throughout the customer journey to improve these stages. The necessity to identify the most critical and vital aspects of the stages is essential. Additionally, understanding critical trigger-points that lead to continuing the purchase journey or discontinuing is indispensable (Lemon & Verhoef 2015). Nevertheless, retailers must recognize that consumers might jump from different stages nonlinearly, meaning that consumers can go from a pre-purchase to a post-purchase (Grewal & Roggeveen 2020). For example, if a consumer considers buying a new frozen pizza brand and reads revealing reviews online that engage the consumer, the consumer can decide not to go further with the purchase and goes straight to the post-purchase mindset.

Retailers should also recognize vital external factors such as social, cultural, and political influences (Grewal & Roggeveen 2020). Social impact is a critical determinant of any shopping behavior. Passive social presence, such as other customers and employees who do not have any personal interaction, affects the subconscious. Grewal & Roggeveen (2020) further state that cultural dimensions such as collectivist, individualist, power distance, and masculinity/femininity significantly impact consumer behavior and need to be considered. Political impacts that influence the customer journey can, e.g., be recognized during the ongoing pandemic of COVID-19, where the government in Norway commanded a requirement to use a facial mask and keep a 2-meter distance separating individuals. As a result, shopping behavior is influence through continuous COVID-19 discussion from social media, news channels, influencers, and political parties (Grewal & Roggeveen 2020).

There is also a necessity to sustain knowledge of the different customer touchpoints to learn the customer journey's critical factors. Lemon and Verhoef (2015) mention four different touchpoints relevant to customer experience; brand-owned, partner-owned, customer-owned, and social/independent/external. Further, Stein and Ramaseshan (2016) identified seven distinct customer experience touchpoints; Technological, Communicative, process, customer to customer interaction, employee to customer interaction, atmospheric, and product interaction (Table 2).

Table 2– Touchpoints/elements (Lemon & Verhoef 2015; Stein & Ramaseshan 2016)

Touchpoint	Description
Brand Owned	All customer interaction that is controlled and managed by the retail company (websites, advertising), and brand managed elements of the marketing mix (service, packaging, price)
Partner Owned	Customer interactions that are jointly controlled and managed by the retail company and partners (agencies, distribution partner, communication channel).
Customer Owned	Customer interactions that are not controlled and influenced by the retail company, nor its partners (individual needs or desires). This touchpoint is the most prevalent post-purchase stage.
Social/External	Others role in the customer experience that can influence the process (other customers, environment, information sources, peer influences, third-party information sources, social media).
Atmospheric	The physical characteristics the customer is experiencing through interaction with the retail company.
Technological	Any interaction with the retail company that is happening through technology platforms.
Communicative	Monological communication from the retail company including promotion and informative messages.

Process	All the steps that are necessary to achieve any outcome with the retail company
Employee to customer interaction	Direct and indirect interaction the customer gets from employees in the retail company
Customer to customer interaction	Direct and indirect interaction the customer has with other customers when interacting with the retail company.
Product interaction	Direct or indirect interactions the customers have with products offered by the retail company, physical or digital.

2.3 Internet of Things

Kevin Ashton first coined the term "Internet of Things" (IoT) in 1999 (Ashton, 2009). There is no clear definition of the term "Internet of Things", but the International Telecommunications Union (ITU) has recommended the following definitions for IoT and 'things' from a technical standardization perspective: "*A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies*". By 'things', ITU means the following: "*With regard to the Internet of things, this is an object of the physical world (physical things) or the information world (virtual things), which is capable of being identified and integrated into communication networks*" (ITU, 2012).

Information and communication technologies (ICT) can be characterized as communication anytime and anywhere, and IoT expands these dimensions with communication between anything illustrated in Figure 1 (ITU, 2012). According to ITU (2012), physical things can be connected, monitored, and controlled by sensors and actuators and can be anything from home appliances to industrial robots in manufacturing companies. The research also states that virtual things are things in the information world that can be stored, processed, and accessed, such as multimedia content or applications. Furthermore, it states that a physical thing can be

represented in the information world through one or more virtual things, but virtual things can also exist without being associated with any physical things. Thus, there are virtually no limits to what may be an "IoT thing". ITU (2012) also uses the term "object" in the context of IoT. An object can consist of one or more physical things and must be able to communicate.

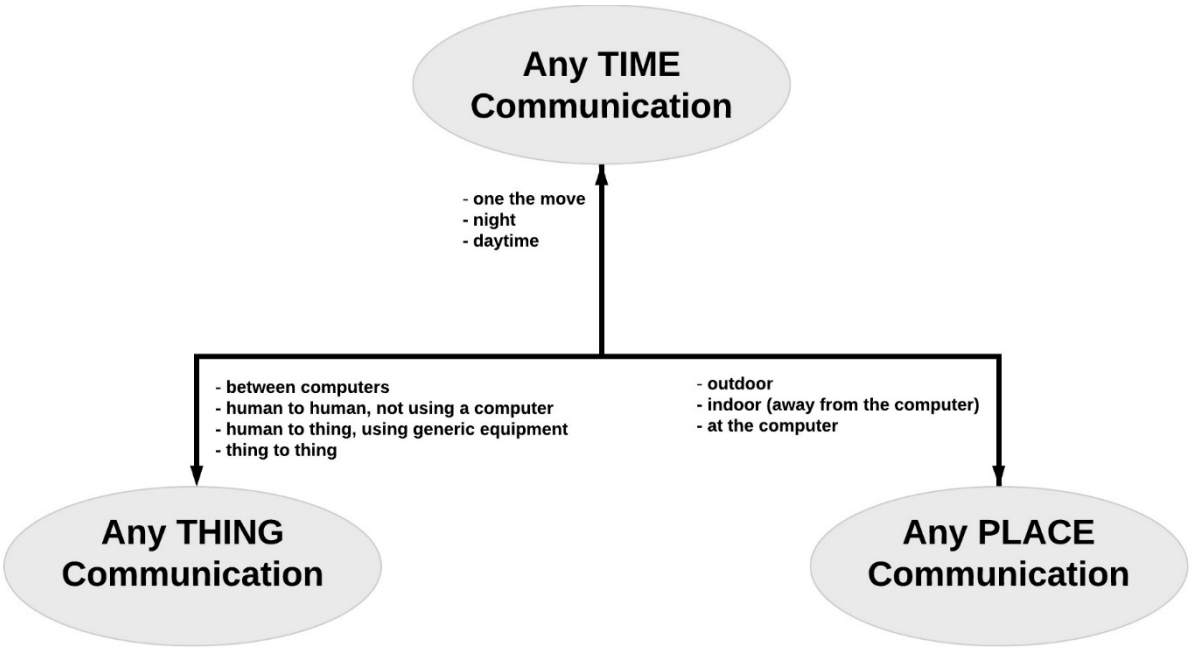

Figure 1 - The new dimension introduced on the Internet of things (b-ITU Report)

The simplest objects can become smarter by equipping it with sensors, a small computer, and a communication device by the underlying fundamentals of creating new services when objects are linked to a network. Sung, Lopez, and Kim (2007) discuss that researchers find radio frequency-identification (RFID) and Wireless Sensor Network (WSN) as some of the most critical technologies, where both use information technology to interact with the physical world. However, the technologies have different directions where WSN are designed to monitor the physical environment, while RFID is mainly used in asset identification in the supply chain. However, Sung, Lopez, and Kim (2007) state that researchers believe these technologies will converge in the future, and WSN is considered the expected RFID tag progression technology. Nevertheless, WSN is currently unable to communicate with each other and are only designed to serve a single purpose service in a local network domain. Therefore, it is challenging for the global network vision to increase connectivity (Sung, Lopez, and Kim, 2007). Sung, Lopez, and Kim (2007) discuss an infrastructure to integrate separate WSN and RFID into one network named EPC Sensor Network. This system uses Application-Level Event Middleware (ALE) to manipulate significant volumes of tag data received from multiple readers.

2.3.1 IoT benefits in Retailing

IoT in Retail is evolving, and, in the future, it can change the retail industry forever. Implementing IoT technology in grocery retailing makes it possible to personalize the consumers' in-store experience created on data gathering from the data collected. Retailers get a unique insight into consumers' behavior and can grant a more satisfying customer experience across several channels. Up to our knowledge, there are only two authors who specifically have researched IoT applications related to Retail (Bansal 2020, p221; Joshi, Singar & Akhilesh 2020, p222). The authors found seven IoT application areas for retailers: (1) Shrinkage reduction, (2) Store Optimization, (3) Sales & Promotion, (4) Fleet Management, (5) Inventory Management, (6) Sustainable Food, and (7) Autonomous Retail.

Shrinkage Reduction

Most retailers share a number one priority: loss prevention (e.g., shoplifting), a $1.23 billion problem each year, and is considered one of the most challenging tasks to manage. How can IoT, e.g., detect unscanned items in a cart and reduce theft? One way is to utilize low-cost RFID technology. Applying RFID tags can track the item's location, and retailers can analyze trends such as patterns that expose where they are missing the most money. The other way is to utilize battery-powered Bluetooth low-energy enabled sensors. Applying this tech can prevent theft and maintain track of the whereabouts of the goods.

Store Optimization

There are several IoT applications to optimize a store. Retailers can trace customers in-store using beacons that detect their phones using WiFi pings. Beacons measure the number of customers in a store accurately, track their product interests, where they go, and where they stop to study products. The data can be converted using a heat map to track their habits, and retailers can create 'hot spots' or 'shoppers' interest. They might find out, e.g., that premium products should be placed in a more heavily trafficked section or that relocating popular products to a 'cold' area increases traffic flow. Nevertheless, understanding customers' habits enables employees to instantly serve their requests and awards retailers insights into several aspects of in-store buying behaviors.

Sales & Promotions

To become more competitive and improve sales, retailers must find new ways by utilizing both new and existing resources:

- By utilizing IoT, retailers can retarget customers on social media based on the data collected on their habits, as pre-mentioned.
- Retailers can send personalized marketing using the habit data collected while visited in-store with no purchase.
- Not solely focus on traditional upselling and cross-selling based on consumers' purchase history. Make the conventional promotions approach more complex by identifying and understanding the consumer's psychological choices by analyzing all the available data and applying advanced technology such as machine learning algorithms to find patterns.

Fleet Management

Retailers can utilize IoT-tech to improve their transportation fleets. The necessary technology is likely to be installed in newer vehicles, meaning no extra expense leveraging the IoT for fleet management. GPS and sensor data can track vehicles' location and speed, enabling both retailers and customers about location and arrival time. Also, this technology allows retailers to make business decisions about product availability quicker. Several additional advantages are related to fleet management, such as workforce behavior monitoring, fuel efficiency, and fraud detection.

Inventory Management

The current estimation is that retailers waste as much as $1.1 trillion from inventory distortion. It might seem like an unachievable job for some retailers to maintain track of the location and quantity of the vast amount of items. However, IoT-technology can support the location of products anywhere in-store. By utilizing big data analytics along with RFID tagging, retailers can overcome inventory distortion. Also, exceptional customer experience is achieved when retailers obtain an accurate daily inventory by supporting in-store pickup of online purchases. In some cases, workers need to be capable of finding specific products instantly.

Substantial Food

By applying sensors and devices at strategic locations, retailers can get data on temperature levels and moisture status on cold food items and vegetables. Not only does it keep vegetables fresher, but applying this technology, can save retailers substantial energy and water costs.

Autonomous Retail

Today's IoT technology can help retailers acquire necessary employee data such as arrival and departure using keypads, biometrics, or a card swipe. The effects of autonomous retail will also provide cost-effective methods to decrease the number of workforces associated in-store by adopting, e.g., robots for repetitive activities or self-service technology. Probably, IoT will not necessarily mean the elimination of the need for human force in retail. Instead, the workforce could allocate to other activities.

2.3.3 IoT Challenges in Retailing

The main challenges related to IoT in Retail are security and privacy concerns (Caro & Ramin, 2019; Dlamini & Johnston, 2016; Kaushik & Dahiya, 2018; Joshi, Singar & Akhilesh 2020; Bansal 2020, p237). There are billions of connected 'things' and increases every year, which leads to an expansion in potential attacks. Research shows significant concerns with IoT devices that include spoofing, cryptographic, authentication, and malware attack. The enormous quantity of data transferred from 'things' means substantial risk related to data privacy. Unfortunately, in some cases, these breaches result from incompetence or laziness by users that are not installing the security updates regularly enough. Research also reveals challenges related to the network, such as battery life, range, density, bandwidth, density, operational costs, and endpoint cost. Because of this, retail businesses should choose IoT technologies that can efficiently and effectively communicate with wired, wireless, and mobile networks. Joshi, Singar & Akhilesh (2020) found in their study that there are several challenges for retailers adopting IoT related to infrastructure & networking elements, data analytics, selecting sensors & devices, value chain collaboration, dashboard & monitoring & consulting services. In other words, retailers should engage technological and cultural challenges and carefully select the proper actions to guarantee security and seam integration. Bansal (2020, p237) also confirms that infrastructure and data management are critical challenges associated with IoT in Retail.

2.3.4 IoT Possibilities in Retail

Xu et al. (2020) proposed a smart unstaffed retail shop scheme based on AI and IoT to enhance user shopping experience notably. Their experiments showed that their system could satisfy new real retail applications' requirements, which significantly improved the customer flow and transaction volume. Saravanan & Srivatsan (2018) propose a custom communication model for IoT devices on its edges to induce intelligence in Retail using wireless technology. The authors propose a Smart Shop architecture (SmSH) that integrates context-aware services, platform-

independent, edge computing, and proximity sensing to establish seamless connectivity for the customer entrusted tasks. According to the authors, their SmSH proposal will help retailers enhanced customer experience, optimize store Operations, improved inventory and supply chain management, and capture new revenue opportunities.

Pavithr et al. (2018) propose a flawless shopping experience through a platform designed for retailers to make the process of shopping seamless and non-tiring activity. They argue that their proposed method/system is unique and new and that a recent variation of their concept can be seen and was implemented by Amazon as Amazon Go. Narayan, Krishnan, and Ponraj (2020) propose a supermarket system to automate the billing process and reduce customer waiting time. Their self-developed systems consist of shopping carts with a barcode scanner, load cell, LCD, and a pi cam. According to the authors, their proposed system seems highly efficient and helps optimize the store. Also, it provides a high level of security to prevent malicious use.

Miguez et al. (2019) propose a low-cost electronic Tag (e-Tag) based on RFID technology, using an electronic ink (e-Ink) display for usage in food retail. The authors argue that their tech can be utilized in several retail supply chain areas such as transportation, logistics, and raw food storage to control stock, shelf life and maintain the first in first out requirements. Retailers can also use e-Tag for dynamic pricing in a store to reduce spoilage. In addition to decreasing food waste, the authors conclude that their product can increase the supermarket experience and provide traceability for the user. Liu et al. (2018) propose a smart unstaffed retail shop project based on AI and IoT. The authors aim to explore the feasibility of implementing the unstaffed retail shopping style. According to their findings, they achieve significant accurate results, which means that the system can make up for the deficiency of traditional unmanaged containers. Tallapragada, Rao & Kanapala (2017) propose an intelligent shopping cart that can trace the customer's emotions and provide a customer behavioral insight through IoT integrated data intelligence. The authors' findings reveal that the proposed technique has an overall accuracy of 95%, which implies that their approach is robust and suitable for practical pose and illumination variant real-time scenarios and offers high-value business intelligence to retailers.

2.3.5 IoT in Grocery Retailing

There are significant opportunities for grocery retailers utilizing IoT technology. A variety of IoT-based solutions can provide actionable insights that permit grocery retailers to implement innovative business models and enhance their ROI. Table 3 lists eight prominent IoT

technologies that have gotten increased attention in the last years, and there is research indicating that these technologies will be more accessible in the early future.

Table 3 - Retail technology that are already here and on the horizon.

Smart Robot		Smart Shopping Cart	
Smart Shelves		Personalized promotion/pricing	
Mobile Apps		Just Walk Out	
Self Scanning		Smart Fridge	

Smart Robot

Smart Robots can function as a supporting integration enforcing the labor army in retail stores. A network robot system (NRS) divides into visible, virtual, and unconscious categories (Kamei et al. 2010). There are multiple designs on visible robots; however, the most common is a person-looking machine with an interactive touchscreen on either its torso or head (Wang, Zhao, and Zhang 2018). In a retail setting and from a customer perspective, the robot allows the consumer to browse inventory and lead to the desired item (Gregory 2015). The visual robot can also provide the information requested from consumers and as a method for push-type messaging in advertising and recommendation of products. For example, instead of using digital signage to suggest new products, there is expected to be more effective using a robot because of its opportunity to point out products in the store (Kamei et al. 2010). Kamei et al. (2010) further suggest that push messaging can be annoying for the consumer. However, when

applying a visual humanoid robot, the consumer is expected to accept the information based on the human-like interaction such as introduction and greeting. Razumov (2005) also mentions that retail robots can provide shopping lists for a more effective shopping experience, and some robots also have an integrated ATM.

Smart Shopping Carts

Smart Shopping Carts can function as a helping tool during customers' shopping experience. Since the first patent registered Smart Shopping Cart in 1988, there have been several introductions to new Smart Shopping Carts solutions. However, the technology is not vastly utilized today and functions primarily for experimental purposes in selected stores. The Smart Shopping Cart has integrated a display consumers can interact with and where suppliers can interact with the consumers. With the supplementation of sensors registration shopping patterns, it can apply for, e.g., commercial purposes giving shoppers offer and commercials on milk or yogurt when walking through the dairy section. It can also provide the customer with information and guide them to desired products (Inman and Nikolova 2017). The Smart Shopping Cart can consist of multiple functions, depending on the supplier, but the primary function is to improve the shopping experience with an overall calculation of the total bill based on chosen inventory. Panjwani et al. (2020) introduce a Smart Shopping Cart solution in their paper designed with an RFID tag reader, keypad, and LCD, where the RFID reader reads RFID tags and displays the overall value on selected items on the LCD. Smart Shopping Carts can also provide a payment system allowing the consumer to complete the payment stage with the shopping cart instead of a cashier employee, avoiding the long waiting queues at the checkout. RFID-readers at the exit will detect unpaid items, and dishonest customers will not pass the payment verification (Li et al. 2017).

Smart shelves

According to Rodriguez et al. (2019) patent description, is the purpose of Smart Shelves technology to communicate to employees when items are removed from the shelves and are below a chosen threshold value. The shelves design also provides strain sensors, photodetectors, microphones, and spillage sensors that indicate when products are out of place, which will decrease the likelihood that items are missing or misplaced. Following Rodriguez et al. (2019), the shelves design allows video displaying characteristics of the given product or category sold from each Smart Shelf.

Personalized promotions/pricing

IoT also allows retailers to give personalized offers as the customer enters the store by utilizing sensors or Bluetooth devices such as beacons locating the customer's smartphone. IoT can use information gathered from the users' online profile, see what the customers are interested in, and then give information and discounts on relevant categories when they visit the physical store (Hoyer et al. 2020).

Mobile Apps

This technology enables retailers to advertise instantly to shoppers, deliver online in-store navigation, and intensify customers' shopping experience. According to Inman & Nikolova (2017), the shoppers will benefit by receiving personalized promotions and messages by applying beacons. The technology can guide shoppers to locate different aisles and specific products they desire to purchase and provide shoppers with an 'In-Store Pick-Up Option' to order the products online and pick them up the store. Through RFID and mobile app technology, customers can also receive information about relevant products such as the distributed country, vendor, content, and carbon footprint, which creates a significantly more transparent production line that might affect the customers' purchase behavior (Floarea and Sgârciu 2016). This technology also enables shoppers to apply their smartphones using the retailers' app to scan products as they place them in their cart, allowing them to pay without scanning the products one more time at the checkout counter. This technology will reduce their waiting time in-store, resulting in an overall better experience (Inman & Nikolova 2017).

Just Walk Out

In 2018, Amazon opened a new grocery store, introducing a revolutionary new concept called 'Just Walk Out' named Amazon Go. Amazon Go is an example of a grocery store, where customers scan their identity at the entrance with an application connected with their credit card. After scanning in, the customers can pick items from the shelves, refrigerators, or the fresh food counter and walk out without any interaction with staff or check-out points. The advanced technology automatically registers what shoppers take out of the shelves, and when they walk out there is automatically sent a recipe and the credit card is automatically charged (Ives, Kathy, & Dennis 2019). The working functionality behind is a complex architecture consisting of multiple AI, machine learning, deep-learning algorithms, and IoT technologies. There is a photo taken of the customer at the entrance, when they take items, and when they leave the store. There is also facial recognition gathering information about each customer, such as height,

weight, and biometrics. The surveillance system is further tracking the customer inside the store, which allows the cameras to see when customers grab items from the shelves, and whether they put the item back or take it to the shopping net (Wankhede, Wukkadada, and Nadar 2018).

Self Scanning

This automated technology process empowers shoppers to scan, bag, and pay for their items, eliminating the demand for a cashier. Today, this technology thrives in many grocery stores across the country. The significant difference with this technology is that a shopper interacts with a computer's user interface instead of a cashier, where the Self-Scanning interface guides until a completed transaction. The technology has integrated a barcode scanner, making it possible to determine product type. Also, it has sensors determining weight when there are no barcodes (e.g., fruits and vegetables) (Inman & Nikolova 2017). Time gain during shopping is an important motivational factor for customers. Moreover, Self-Scanning can be categorized as a self-service technology and can improve efficiency and reduce long queues. However, this should be evaluated and calculated based on the different retail situations. Previous research has found that education is an essential factor in adoption of Self Scanning Technology in general, where those with lower education are less prominent. Other findings revealed that perceived usefulness is less critical for females than men's (Weijters et al. 2007).

Smart Fridge

The implementation of IoT in consumers' homes is possible through Smart Fridge Technology, where the technology informs when items need to be replenished and automatically orders these from a chosen grocery store (Hoyer et al. 2020). Floarea and Sgârciu (2016) have investigated how Smart Refrigerators are working and increasing functionality for consumers. The first Smart Refrigerator was introduced in 2000 by LG called Internet Digital DIOS, or R-S73CT. It had multiple functions communicated through an LCD screen. Consumers could check the temperature, the freshness of food, recipes, nutrition information, webcam showing the content, and MP3 player. However, this was a fiasco with a $20,000 price tag. Consumers found it too expensive and did not see the value as it was more of a "nice to have" item. Nevertheless, Smart Fridge technology has changed tremendously over the past 20 years. Smart Refrigerators in today's market have a significantly lower price tag, are timely relevant, and can be an efficient tool in everyday life. The Smart Fridge can scan and detect repeatedly restocked items, identify removed products, and automatically add them to the consumers' shopping list (RFID tags are

required). Consumers can also list essential items they want continuous access to, such as milk, eggs, and cheese. The refrigerators also detect when an item has not been used over a more extended period and detect expiration dates (Floarea and Sgârciu 2016).

2.4 Customer Perceptions

According to Kimani et al. (2012), customer perception defines the organization's overall impression and services. However, the overall impression is further influenced, and there is a necessity to divide it into multiple categories to understand the consumer's overall perception thoroughly, such as product prices, facilities, employees, and services. The image is highly influenced by its 'atmosphere' or psychological feeling the customer is experiencing when entering the store.

2.4.1 Justice/Fairness Perception

According to Nguyen and Klaus (2013), fairness is defined as "*judgment of whether an outcome or the process to reach an outcome acceptable, reasonable, or jus*t". Following Inman and Nikolova (2017), justice and fairness are used interchangeably in the literature. The author's definition is the judgment of the extent to which people believe that there is equity in the exchange between themselves and another party. The authors further distinguish between three types of fairness/justice influencing the consumer: procedural, distributive, and interactional. From a marketing perspective, price is an essential subtype of fairness, and retailers should pay attention to consumers' perceptions of price as it is one critical factor that determines customers' willingness to pay and purchase intention. Customers that find retailers unfair might get punished by the consumer. Nguyen and Klaus (2013) discuss customers' fairness perception on companies marketing activities and found that advertisers were the second least trusted group, behind politicians. Advertisers are often associated with dishonest information and exploitative practices. Consumers have become more aware of companies' customer-tracking systems, favoring profitable customers, information handling, hidden fees, dynamic pricing and surcharges, and their perception of fairness in these marketing activities.

2.4.2 Value Perception

Another vital element for shopping perception is value perception, as it represents the customer's overall usefulness of an exchange with the retailer grounded on the perception of what is given and what is received (Inman and Nikolova 2017). While interacting with a retailer, the customer needs to make sacrifices, and the value returned from the retailer should be

perceived as higher than the sacrifice (e.g., the prices they need to pay, effort, and time used to procure products). Typical benefits the customer can expect are personalized promotion, just-in-time promotion, product quality, and a convenient shopping environment. To increase customers' value perception, the retailer should reduce customer sacrifice or increase customer benefit to the degree that both parties benefit from the interaction. Ramaseshan, Evanschitzky, and Johnston (2008) also pinpoint that customer value perception is an important focus area and an essential driver for increased profit. A customer that feels valued and experience received value higher than the sacrifice taken will spend more money on the retailer on a year-to-year basis. Furthermore, Inman and Nikolova (2017) discuss that retailers should be sceptical and consider how new technology might affect the customers' overall value perception.

2.4.3 Satisfaction

Customer satisfaction is connected to customer behavior and is a critical factor for companies to keep and gain customers. Inman and Nikolova (2017) mention that satisfaction is closely related to shareholder value, profitability, market shares, and stock price. The authors mention there is multiple definitions that the researcher should explicitly define based on the context of interest. Researchers have different opinions if customer satisfaction is part of an evaluation process or a response to the evaluation process. Based on the similarity between existing definitions, we can interpret satisfaction as customer response to a particular focus and occurs at a particular time. Nevertheless, the conceptualization is either an emotional or cognitive response (Giese and Cote 2000). Finally, Inman and Nikolova (2017) discuss that retailers should investigate how the consumers adopt new technology and how it positively or negatively impacts customer satisfaction. It is critical to understand potential reactions before fully adopting new technology.

2.4.4 Relationship Trust

From a retail context, trust is about customers believing in the retailers' reliability and integrity. It is expected from retailers to take actions that will positively affect the customers and avoid actions that might negatively affect them (Inman and Nikolova 2017). The authors further discuss three antecedents for building trust between customers and suppliers: (1) Communication, sharing information valuable for the customers, and sustaining a transparent business, (2) shared value, obtain an understanding of what policies, procedures, and behaviors are appropriate for both the retailer and the customers, and (3) opportunistic behavior, self-interested behavior harming norms of behavior.

2.4.5 Relationship Commitment and Loyalty

According to Inman and Nikolova (2017), the conceptualization of relationship commitment is very similar to loyalty. Relationship commitment differentiation itself from loyalty on the basis that it refers to the belief of an exchange partner that a relationship with another party is so precious that it deserves the maximum force to support it. While loyalty represents the willingness to complete a set of behaviors that indicate shoppers' propensity to preserve a continuing relationship with the retailer, such behaviors might involve repeat purchasing and a more substantial share of wallet. To sustain a relationship commitment and customer loyalty, retailers need to ensure a consistent stream of revenues and increase profitability. Therefore, the authors pinpoint that retailers should look closely at how the implementation of new technology will impact the customer relationship and the loyalty to the retailer. Investigating how new technology might improve relationships and increase loyalty among existing and new customers is highly relevant.

2.4.6 Privacy Concerns

As technology has infiltrated everyday life, privacy concerns have emerged. Retailers utilize technology to improve and streamline processes and complete a more cost-effective personal marketing strategy. As a result, research shows increased concerns among consumers and how other parties use and misuse their private information. According to Inman and Nikolova (2017), the most significant privacy concerns among consumers are in the USA, where they believe private information is under severe threat. Moreover, privacy concerns arise from three distinct dimensions: (1) Collection of private data, (2) control over other parties' usage of private data, (3) awareness of privacy practices and how the utilization of data. Retailers should be aware of how new technology affects customers' perception of privacy. For instance, if the customer feels surveilled by cameras in the store without feeling any benefit of customer service and in-store experience, it might influence privacy concerns. Technology implemented by retailers should improve the customer in-store experience and service, and in return, the customers are more willing to share private information (Inman and Nikolova 2017).

2.5 Customer Experience

Meyer and Schwager (2007) thoroughly investigated what customer experience are and how businesses should increase this focus to get a customer relationship. The customer experience is encompassing each aspect the enterprise is offering. Meyer and Schwager (2007) mention that there is a focus on customer care and service, which is a critical aspect, however, they also

mention reliability, advertising, product, and packaging as significant areas. The majority of staff responsible for these areas do not give enough thought on how the different decisions are affecting the overall customer experience. Today, consumers have a great range of choices and companies have multiple channels they can pursue them. There are simple integrated solutions to problems that will win the time-pressed consumer (Meyer and Schwager 2007). The customer experience is appearing through direct and indirect contact. Direct contact is normally initiated by the customer and can be during the purchase stage, during use, and through service. Indirect is unplanned encounters representing the enterprise brand, service and product, often through news, advertising, reviews, word of mouth, and criticism. Grewal, Levy & Kumar (2009) mention that many companies are increasing customer experience through deep strong promotional efforts such as big discounts and free shipping. This might have generated new customers; however, this also leads to deep profit cuts. Therefore, companies should look at methods to meet customer expectations and their actual experience that, primarily, will have a positive impact on profit.

To enhance the customer experience, the enterprise should track the customers past patterns, present patterns and potential patterns, or a combination of these:

- **Past** - includes to capture recent experiences and should improve transaction experiences, track goals and trends and identify potential issues that are emerging.
- **Present** - tracks the current experience issue and relationship and should keep overview of the customers relationship to the overall brand. It is intended to look at future opportunities but also investigate previous actions.
- **Potential** – this a more focused stage and targets inquiries to disclose and test future opportunities (Meyer and Schwager 2007).

Grewal & Roggeveen (2020) also discuss how technology impacts shopping behavior. Technology is getting more advanced and has become a significant part of the way humans live. Technology has and will further reshape retail landscapes and change the way we shop. There is more mobile technology and social media interaction, and we are also witnessing the entrance of the IoT in Retail. Osselaer et al. (2020) discuss how technology and automation might have a negative impact on consumers and workers regarding that they might feel more objectified, and consumers feel more estranged by the producers. This feeling will have a negative influence on both producer and consumer. Osselaer et al. (2020) pinpoint Karl Marx`s saying about

alienation that capitalistic communities objectify humans by depriving them of meaning and taking control over their functional outcome. Producers are placed away from consumers to create greater operational efficiency, which, according to Karl Marx, removing much of the producers' meaning and pride in their work and more repetitive work life. From the consumers' perspective, they do not know who has produced the product that is considered, which leads to less willingness to pay.

Increased automation of retail stores might influence consumers' willingness to pay. Today, for example, it is possible to purchase a coffee through a smartphone and pick it up at the cafe, with almost no human interaction. At McDonald's, shoppers can also order through a digital screen at the restaurant with no personnel interaction. In a grocery store setting, Amazon has rolled out a new way of purchasing daily groceries with the concept store Amazon Go. These stores have implemented advanced technologies allowing the customers to go in, pick what they need, and go straight out without any checkout interaction. Instead, they get a receipt on their phone.

These automating systems change the customer journey, and Osselaer et al. (2020) mention the necessity to personalize to make consumers feel less objectified and mere profit tools. Extended marketing research discusses how two-way communication positively affects the customer experience. Grewal & Roggeveen (2020) mention that workers and consumers should share personal information to maintain meaning, value, and increased experience.

2.5.1 Internet of Things Impact on Customer Experience

As the previous chapters indicate, IoT has an enormous opportunity to impact the retail industry and customers' overall experience positively. However, the management should be aware of possible adverse effects before investing in new automated technology as it might negatively impact customers' experience as interaction with only technology can result in an objectifying feeling among the customers (Osselaer et al. 2020). There are many ways IoT can improve customer experience, e.g., with RFID-tags, consumers can find product information such as where the product is produced, washing information, the material source, related costs, and different deliveries method (Floarea and Sgârciu 2016). If products are attached with RFID-tags, sensors, and barcode scanners, consumers have the opportunity to interact with the product through smartphone cameras, smart glasses, or other "smart" devices. This gives an efficient method for consumers to check prices, quality, sizes, colors, and stock availability.

With beacon technology, customers can get customized promotions and discounts on relevant categories as they enter the store, based on the previous action online. Bluetooth sensors/beacons detect shoppers' smartphones and gather data on what the customer is interested in and what they previously have paid attention to in their online profile (Hoyer et al. 2020). Grewal, Levy & Kumar (2009) mentions how companies are in many situations using free shipping and discounts to attract customers and increase their experience with the brand. This also leads to reduced profit and more of a method to invest in the market/customer to increase market shares.

2.6 Internet of Things in Customer Journey – Overview

A framework made by Hoyer et al. (2020) indicates that IoT has a high influence on the pre-transaction stage, medium influence at the transaction stage, and low influence on post-transactions. Consumers' cognitive value with IoT is through information access, which the companies can utilize later to target better and understand their customers. As more items and devices get connected to the internet, more data can be collected, and the more insight and information access there is. Table 4 illustrates how IoT technology will impact the different stages in a retail customer journey.

Table 4 - Internet of Things in Retail: Customer Journey

Pre-purchase (high impact)	This stage is about information gathering through technologies such as RFID tags. The consumer has the possibility to collect much more information about products than before, everything from where the raw material is gathered, who has produced it, and how the product is impacting climate change. There are also technologies such as beacons, smart shelves, smart shopping bags, etc.
purchase (medium impact)	The transaction stage is all technology utilized during the actual transaction. These are concepts such as 'Just Walk Out', where the customers do not need to interact with a cashier, and instead pick the goods, go out, and the bank account automatically withdraws for the items chosen.
Post-purchase (low impact)	The Post-transaction stage is about service and maintenance and can be connected to smart home technologies such as a smart fridge. A smart fridge can directly impact the grocery industry, as it automatically registers missing items and can communicate directly with favored grocery stores.

2.6.1 Consumers Reactions to New Technology

Hoyer et al. (2020) mention that customers will be affected in two different ways when exposed to new technology; either they are experiencing perceived ease of use or an uncanniness. The technologies are supposed to positively affect the consumers and improve their overall experience in meeting the brand. However, some consumers might feel the technology unnecessary and more of a hassle than an improvement. It will vary based on situation and user, e.g., there is more likely that younger humans are more accepting of new technology than older humans, even though it is beneficial (Chen & Chan 2011). Therefore, it is critical to empirically analyze to what degree the consumers experience perceived ease of use vs. uncanny (Hoyer et al. 2020). Research also discusses how technology replacing human power tends to be anthropomorphized. It remains for future research to what degree technologies should be anthropomorphized vs. very technological and how the different dimensions affect customer experience. For example, there is found that chatbots and digital helpers are less liked when anthropomorphized (Hoyer et al. 2020).

2.8 A model for this study

Figure 2 represents our secondary research findings divided into two primary categories; IoT Grocery Technology and impact on customers. There are eight prominent IoT applications, where some of which have been or probably will be adopted by grocery retailers in the near future. These technologies have an impact on the customer journey and the different purchase stages. As mentioned above, IoT has the highest impact on the pre-purchase stage. However, it is vital to find out what technology on what stage is influencing the customer the most. Throughout the purchase-stages, there is possible to interpret what touchpoints are most vital and what technology has the most significant effect on each touchpoint. Further, after the customer has interacted with the retailer and completed the customer journey, they will have some perceptions of the technology that further influence their customer experience. Inspired by Nikolova et al. (2017), the model introduces six different customer perceptions; Justice/Fairness perception, value perception, satisfaction, relationship trust, relationship commitment, relationship loyalty, and privacy concerns.

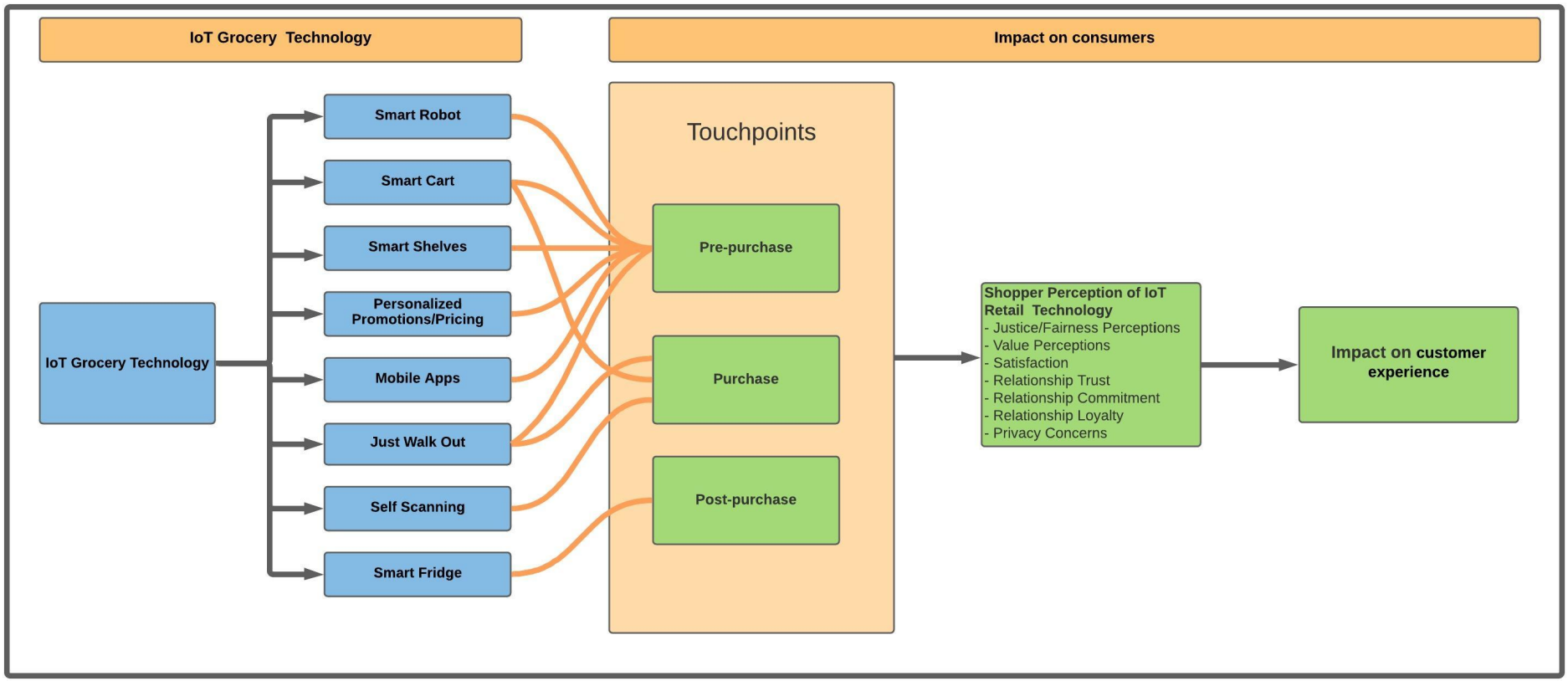

Figure 2 - A model for this study

3.0 Research Methodology

This thesis aims to contribute to more knowledge on the future of grocery retailing by providing reliable insight into customer perceptions towards eight prominent IoT technologies that have penetrated the market or that will probably appear in the visible future. The utilization of surveys as a data generation is applied to apprehend a comprehensive approach and obtain an accurate measure of customer perception towards these technologies. The dissertation is based on survey research using a quantitative exploratory-descriptive research design that does not test hypotheses. The idea is to use statistical precision to quantify the population opinions on described technologies and compare groups. By understanding characteristics, we can better conclude and define future research areas.

3.1 Designing the Questionnaire

This paper has adopted the self-administered questionnaire from Inman & Nikolova (2017), which again have adopted it from various authors. It is a widely tested and well-designed questionnaire that ensures high content validity and reliability. The questionnaire is designed to generate primarily opinion data and some factual data in the start to determine demographics. All the questions are closed, forcing our respondents to choose from a range of predefined answers. The process of refining the questionnaire to match our study took a significant amount of time, ensuring that we had the data needed to answer the research question. The layout and structure of the questions is a mix of a descriptive text and pictures/meme that explains the technology and its purpose.

Introductory, the respondents were shown the purpose of the research and assured that their answers would be confidential. In addition, they were given explicit instructions on how to complete the survey. We have investigated eight IoT technologies for grocery stores to examine customers' attitudes and understand better if implementing such technologies will improve the overall customer experience towards grocery retailers. The survey starts with demographic questions to better understand the respondents and recognize what differentiates respondents' opinions. Furthermore, a description of the technology followed up with questions within the seven consumer perceptions described in chapter X.X was presented. The questionnaire was generated using Google Forms, and our supervisor, Asle Fagerstrøm, reviewed early versions of the questionnaire. Appendix X contains the complete questionnaire.

3.2 Measures

The respondents answered the demographic questions using multiple options generated with the influence of previous studies. To better understand the respondent's situation, we gather data related to gender, age, location, attitude towards grocery shopping, what type of household, and who does the shopping, frequency of shopping, and education

On a Likert scale of 1 to 7, respondents were asked to rate their perceptions of each technology after reading their description. They were asked to scale their level of agreement *(1=strongly disagree, 7=strongly agree)*, level of change *(1=Would change extremely negatively, 7= Would change extremely positively)*, level of satisfaction *(1 = Very low; 7 = Very high)*, level of agreement *(1 = Strongly disagree; 7 = Strongly agree)*, level of concern *(1 = Not concerned at all; 7 = Very concerned)*, and level of attitude towards retailer after implementation *(1 = Would change extremely negatively, 7 = Would change extremely positively).*

The Likert scales are adopted from Inman and Nikolova (2017); however, they have different values, some are 7 points, and some are 10 points. To make it more accessible making sense of the data in the analysis, we converted it all to a 7-point Likert scale as strongly advised by our supervisor. Questions with this scale are helpful as they permit the respondents to be neutral to the questions asked. Questionnaires with this scale help measure the respondents' attitudes and values (Ringdal 2013, 202). By having a scale of 6 (or other 7) measurement points, the respondents, who may have no shape on the topic, become forced to confront the question.

3.3 Pilot Study

Following Oates (2006, 226), we conducted a pilot study to find weaknesses in the questionnaire. The questionnaire is comprehensive and took approximately 15 minutes to complete. Since the questionnaire was time-consuming and each respondent had to put in some effort to answer all the questions, we had difficulties finding a population willing to respond. Thereby, we used Amazon Mturk, a crowdsourcing marketplace that allows researchers to pay a small fee to those who complete surveys. In the pilot study, we put a limit on 20 respondents, which are similar to our intended respondents, and found that as a satisfying amount of people to create a sample of data. However, the respondents from Amazon Mturk were randomly generated worldwide, and we could not later hear their opinions of questionnaire structure. Therefore, the questionnaire was sent to family, acquaintances, and supervisor, in order to receive constructive critique and ideas for improvement based on their experience.

The overall feedback was positive, and the respondents agreed that the questions and descriptions of technologies were understandable and adequately formulated. There were some implications that it was too time-consuming. However, since we generate respondents through a small fee, we decided to stick with all the questions.

3.4 Gathering Respondents

The designed questionnaires' goal was to be understandable for the general population and intentionally categorize a group of people for comparison. We did a convenience sampling of data using Amazon Mturk (200 respondents) and family/acquaintances (50 respondents) to the questionnaire. The response rate was 100% through Amazon Mturk. However, only 4 of 50 asked family and acquaintances answered, and resulted in a poor response rate of 8%. In total, we ended with 204 respondents representing the data used in section 4. We hoped for a diverse selection of respondents from all continents, but Asia and North America accounted for the majority of respondents. We also hoped for a full range of gender responses, but there were significantly more male respondents. In education level the majority of respondents had a bachelor or master's degree, where we also wished for some more respondents on high school and PhD level.

4.0 Analysis and Results

In this research, we conducted a Kruskal-Wallis test for an independent sample, a nonparametric equivalent of the one-way ANOVA based on Chi-square statistics. The test-statistics for this test are H statistics. The Kruskal-Wallis H test (sometimes called the "one-way ANOVA on ranks") is a rank-based nonparametric test applied to determine statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable. The Kruskal-Wallis H test found several significant differences between the groups. However, since the Kruskal-Wallis H test only determines whether the medians of two or more groups are different and not which groups are different, we also conducted a Dunn-Bonferroni post-hoc test. In this way, we could fully grasp the diversity in all shoppers' perceptions between the eight different retail technologies and pinpoint which specific means are significant from the others. Finally, to eliminate the likelihood of coming about a significant result by pure chance, we conducted a Bonferroni correction to protect from Type I error. As we are conducting multiple analyses on the same dependent variables, the chance of committing a Type I error increases. Therefore, in the following analytics section, we will only account for the results generated by the Bonferroni correction.

4.1 Descriptive Statistics

Bryman & Bell (2015, p13) write that data inspection must be carried out to determine any apparent errors in the dataset. By analyzing the variables related to the respondents, the goal is to find abnormalities, weaknesses, or discrepancies. Table 5 showcases the distribution of respondents on sex, age, education level, continent, household type, attitude towards grocery retailing, who usually does the grocery shopping, and how often they do grocery shopping.

Table 5 - Descriptive Statistics

Select your gender		
Sex	**Frequency**	**Percent**
Female	54	26.5
Male	147	72.1
Prefer not to say	3	1.5

Where are you from?		
Location	**Frequency**	**Percent**
Africa	12	5.9
Asia	72	35.3
Europe	11	5.4
North America	84	41.2
South America	25	12.3

What is your attitude towards grocery shopping?		
Score	**Frequency**	**Percent**
1	16	7.8
2	0	0
3	31	15.2
4	11	5.4
5	38	18.5
6	66	32.4
7	42	20.6

How old are you?		
Age	**Frequency**	**Percent**
18-24	10	4.9
25-29	79	38.7
30-34	54	26.5
35-44	35	11.8
45-54	11	5.4
55+	26	12.7

What is the highest level of education you have?		
Education	**Frequency**	**Percent**
High School	16	7.8
Bachelor's degree	102	50.0
Master's degree	65	31.9
Doctor of Philosophy (PhD)	21	10.3

Who grocery shops in your household?		
Who	**Frequency**	**Percent**
I do it myself	86	42.2
My children	39	19.1
Shared responsibility	28	13.7
Spouse/cohabitant	51	25.0

What household type are you?		
Age	**Frequency**	**Percent**
'Other'	4	2.0
Couple households	142	69.6
Single person households	16	7.8
Single-parent households	42	20.6

How often do you do your grocery shopping?		
Amount	**Frequency**	**Percent**
2-3 times a week	72	35.3
2-3 times per month	34	16.7
More than 4 times a week or everyday	9	4.4
Once a week	89	43.6

4.2 Smart Robot

For grocery stores implementing smart robot technology, we can see a significant difference between age segment 55+ and 35-44 and their perception of relationship commitment. Respondents within 35-44 years have a significantly higher average rank and will contribute to a more consistent revenue stream for retailers implementing smart robot technology. Respondents' attitude towards grocery shopping is the variable that has the most significant variation on the different perceptions. Similarly, on all the perceptions, we can see that those who are very positive towards grocery shopping (7) have the highest average rank, including privacy concerns. In justice/fairness and value perception, there are found significant differences between those who are very positive (7), those who are less (5 and 6), and those who are neutral (4). Figure 3 showcases that respondents' justice/fairness perception and their perceived value decreases as their attitude towards grocery shopping decreases. In privacy concerns and relationship commitment, there are revealed significant differences between those who are very positive (7), and those who are less positive (5), and those who are more negative (3). The respondents who are positive towards grocery shopping, in general, have also found to have a high relationship commitment towards grocery stores implementing Smart Robots. However, these customers are also most concerned about their privacy when interacting with this technology. There are also differences between Respondents' satisfaction perception, relationship trust, and relationship loyalty of grocery stores, and their general attitude towards grocery shopping. Figure 3 illustrates significant differences between attitude segments very high (7) and less positive (5 and 6), neutral (4), and negative (3). as well as the other perceptions, show the result that those who scored very high on grocery shopping attitude also scored high on satisfaction perception, relationship trust, and relationship loyalty. Figure 3 indicates that Smart Robot technologies are most attractive to 35-44 and those who have a positive attitude towards grocery shopping.

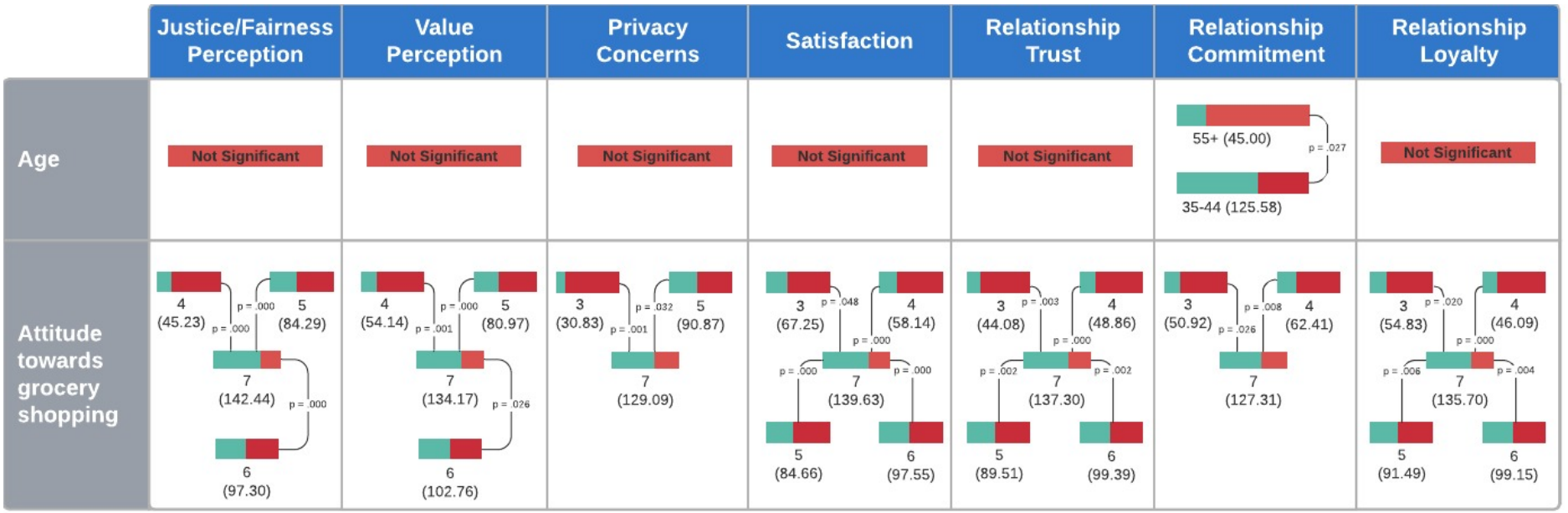

Figure 3 - Bonferroni Correction of Smart Robot. Value of the mean rank presented in parenthesis and visualized in green. Minimum Value = 1, Maximum Value = 204 (N). The lines represent the adj.Sig. and contains the adjusted p-values between the groups

4.3 Smart Shopping Cart

Our analysis revealed significant differences between the groups' age, location, attitude towards grocery shopping, and household type (Figure 4). First, findings reveal a significant difference between 55+ and 35-44 on Satisfaction and Relationship Commitment, and Trust. This result indicates that the age group 35-44 has a higher probability of accepting Smart Shopping Cart technology as they find it more satisfactory and are more likely to commit to their local grocery implementing the technology and increased loyalty. Second, the data revealed a significant difference between Asia and North America on Privacy Concerns by analyzing shoppers' location, which means that shoppers in Asia have significantly fewer privacy concerns towards Smart Shopping Cart than shoppers in North America.

Third, our analysis revealed significant differences between shoppers' attitudes towards grocery shopping on every perception. Compared to the other shoppers with less (6 and 5), neutral (4), and lower (3) attitudes, the results reveal that shoppers with the most positive attitude towards grocery shopping (7) have a higher probability to accept Self Scanning technology. They find it more just/fair, valuable, satisfactory, and more likely to commit, trust or increase loyalty to their local grocery implementing the technology. The results also revealed that the more positive attitude shoppers have, the more privacy concerns they have. However, there are two things worth pointing out. First, on Justice/Fairness Perception, there is no significant difference between a lower attitude towards grocery shopping (3 or lower). Second, significant differences between shoppers with positive (6) and neutral (4) attitudes were only significant on privacy concerns. However, the overall results can be interpreted as that the shoppers with the most positive attitude towards grocery shopping (7) have a higher probability of accepting Smart Shopping Cart technology. Nevertheless, without the confirmation of significant difference between 6 and 4 on some perspectives, and the lack of significant difference on shoppers with low attitudes on Justice/Fairness Perception might indicate that grocery retailers might benefit more by implementing one of the other technologies.

Finally, our data revealed a significant difference between Household Type on Relationship Trust and Commitment. These findings indicate that Single-parent households have higher Trust and Integrity towards Smart Shopping Cart than Single-Person Households and that Couple Households are more likely to commit to the technology than others Households.

Figure 4 - Bonferroni Correction of Smart Shopping Cart. Value of the mean rank presented in parenthesis and visualized in green. Minimum Value = 1, Maximum Value = 204 (N). The lines represent the adj.Sig. and contains the adjusted p-values between the groups

4.4 Smart Shelves

The Dunn-Bonferroni correction test found significant differences in perceptions based on respondents' attitudes towards grocery shopping and their household type. In justice/fairness perception, relationship trust, and relationship commitment, there are found differences between very positive attitudes (7) and those who have less positive (5 and 6) and those who have a neutral attitude (4). Those with a positive attitude have the highest average rank on all three perceptions. The perceived justice/fairness, trust, and commitment are decreasing similarly with the respondents' attitude.

When measuring value perception, there is found significant differences between very positive attitudes (7) and those who have less positive (5), and those who have a neutral attitude (4). Those respondents who scored very high will feel more excellent perceived value when visiting a grocery store implementing this technology. Relationship loyalty perception has similar findings. However, there was also a significant difference between those who scored very high (7) and those who were more negative (3). In satisfaction perception, there is only a significant difference between those who scored very high (7) and those who are neutral (4), where those very positive towards grocery shopping will experience significantly higher customer experience shopping at a grocery store with smart shelves.

Regarding privacy concerns, there is found that those who have a positive attitude towards grocery shopping are those most concerned about privacy when shopping at a store utilizing Smart Shelves technology. There are further found significant differences between those who are very positive (7) and those who are less positive (5 and 6), those who are neutral (4), and those who are negative towards grocery shopping (3). The analysis also revealed a significant difference between positive (6) and those who are negative (3). Privacy concerns are decreasing together with customers' attitudes towards grocery shopping.

Figure 5 also lists significant differences between households in privacy and relationship trust. We can see that single-parent households have significantly more serious privacy concerns than single-person households. It is also found that couple households have a higher average score on relationship trust than single-person households. This indicates that couples have a higher level of confidence in grocery stores with smart shelves built into their infrastructure.

Figure 5 - Bonferroni Correction of Smart Shelves. Value of the mean rank presented in parenthesis and visualized in green. Minimum Value = 1, Maximum Value = 204 (N). The lines represent the adj.Sig. and contains the adjusted p-values between the groups

4.5 Personalized Promotion/Pricing

Our analysis revealed significant differences between the groups' location, attitude towards grocery shopping, who does the shopping, and education (Figure 6). First, the data revealed a significant difference between Asia and North America on Privacy Concerns and Relationship Trust. This indicates that shoppers in Asia have significantly fewer privacy concerns and significantly more trust towards Smart Shopping Cart than shoppers in North America. Third, the data revealed significant differences between shoppers' attitudes towards grocery shopping on every perception. The overall results came out the same as with Smart Shopping Cart. However, there were some noticeable differences. The most exciting difference relates to Justice/Fairness Perception, Value Perception, Relationship Trust, Commitment, and Loyalty. Where there is a significant difference between positive attitude (6) and negative attitude (3), in addition to very positive attitude (7) and negative attitude (3), also found in the technologies as mentioned earlier. However, since there is also a significant difference between 6 and 3, it confirms that the more positive shoppers' attitude towards grocery shopping is (7 and 6), the higher is the probability of accepting Personalized Promotion/Pricing compared to shoppers with a less positive attitude (3).

Third, the data revealed significant differences between households with shared responsibility, shoppers who do the shopping themselves or use their children or spouse/cohabitant on Justice/Fairness, Satisfaction and Relationship Trust, Commitment Loyalty. These results might indicate that the shoppers with shared responsibility have a lower probability of accepting Personalized Promotion/Pricing technology. They find it less just/fair and are less likely to commit, trust, or increase loyalty to their local grocery implementing the technology compared to the other groups. The same results were found on Value Perception, Satisfaction, but in these perceptions it was also a significant difference in perceived usefulness between shoppers with shared responsibility and shoppers who use their child(ren). Finally, our findings revealed a significant difference between shoppers with High School, Masters's, and Bachelor's degrees on every perception. Compared to shoppers with High School Degree, these results indicate that the shoppers with either Bachelor's or Master's degrees see a significantly higher perceived usefulness in Personalized Promotion/Pricing. They find it more just/fair, valuable, satisfactory, and more likely to commit, trust or increase loyalty to their local grocery implementing the technology. Also, shoppers with Master's or Bachelor's degree has significantly more privacy concerns towards the technology.

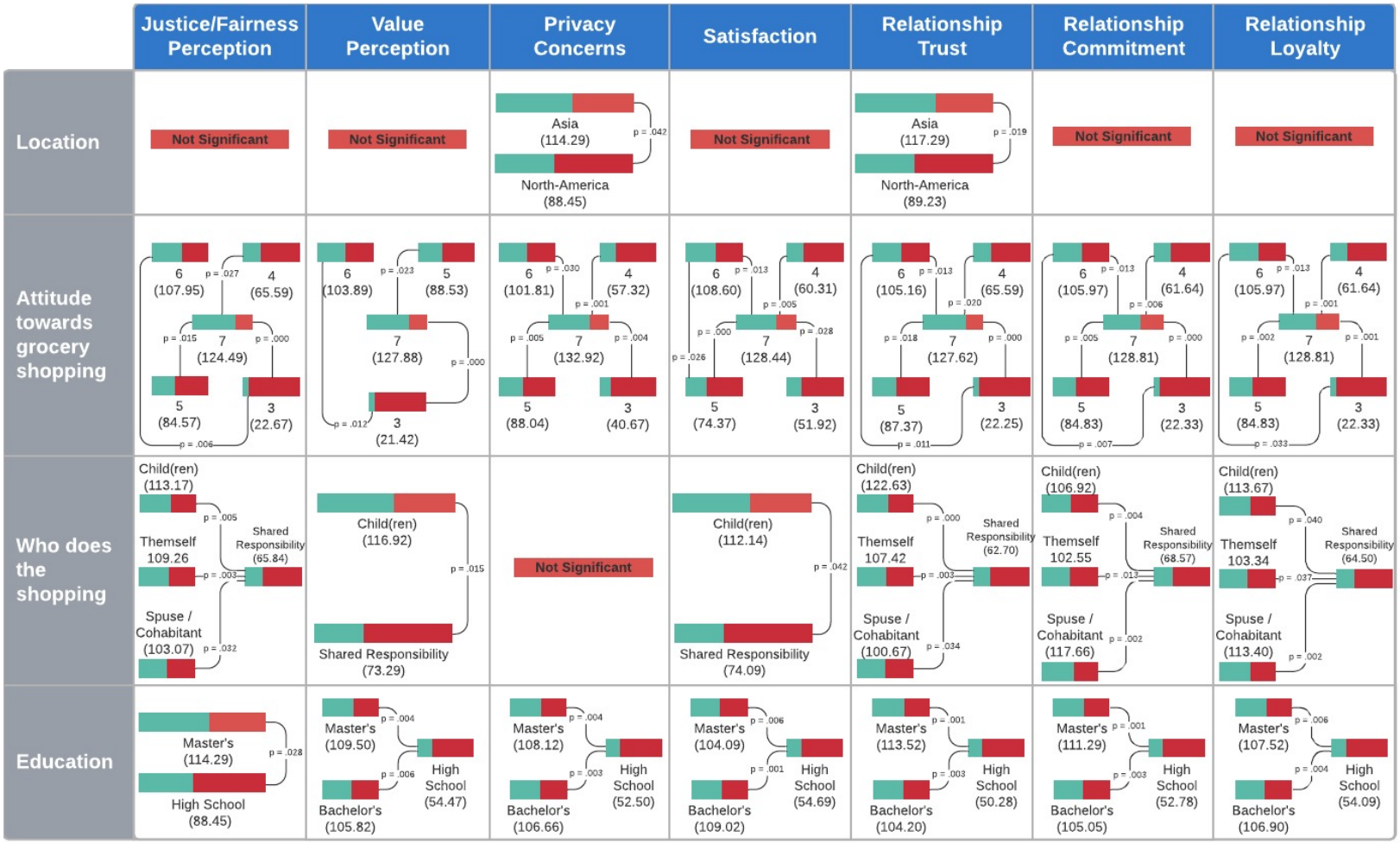

Figure 6 - Bonferroni Correction of Personalized Promotion/Pricing. Value of the mean rank presented in parenthesis and visualized in green. Minimum Value = 1, Maximum Value = 204 (N). The lines represent the adj.Sig. and contains the adjusted p-values between the groups

4.6 Mobile Apps

Our analysis revealed significant differences between the shoppers' attitude towards grocery shopping and education (Figure 7). The data revealed a significant difference between shoppers' attitudes towards grocery shopping on every perception. The overall results came out the same as with Smart Shopping Cart and Personalized Promotion/Pricing. Nevertheless, there were some noticeable differences. First, there was a significant difference between positive attitude (6) and negative attitude (3) on Satisfaction and Relationship Trust, in addition to very positive attitude (7) and negative attitude (3). Second, there is no significance findings on negative attitudes (3 or lower) on Justice/Fairness Perception. Third, there is no significance difference between positive attitude (6) on either Value Perception, Privacy Concerns, or Relationship Loyalty. However, since there are less significant results on less perspectives between positive attitude (6) and negative attitude (3), positive attitude (7) and negative attitude (3), no significant findings on negative attitude (3 or lower) on Justice/Fairness Perception, in addition to lack of significance between positive attitude (6) on several perceptions.

Finally, our findings revealed a significant difference between shoppers with High School, Masters's, and Bachelors's degrees on privacy concerns. This result indicates that the shoppers with either Bachelor's or Masters' degree have significantly more privacy concerns towards the technology than shoppers with a high school degree.

Figure 7 - Bonferroni Correction Mobile Apps. Value of the mean rank presented in parenthesis and visualized in green. Minimum Value = 1, Maximum Value = 204 (N). The lines represent the adj.Sig. and contains the adjusted p-values between the groups

4.7 ‘Just Walk Out’

The analysis found a significant difference between age segments after the Bonferroni correction. In the justice/fairness perception, we can see a significant difference between the age segments 45-54 and 35-44, where the older age segment feels less equity in the exchange between themself and the grocery store implementing this technology. Age segment 35-44 have the highest score and have the highest justice perception of 'Just Walk Out'. The same goes for the value perception, where there is a significant difference between age segment 35-44 and 55+. Figure 8 also shows that age segments 35-44 will increase their relationship loyalty significantly, implementing 'Just Walk Out' technology, rather than age segment 45-54. These numbers indicate that the older age segments have more negative perceptions of this technology. However, in privacy concerns, there are significant differences between age segments 45-54 and 25-29, showing that the younger age segment is significantly more concerned about privacy.

There are also found significant differences in perception based on respondents' attitude towards grocery shopping in general. Figure 8 showcases that those who have a highly positive attitude towards grocery retailing (7) in general also are highly positive towards 'Just Walk Out' technology. Those who are very positive (7) have the highest average score on all the perceptions except relationship loyalty, which had no significant differences after the Bonferroni correction. The analysis also indicates that the lower attitude they have towards grocery retailing mirrors their perceptions of this type of technology. Those who have low scores on attitude also have low scores on the perceptions.

Interestingly, we can also see that respondents with a positive attitude towards grocery retailing are more skeptical regarding privacy concerns. In privacy concerns, there are significant differences between those who are very positive (7) and those who are less positive (5), and those who are more negative (3). There is also a significant difference between positive (6) and those who are negative (3). The score decreases with respondents' attitudes, indicating that the more positive they are towards grocery shopping, the more concerned they are about privacy when shopping at a store with the 'Just Walk Out' concept.

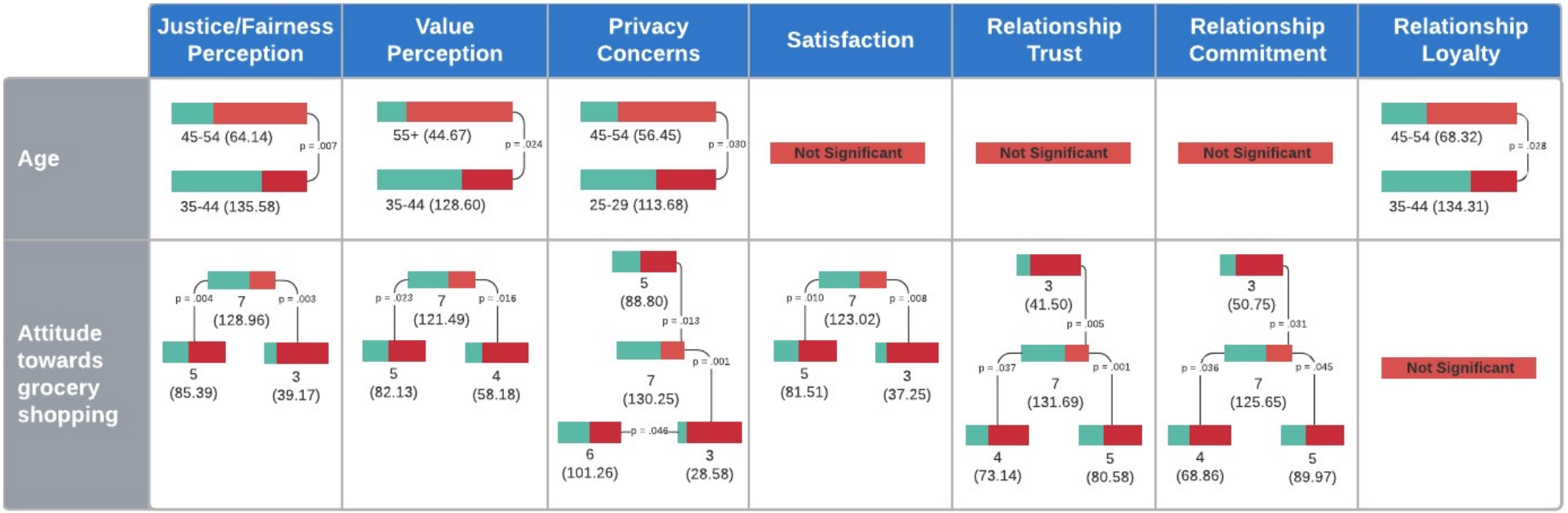

Figure 8 - Bonferroni Correction of Just Walk out. Value of the mean rank presented in parenthesis and visualized in green. Minimum Value = 1, Maximum Value = 204 (N). The lines represent the adj.Sig. and contains the adjusted p-values between the groups

4.8 Self Scanning

Our analysis revealed significant differences between the groups on age and attitude towards grocery shopping (Figure 9). First, our findings reveal a significant difference between the age segment 55+ and 35-44 on Justice/Fairness, Satisfaction, and Relationship Commitment. This result indicates that the age segment 35-44 has a higher probability of accepting Self Scanning technology. They find it more just, fair, satisfactory, and more likely to commit to their local grocery implementing the technology. In contrast, the age segment 55+ is the opposite. The same results were found on Value Perception, Privacy Concerns, and Relationship Trust, but in these perceptions, the data also revealed a significant difference between age segment 55+ and 25-29. According to the data, this means that the age segment 25-29 and 35-44 have a higher perceived value and trust towards Self Scanning technology, but significantly more privacy concerns than the age segment 55+.

Second, our analysis revealed significant differences between shoppers' attitudes towards grocery shopping on every perception. The overall results came out the same as Smart Shopping Cart, Personalized Promotion/Pricing, and Mobile Apps. Interestingly, the results also revealed a significant difference between shoppers with positive (6) and neutral (4) attitudes on Justice/Fairness Perception, Value Perception, Relationship Trust, and Commitment. This might give a stronger confirmation that the more positive shoppers' attitude is, they are more likely to accept Self Scanning technology.

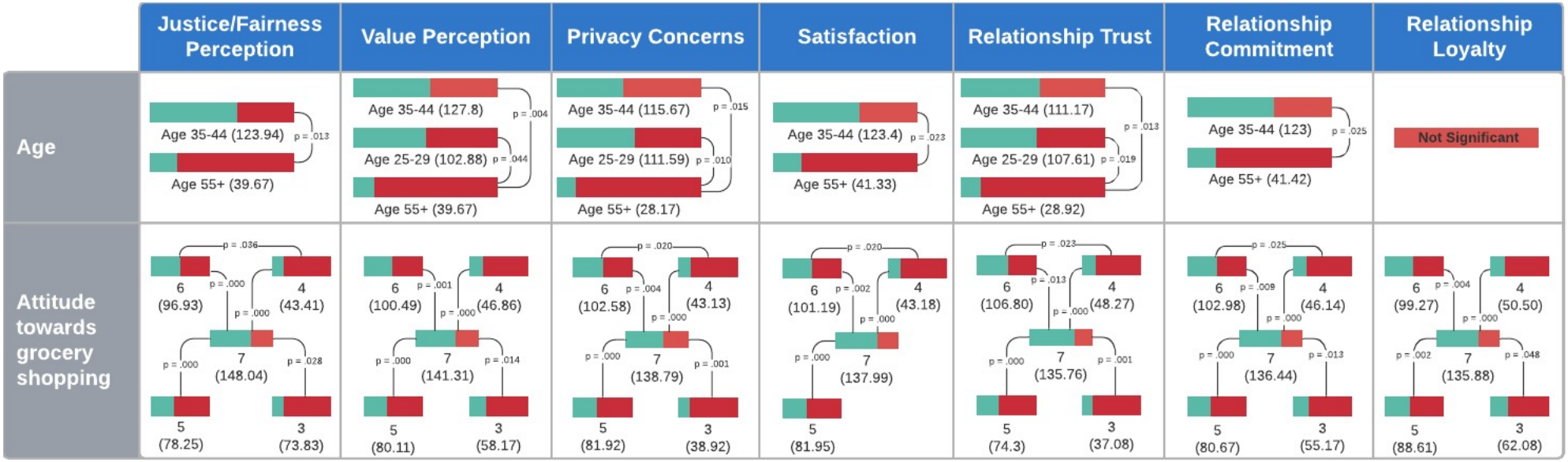

Figure 9 - Bonferroni Correction of Self Scanning. Value of the mean rank presented in parenthesis and visualized in green. Minimum Value = 1, Maximum Value = 204 (N). The lines represent the adj.Sig. and contains the adjusted p-values between the groups

4.9 Smart Fridge

The smart fridge technology differentiates from the other technologies and is not measured as a direct link to any grocery technology. Therefore, we have removed satisfaction perception, relationship trust, relationship commitment, and relationship loyalty. Smart Fridge is the only IoT technology in this thesis that affects the consumers in the post-purchase stage. As figure 10 shows, there is a significant difference between the age segments 55+ and 35-44 in the justice/fairness perception. Age segment 35-44 feel more significant equity in the exchange between themself and the grocery store implementing this technology. Looking at the findings in value perception, there are significant differences in 55+ and 35-44, 35-44 and 30-34, and lastly 35-44 and 25-29. The age segment 35-44 feels a significantly greater value of what is given and received using a smart fridge. 55+ are the age segment that scores lowest and sees less value and investment return in this technology.

Figure 10 further illustrates that respondents' attitudes towards grocery retailing have a significant impact on all the perceptions of the smart fridge. In the justice/fairness perception, we can see that those who are very positive (7) have a significant difference between those who are less positive (5 and 6) and those who are neutral (4). Respondent attitude is aligned with their perception of fairness using the smart fridge, showing that those who have a positive attitude towards grocery retailing also have a positive justice/fairness perception. Those who scored low on attitude towards grocery retailing also have a less positive perception of fairness in this technology. There are similar patterns in the respondents' value perception of the smart fridge. However, there is also a significant difference between very positive (7) and those who are negative (3). Whereas those who are very positive place a significantly higher value on what is given and obtained by this technology. As well as the other technologies, there were significant differences in respondents' attitudes towards grocery retailing and the privacy perception of this technology. In this case, there are significant differences between very positive (7) and those who are less positive (5), neutral (4), and negative (3). Those that are really positive have significantly more privacy issues, which corresponds to their attitudes toward grocery shopping. There are also significant differences in privacy based on respondents' household types in the smart fridge technology. Figure 10 shows that respondents living in a single-person household have slightly fewer privacy concerns using smart fridges than single-parent households. Measuring justice/fairness perception towards smart fridges, we can see that couple households will experience significantly higher fairness than single-person households.

Figure 10 - Bonferroni Correction of Smart Fridge. Value of the mean rank presented in parenthesis and visualized in green. Minimum Value = 1, Maximum Value = 204 (N). The lines represent the adj.Sig. and contains the adjusted p-values between the groups

5.0 Discussion

The study's key results are compared to the literature review findings to answer the research question "*How can retailers benefit by implementing IoT in grocery stores to enhance customer experience?*".

The future of retail grocery is highly dependent on IoT technology which plays an essential role in increasing revenues and decreasing costs. This thesis addresses various disruptive grocery retail technologies based on IoT that are beginning to gain traction and potential in future grocery retailing. The literature already suggests several application areas for grocery retailers, such as shrinkage reduction, store optimization, and automatization, architecture, privacy, and security (Bansal 2020, p221-237; Joshi, Singar & Akhilesh 2020, p222; Inman and Nikolova 2017; Caro & Ramin, 2019; Dlamini & Johnston, 2016; Kaushik & Dahiya, 2018; Saravanan & Srivatsan 2018). However, the literature reveals limited research on how these technologies affect the customer experience and customer perceptions (Fagerstøm, Eriksson & Sigurðssonc 2017). Our findings reveal that grocery retailers planning to implement some of the discussed technologies should consider shopper perspectives and evaluate how the technologies affect the customer experience. Our framework proposes a method to examine shopper perceptions of the discussed technologies to determine how and if it affects the customer experience. We assume that shoppers renew their perceptions of fairness, value, satisfaction, trust, commitment, and loyalty and judge the likely intrusiveness of the technology on their privacy. As the literature suggests, grocery retailers should have a clear vision and understanding of the firm and its customers' perspective of the customer journey to improve pre-purchase, purchase, and post-purchase stages (Grewal & Roggeveen 2020). The findings reveal that shoppers' perceptions of the retailer implementing the various technologies are affected and might result in a better customer experience for some groups. Therefore, grocery retailers should consider shoppers' perspectives to measure the potential success of any large-scale technology adoption because differences in views drive future purchase likelihood and affect the customer experience. The findings also help calibrate each technology and its potential to deliver its value proposition in the framework. Each technology has its purpose and serves its value. The analysis and result revealed customer perceptions of the mentioned technologies.

The eight technologies are changing the way customers do shopping, and in most of these cases, there is a need for some technological interaction. When implementing these types of technologies, there is a risk that customers will feel more objectified and estranged from the producers. Two-way communication is found to have a positive effect on customer experience. Therefore, there might be a negative effect on implementing technology focusing on reduced use of physical staff (Osselaer et al. 2020). There is a high probability of a different response to the technologies based on customer demographic differences; the majority will hopefully experience these technologies as perceived usefulness. However, some will probably experience the technology as unnecessary and prefer grocery stores to stay as they are. On all the technologies, the analysis found that differences between grocery attitudes have the most significant findings. Those who scored 7 (highest) in their attitude towards grocery shopping, indicating they are very positive, also had the highest overall score on all the seven perceptions. Between age segments, the findings revealed that shoppers between 35-44 are those most positive towards all the technologies and was the age segment who had, in general, the highest average rank on all perceptions where it was significant findings.

There is reason to believe that multiple of these technologies will help improve the overall customer experience. The majority of respondents are above neutral at the Likert scale on all perceptions, indicating that they are overweight on the 'positive' side. However, there is also overweight on people that are concerned about their privacy. Similarly, on all the technologies, there is found that privacy concerns increase as customers' interests increase which indicates that those who have a positive attitude towards grocery shopping are more concerned about their data and potential malicious use. As mentioned, privacy and security are among the most significant threats when utilizing IoT technology (Caro & Ramin, 2019; Dlamini & Johnston, 2016; Kaushik & Dahiya, 2018; Kosha & Singar, 2020; Bansal 2020, p237). Thereover, retailers should have a primary focus on handling customer privacy and communicate this to the customers.

To best clarify the technologies' impact on customer experience, it is helpful to categorize them in different stages in the customer journey and what type of touchpoints they have influence. This dissertation has followed Lemon & Verhoef (2015) division of the customer journey and grouped the technologies in pre-purchase, purchase, or post-purchase. According to Hoyer et al. (2020), IoT has the most significant impact on the pre-purchase stage, which is also correct in this case. Figure 2 illustrates the different technologies belongings and showcases Smart

Robot, Personalized promotion/pricing, smart shelves, and mobile apps belonging to the pre-purchase stage. Self-scanning belongs to the purchase stage, Smart Fridge belongs to post-purchase, while 'Just Walk Out' and Smart Cart belong to both the pre-purchase and purchase stage. The pre-purchase stage is all the interaction customers do before a potential transaction. The purchase stage is where the customer executes any transaction. Post-purchase is all interaction with the brand after the transaction.

Moreover, the technologies affect different touchpoints during the customer journey. Their perception of the grocery store also depends on Technological, Communicative, process, customer to customer interaction, employee to customer interaction, atmospheric and product interaction (Stein and Ramaseshan 2016), and brand-owned, partner-owned, customer-owned, and social/independent/external (Lemon and Verhoef 2015).

Smart Robots, personalized promotion/pricing, and mobile apps had significant findings on customers' attitudes towards grocery shopping. In personalized promotion/pricing, the analysis also found significant differences in location, household situation, and education. Asia has a slightly higher overall rank on relationship trust and privacy concerns. Those who have shared responsibility regarding grocery shopping are less willing to adopt this technology, while bachelor's or master's degrees have a higher probability of accepting Personalized Promotion/Pricing. As well as personalized promotion/pricing contributing to better customer offers is beacon technology improving grocery retailers' customer understanding. It provides numbers of how many are visiting, most or least traffic, and product interests. Grocery retailers can then build a more optimized store tailored to the needs of their customers. Personalized promotion/pricing can be categorized under brand-owned touchpoints and controlled by the grocery store providing this technology. According to Stein and Ramaseshan (2016), it can also be viewed as a communicative touchpoint where the brand communicates through monolog.

Looking at the Smart Robot analysis, we see that the age segment 35-44 years has a significantly higher average rank and will contribute to a more consistent revenue stream for retailers implementing Smart Robot technology. Smart Robots are also brand-owned and controlled by the grocery retailer. Smart Robots will influence the atmospheric touchpoint and the technological touchpoint. The analysis of Mobile apps, categorized under partner-owned touchpoint, found that bachelor's or master's graduates will be more skeptical of adoption because of privacy concerns. Mobile Apps are considerably vague and have multiple functions

and application areas. Beneficial for the customers, mobile applications influence the product interaction touchpoint, where customers can track orders, and in-store (if implemented), they can scan QR codes to see more information about products. Grocery retailers can further track customer behavior on Mobile Apps and collect data applicable to understand psychological behavior among customers. There are numerous other ways to utilize Mobile Apps, but this finding appears to be the most prominent and essential in the context of IoT.

Smart Shelves are the least intrusive technology and indirectly influence customer experience by improving inventory management and product representation. This technology influences the atmospheric touchpoint (primarily if implemented LCD promotion screens) and is brand owned. Like all other technologies, those who have a positive attitude towards grocery shopping also have a positive attitude towards Smart Shelves. The analysis also reveals that single-parent households are most skeptical regarding privacy concerns and that couples are more trusting of grocery stores with Smart Shelves integrated into their networks. Smart shelves are also an effective method to improve grocery retailers' inventory fleet. The shelves will register if products are missing or misplaced. In case of spillage, employees will get notifications immediately and contribute to reducing the $1.1 trillion inventory waste (Bansal 2020, p221; Joshi, Singar & Akhilesh 2020 2020, p222).

Self-scanning, allocated at the purchase stage, is a technology that has appeared more frequently in the last years and contributes to a shorter queue and more time efficient. While other studies found significant differences between customers' education levels and gender, our analysis found significant findings on customers' attitudes and age. People between the age segment 35-44 have a significantly higher chance of adopting this technology than the age segment 55+. The analysis also indicates that those between the age segment 25-29 are most skeptical towards privacy issues in this technology. Self-scanning is a brand-owned touchpoint and creates a technological touchpoint, making it necessary for customers to interact with a technological interface when checking out. This technology also influences the grocery store's atmosphere and communicative process.

Smart Fridge is the only technology allocated at the post-purchase stage and is an investment done by the customers, thereby a customer-owned touchpoint. The Smart Fridge should contribute to a more convenient and automating shopping process. The analysis found that the age segment 30-44 has seen the most fairness and value in this investment, while the older age

segment 55+ score lowest. Regarding perceptions of justice and fairness with Smart Fridge, couple households see slightly higher fairness than single individual households. Moreover, single-parent households feel a more significant threat regarding privacy issues.

'Just Walk Out' and Smart Shopping Carts affect both the pre-purchase and purchase stages, with those in the 35-44 age group, as well as those who are generally optimistic about grocery shopping, having the highest likelihood of embracing these innovations. In terms of Smart Shopping Carts, the findings revealed that Asia has marginally higher privacy issues than North America and that single parents have the highest level of trust. In contrast, couples have the highest level of commitment towards technology. Smart Shopping Carts are brand-owned and influence the atmospheric, communicative, process, and technological touchpoints. Implementing one of these technologies (mainly 'Just Walk Out') would result in a more automated shopping experience and significant cost savings in the event of a staff reduction. The technology would not likely replace the entire customer-facing workforce, but it will redirect them to other tasks (Bansal 2020, p221). The analysis revealed that the age segment 35-44 and shoppers' positive attitude towards grocery shopping has a higher chance of adopting 'Just Walk Out' technology. This technology is brand-owned and strongly influences the atmospheric touchpoint because of the innovative way to grocery shop without the check-out stage. 'Just Walk Out' also influence the process, communicative, and technological touchpoints. SmSH, which is close to 'Just Walk Out,' was explored by Xu et al. (2020) and Liu et al. (2018), who investigated the feasibility of fully automated and unstaffed stores. According to both studies, their technology architecture would boost customer experience, store operations, inventory & supply chain management, and sales opportunities. Moreover, Arayan et al. (2020) and Tallapragada, Rao & Kanapala. (2017) proposed utilizing Smart Shopping Cart technology to increase efficiency while reducing malicious behavior such as shoplifting.

Overall, all the technologies investigated unveiled the potential to enhance customer service. The majority of the eight IoT technologies are allocated at the pre-purchase stage, and Hoyer et al. (2020) discovered, it is during this period that IoT has the most significant effect on the customer journey. The majority of the technologies are either brand-owned or partner-owned and influence the atmospheric, process, communicative and technological touchpoints. The IoT technologies are most appealing to the age segment 35-44 and shoppers with a generally positive attitude towards grocery shopping. According to the results, grocery stores should consider investing in IoT technology to increase customer experience and improve competitive

advantage. Nevertheless, it is imperative to understand that some customers receive value when interacting with other humans and might feel estranged from the producers when interacting with primary technology.

5.1 Managerial Implications

The findings of this dissertation revealed multiple implications for practitioners and might supply valuable insight for grocery retailers looking to modernize their store. Firstly, previous research and this dissertation analysis have found that security and privacy issues are fundamental challenges in IoT. Grocery retailers should ensure customers' privacy and security when implementing one or more of the eight technologies investigated. Second, the grocery retailers should be aware of the customer journey and understand that IoT technologies have the most significant impact in the pre-purchase stage. However, this is not the case for all technologies. Third, implementing one of these IoT technologies will influence some of the customer touchpoints mentioned in table 2, primarily impacting the atmospheric, technological, process, and communicative touchpoints. The majority of technologies are also either brand-owned or partner-owned.

Fourth, the analysis revealed that each of the technologies would have the most significant impact on customers in age-segment 35-44 together with those who already have a positive attitude towards grocery retailing in general. The technologies will have a different level of intrusiveness. For instance, 'Just Walk Out' is the most intrusive technology with facial recognition, camera vision, sensors, and more, which might experience as unpleasant for most customers. Furthermore, Smart Shelves influences the customer experience indirectly and probably the least intrusive technology because it is not collecting any personal customer data.

Finally, throughout the literature review, there is also found that customers might feel estranged from the producer when interacting only with technologies, and two-way communication with staff members will have a positive effect on customer experience for the mass majority (Osselaer et al. 2020).

5.2 Limitation and Future Research

Several limitations should be addressed in this study. The process of gathering respondents was a challenging task as the questionnaire was comprehensive and time-consuming. We tried to use our network to gather the data, but it was nearly impossible to gather willing respondents. As a result, we used Amazon mTurk to gather respondents in exchange for a small amount of money. This was a secure way to collect respondents. However, it had some limitations. It only allowed us to use four segments, which made it impossible to measure, e.g., respondents based on continents or in a specific area like western Europe vs. eastern Europe or use several age segments in several specific areas. Because of this issue, we were obligated to find another solution and decided to make the demographics directly in the google form. By doing this, we had no control over the demographics of the responses who completed the survey. As a result, we had to limit our expectations on how specific data we could get and rely more on a general matter. Even though our data provides general rich insight into several areas, it does not go into specific.

The population in this study was conducted through Amazon M-Turk as convenience samples. Based on this, one cannot conclude null hypotheses and causal relationships. However, it was not a significant challenge in this study. The purpose of this study was to understand shoppers' perspectives on various technologies and find out how retailers could benefit by implementing IoT in grocery stores to improve customer experience. An important implication of the following is that the findings have no generalizing effect. The results in the study cannot be assumed to apply to other samples than precisely what has been tested. Since some findings in the study correspond to previous research, it can be assumed that some relevant phenomena have been found among shoppers that may be practical for some retailers.

Firstly, out of the 204 respondents, the distribution of sex is unequal(male 72.1% and female 26.5%), making it harder to generalize across gender. This might explain the lack of findings gender-wise in the analysis. The same unequal distribution goes for location, where Asia (35.3%) and North America (41.2%) is the one with the most respondents. This might explain the lack of findings location-wise in the analysis as Africa had 5.9%, Europe 5.4%, and South America 12.3 %. If we had an equal distribution of sex and gender, we might have more significant findings in the analysis. Taking Self Scanning Technology, Weijters et al. (2007) found that perceived usefulness is less critical for females than men. Had we had a more even distribution of gender, we might have found similar results. Therefore, future researchers

could investigate more comprehensively the differences between gender and find out why that is. From a business perspective, that could help grocery retailers gain valuable insight before implementing the technology and adapting the implementation. It could increase the customer experience for both genders. Also, future researchers could focus on one specific location rather than every continent. It could, e.g., be beneficial for Norwegian grocery retailers to find out the different perceptions between males and females exclusively for Norwegian shoppers.

Secondly, even though the age distribution was relatively unequal, it gave us several significant results. However, it would be engaging to do the analysis again with a more even distribution. Future researchers could, for example, study the differences between the different age groups or generations and find out their perspective on a specific grocery technology. As our result revealed significant differences between the older and younger age segments, it might serve as a guideline for future researchers to determine why. The exact parallels can also be drawn towards education. Even though the education distribution was relatively uneven, it gave us some significant results of several technologies. Weijters et al. (2007) found that education is an essential factor in adopting Self Scanning Technology in general, where those with lower education are less prominent. We did not find that significant differences education-wise of Self Scanning Technology in our analysis. However, we found some perceptual differences in some of the technologies. Had we had a more even distribution of education, we might have found more significant results. Nevertheless, based on the significant result, it can work as a future guideline for researchers to determine why that difference occurs.

Finally, the unequal contributions continue on the household type. Since most of the respondents were couples' households (69.6%), it might explain why the analysis did not find more correlations. However, our analysis found significant results on some perspectives on two technologies (Smart Shopping Cart and Smart Fridge). Future researchers could, e.g., investigate this further and find out the why as aforementioned. The same applies to those who do the grocery shopping in the household where people who do the shopping themself dominate (42.2%). Nevertheless, our analysis found significant results on every perception related to Personalized Promotion/Pricing except privacy concerns. Future researchers could use these findings to investigate the why and which household types are most adaptable for this technology. This could have a tremendous value for grocery retailers planning to develop such technology. Grocery retailers can develop such technology based on in-store behavioral data. However, to truly develop a customized, personalized promotion/pricing technology, we

assume it would be of great value to understand their shoppers' perspective genuinely. This could increase the customer experience, which again could increase the return on investment.

6.0 Conclusion

As Retail 4.0 represents the era of now, there is no direct blueprint of what shape it will take. Nevertheless, as presented in this thesis, IoT has an enormous opportunity to positively impact the grocery retail industry and customers' overall experience. Up to our knowledge, empirical evidence of shoppers' perception regarding retail grocery technology are relatively rare in MIS research. As such, this research provides new knowledge on this topic. While this study goes a long way in uncovering shoppers' perceptions of various grocery retail technology, it does not sufficiently answer why these perceptions are weighted as they are. Speculations and possible explanations have been discussed, and the dissertation provide some knowledge, but some questions remain unanswered, deserving further research. From a business perspective, our findings provide valuable insight to grocery retailers. For example, Grewal, Levy & Kumar (2009) mention that many companies increase customer experience through deep, promotional solid efforts such as significant discounts and free shipping. Our analysis revealed that shoppers with a positive attitude towards grocery shopping and shoppers in age 35-44 are most confident about the suggested technologies. Grocery retailers can use these findings on Personalized Promotion/Pricing to identify which group they could target to achieve this, while future researchers could extend the research and investigate why that is. In addition, to further enhance the customer experience, grocery retailers can use several suggested technologies to track the customers' past patterns, present patterns, potential patterns, or a combination of these (Meyer and Schwager 2007). It is imminent that grocery retailers must be aware of how technology and automation might negatively impact consumers. They might feel more objectified and feel more estranged by the producers (Osselaer et al. 2020). For example, our research found significant differences between age on 'Just Walk Out' technology, which is why grocery retailers should carefully find out why the older age segment is less adaptable for automation and find a solution.

Nevertheless, IoT Technology changes the customer journey, and Osselaer et al. (2020) mention the necessity to personalize to make consumers feel less objectified and mere profit tools. By understanding shoppers' perspectives, retailers can better predict the technologies' effect on customer experience.

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Appendix 1 – Questionnaire

Descriptive questions:

- Select your gender?
- How old are you?
- Where are you from?
- What is the highest level of education you have?
- What is your attitude towards grocery shopping?
- Who grocery shops in your household?
- How often do you do your grocery shopping?
- What household type are you?

Justice/fairness Perception

(*1 = Strongly disagree; 7 = Strongly agree)*

1. Given the investments I need to make to adopt this new technology (e.g., time, personal information, money), the final outcome that I will receive is fair.

2. The outcome of the retailer's implementation of this new technology is very positive for me

3. Considering the inconvenience that this technology might cause me, the outcome that I will receive is more than fair

Value perceptions

1. Please indicate how the perceived value of this retailer to you would change as a result of adding this new technology *(1 = Would change extremely negatively, 7 = Would change extremely positively)*

2. Compared to what I have to give up, the overall ability of this grocery retailer to satisfy my wants and needs is *(1 = Very low; 7 = Very high).*

Privacy concerns

(1 = Strongly disagree; 7 = Strongly agree)

1. I think my benefits gained from the use of this technology can offset the risk of my information disclosure

2. The value I gain from using this technology is worth the information I give away.

3. I think the risks of my information disclosure will be greater than the benefits gained from the use of this technology.

4. How concerned will you be about threats to your personal privacy when shopping at this grocery store after the implementation of this technology? *(1 = Not concerned at all; 7 = Very concerned)*

Satisfaction

1. Please indicate how your perceptions of the retailer would change as a result of adding this new technology: My overall satisfaction with the retailer. *(1 = Would change extremely negatively; 7 = Would change extremely positively)*

Relationship Commitment

(1 = Would change extremely negatively; 7 = Would change extremely positively)

Please indicate how your perceptions of the retailer would change as a result of adding this new technology:

1. My commitment to continue my relationship with the retailer

2. My belief that my relationship with this retailer deserves my maximum effort to maintain

3. My intent to maintain my relationship with this retailer indefinitely

Relationship Trust

Please indicate how your perceptions of the retailer would change as a result of adding this new technology:

1 . My trust that this retailer can be counted on to do what is right

2 . My belief that this retailer has high integrity

Relationship Loyalty

(1 = Would change extremely negatively; 7 = Would change extremely positively)

Please indicate how your perceptions of the retailer would change as a result of adding this new technology:

1. My loyalty towards this retailer

2. The extent to which I care about the long-term success of this store

Appendix 2 - Technology Descriptions

Self-Scanning

Imagine your local grocery store has invested in 'Self-scanning'. This technology allows you to scan, bag, and pay for your items. You will interact with a computer's user interface instead of a cashier. Once you begin the checkout process, the self-scan interface will guide you through the process of scanning each item and where to place it after it has been scanned. When you scan an item, the barcode provides the computer with the information it needs to determine what items you scanned and the item's weight and price.

Smart Shopping Cart

Your local grocery store has invested in smart shopping carts. These carts will register an overall calculation of prices based on what you have put in the cart, allowing you continuous control over the ending price. The shopping cart can also deliver promotions on products based on where you are located in the store. E.g., when walking through the dairy section, you can get offers and commercials on milk, yogurt, and further. The shopping cart has also installed a billing system, allowing you to skip long queues at check out. Instead, you do the payment step with the shopping cart and walk out without any interaction with a cashier employee.

Personalized promotions/pricing

Imagine your local grocery store gives you the possibility to receive personalized promotions/pricing. Technology makes it possible for retailers to provide customized offers as you enter the store. This is done through sensors or Bluetooth devices such as beacons locating your smartphone. This technology can use information gathered from your online profile to see what you are interested in. It can also give information and discounts on relevant categories when visiting the physical store.

Mobile Apps

Imagine your local grocery store has invested in a mobile application. This app provides you with online in-store navigation, and you can receive personalized promotions based on your preferences. The application also offers in-store navigation so that you can locate various aisles and the specific products you wish to buy. Finally, the app has an ‘In-Store Pick-up Option’ where you can use the app to order products online and pick them up in the store when they are ready.

Smart Shelves

Imagine your local grocery store has invested in smart shelves. These shelves' idea is to ensure there are always are items on the shelf and correct items on the shelves. The shelf is constructed with sensors registering and alerting employees if the number of items is below a given number. The shelf will also provide an indication if there are products misplaced or spilled. As long as there are products in the back room, you will hopefully not experience

empty shelves again. The shelves are also designed with LED-displays giving relevant promotion based on what exists on the shelves.

Smart Robot

Imagine your local grocery store has decided to invest in smart robots that enforce the employee army. These visual robots have a human-looking design with an interactive screen on their torso. The robot allows you to browse inventory and lead you to desired items. The visual robot can also provide information if you have any questions. The robot can also display sales promotions and recommendations.

Smart Fridge

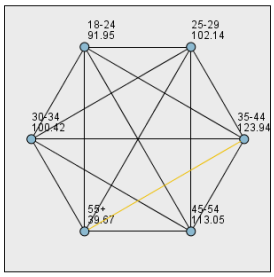
Imagine you have invested in a 'Smart Fridge.' This technology allows the fridge to scan and detect items that repeatedly are restocked, provided that grocery items are equipped with RFID-tags. In this way, it can identify removed products and automatically add them to your shopping list. You can also list essential items you want continuous access to, such as milk, eggs, and cheese. The refrigerators also detect when an item hasn't been used over a more extended period and detect items expiration dates. You could also check the temperature, the freshness of food, recipes, nutrition information, and webcam showing the content to mention some of the features.

Just Walk Out

Imagine your local grocery store has invested technology where you can scan your identity at the entrance with an application connected with your credit card. After scanning in, you can pick items from the shelves, refrigerators, or the fresh food counter and walk out without any interaction with staff or check-out points. The advanced technology automatically registers what you take out of the shelves. There is automatically sent a recipe when you walk out, and the credit card is automatically charged.

Appendix 3 – Self Scanning Analysis

Pairwise Comparisons of Age



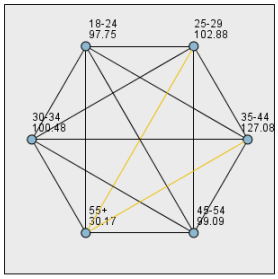
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	52.283	28.584	1.829	.067	1.000
55+-30-34	60.750	23.820	2.550	.011	.161
55+-25-29	62.475	23.272	2.685	.007	.109
55+-45-54	73.379	28.093	2.612	.009	.135
55+-35-44	84.271	25.265	3.335	.001	.013
18-24-30-34	-8.467	19.056	-.444	.657	1.000
18-24-25-29	-10.191	18.367	-.555	.579	1.000
18-24-45-54	-21.095	24.185	-.872	.383	1.000
18-24-35-44	-31.988	20.834	-1.535	.125	1.000
30-34-25-29	1.725	9.364	.184	.854	1.000
30-34-45-54	-12.629	18.311	-.690	.490	1.000
30-34-35-44	-23.521	13.579	-1.732	.083	1.000
25-29-45-54	-10.904	17.592	-.620	.535	1.000
25-29-35-44	-21.796	12.594	-1.731	.084	1.000
45-54-35-44	10.892	20.154	.540	.589	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by age for Self-scanning

Pairwise Comparisons of Age



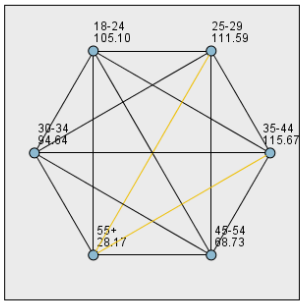
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	67.583	30.021	2.251	.024	.366
55+-45-54	68.924	29.505	2.336	.019	.292
55+-30-34	70.315	25.018	2.811	.005	.074
55+-25-29	72.717	24.443	2.975	.003	.044
55+-35-44	96.917	26.535	3.652	.000	.004
18-24-45-54	-1.341	25.402	-.053	.958	1.000
18-24-30-34	-2.731	20.014	-.136	.891	1.000
18-24-25-29	-5.134	19.290	-.266	.790	1.000
18-24-35-44	-29.333	21.882	-1.341	.180	1.000
45-54-30-34	1.391	19.231	.072	.942	1.000
45-54-25-29	3.793	18.477	.205	.837	1.000
45-54-35-44	27.992	21.168	1.322	.186	1.000
30-34-25-29	2.402	9.835	.244	.807	1.000
30-34-35-44	-26.602	14.262	-1.865	.062	.932
25-29-35-44	-24.199	13.227	-1.829	.067	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by age for Self-Scanning

Pairwise Comparisons of Age



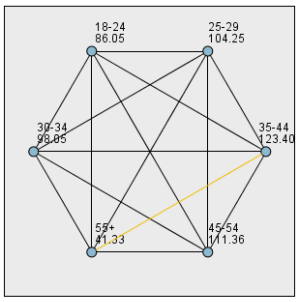
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-45-54	40.561	29.494	1.375	.169	1.000
55+-30-34	66.472	25.008	2.658	.008	.118
55+-18-24	76.933	30.010	2.564	.010	.155
55+-25-29	83.424	24.433	3.414	.001	.010
55+-35-44	87.500	26.525	3.299	.001	.015
45-54-30-34	25.912	19.224	1.348	.178	1.000
45-54-18-24	36.373	25.392	1.432	.152	1.000
45-54-25-29	42.864	18.470	2.321	.020	.305
45-54-35-44	46.939	21.160	2.218	.027	.398
30-34-18-24	10.461	20.007	.523	.601	1.000
30-34-25-29	16.952	9.831	1.724	.085	1.000
30-34-35-44	-21.028	14.257	-1.475	.140	1.000
18-24-25-29	-6.491	19.283	-.337	.736	1.000
18-24-35-44	-10.567	21.873	-.483	.629	1.000
25-29-35-44	-4.076	13.222	-.308	.758	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by age for Self-Scanning

Pairwise Comparisons of Age



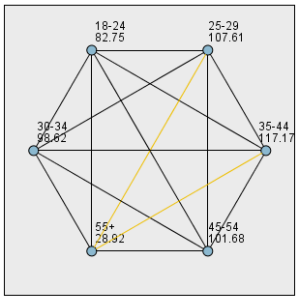
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	44.717	29.284	1.527	.127	1.000
55+-30-34	56.713	24.404	2.324	.020	.302
55+-25-29	62.914	23.843	2.639	.008	.125
55+-45-54	70.030	28.781	2.433	.015	.224
55+-35-44	82.062	25.884	3.170	.002	.023
18-24-30-34	-11.996	19.523	-.614	.539	1.000
18-24-25-29	-18.197	18.817	-.967	.334	1.000
18-24-45-54	-25.314	24.778	-1.022	.307	1.000
18-24-35-44	-37.346	21.344	-1.750	.080	1.000
30-34-25-29	6.201	9.594	.646	.518	1.000
30-34-45-54	-13.317	18.759	-.710	.478	1.000
30-34-35-44	-25.350	13.912	-1.822	.068	1.000
25-29-45-54	-7.116	18.023	-.395	.693	1.000
25-29-35-44	-19.148	12.903	-1.484	.138	1.000
45-54-35-44	12.032	20.648	.583	.560	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by age for Self-Scanning

Pairwise Comparisons of Age



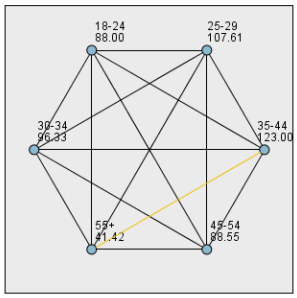
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	53.833	29.987	1.795	.073	1.000
55+-30-34	69.704	24.989	2.789	.005	.079
55+-45-54	72.765	29.472	2.469	.014	.203
55+-25-29	78.689	24.415	3.223	.001	.019
55+-35-44	88.250	26.505	3.330	.001	.013
18-24-30-34	-15.870	19.992	-.794	.427	1.000
18-24-45-54	-18.932	25.373	-.746	.456	1.000
18-24-25-29	-24.856	19.269	-1.290	.197	1.000
18-24-35-44	-34.417	21.857	-1.575	.115	1.000
30-34-45-54	-3.061	19.209	-.159	.873	1.000
30-34-25-29	8.986	9.824	.915	.360	1.000
30-34-35-44	-18.546	14.246	-1.302	.193	1.000
45-54-25-29	5.924	18.456	.321	.748	1.000
45-54-35-44	15.485	21.144	.732	.464	1.000
25-29-35-44	-9.561	13.212	-.724	.469	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by age for Self-Scanning

Pairwise Comparisons of Age



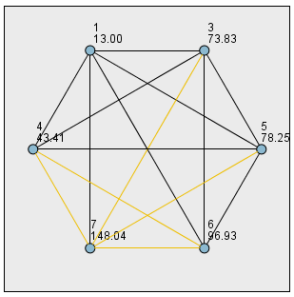
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	46.583	29.307	1.589	.112	1.000
55+-45-54	47.129	28.803	1.636	.102	1.000
55+-30-34	54.917	24.422	2.249	.025	.368
55+-25-29	66.194	23.861	2.774	.006	.083
55+-35-44	81.583	25.904	3.149	.002	.025
18-24-45-54	-.545	24.797	-.022	.982	1.000
18-24-30-34	-8.333	19.538	-.427	.670	1.000
18-24-25-29	-19.611	18.831	-1.041	.298	1.000
18-24-35-44	-35.000	21.361	-1.639	.101	1.000
45-54-30-34	7.788	18.774	.415	.678	1.000
45-54-25-29	19.066	18.037	1.057	.291	1.000
45-54-35-44	34.455	20.664	1.667	.095	1.000
30-34-25-29	11.278	9.601	1.175	.240	1.000
30-34-35-44	-26.667	13.923	-1.915	.055	.832
25-29-35-44	-15.389	12.913	-1.192	.233	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by age for Self-Scanning

Pairwise Comparisons of What is your attitude towards grocery shopping?



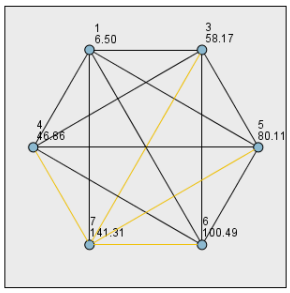
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-30.409	57.814	-.526	.599	1.000
1-3	-60.833	59.788	-1.017	.309	1.000
1-5	-65.250	56.076	-1.164	.245	1.000
1-6	-83.927	55.640	-1.508	.131	1.000
1-7	-135.038	55.882	-2.416	.016	.235
4-3	30.424	28.093	1.083	.279	1.000
4-5	-34.841	18.952	-1.838	.066	.990
4-6	-53.518	17.620	-3.037	.002	.036
4-7	-104.629	18.370	-5.696	.000	.000
3-5	-4.417	24.316	-.182	.856	1.000
3-6	-23.094	23.293	-.991	.321	1.000
3-7	-74.205	23.866	-3.109	.002	.028
5-6	-18.677	10.609	-1.761	.078	1.000
5-7	-69.788	11.813	-5.908	.000	.000
6-7	-51.111	9.531	-5.363	.000	.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception with Attitude toward Grocery Shopping for Self-Scanning

Pairwise Comparisons of What is your attitude towards grocery shopping?



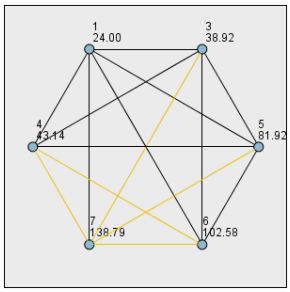
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-40.364	60.721	-.665	.506	1.000
1-3	-51.667	62.794	-.823	.411	1.000
1-5	-73.605	58.896	-1.250	.211	1.000
1-6	-93.990	58.438	-1.608	.108	1.000
1-7	-134.808	58.693	-2.297	.022	.324
4-3	11.303	29.505	.383	.702	1.000
4-5	-33.242	19.905	-1.670	.095	1.000
4-6	-53.626	18.506	-2.898	.004	.056
4-7	-94.444	19.294	-4.895	.000	.000
3-5	-21.939	25.539	-.859	.390	1.000
3-6	-42.323	24.464	-1.730	.084	1.000
3-7	-83.141	25.066	-3.317	.001	.014
5-6	-20.384	11.142	-1.829	.067	1.000
5-7	-61.202	12.407	-4.933	.000	.000
6-7	-40.818	10.010	-4.078	.000	.001

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception with Attitude toward Grocery Shopping for Self-Scanning

Pairwise Comparisons of What is your attitude towards grocery shopping?



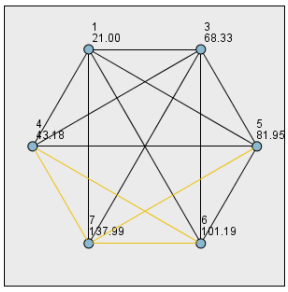
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-14.917	62.770	-.238	.812	1.000
1-4	-19.136	60.698	-.315	.753	1.000
1-5	-57.921	58.874	-.984	.325	1.000
1-6	-78.583	58.416	-1.345	.179	1.000
1-7	-114.788	58.670	-1.957	.050	.756
3-4	-4.220	29.494	-.143	.886	1.000
3-5	-43.004	25.529	-1.685	.092	1.000
3-6	-63.667	24.455	-2.603	.009	.138
3-7	-99.872	25.056	-3.986	.000	.001
4-5	-38.785	19.897	-1.949	.051	.769
4-6	-59.447	18.499	-3.214	.001	.020
4-7	-95.652	19.286	-4.960	.000	.000
5-6	-20.662	11.138	-1.855	.064	.954
5-7	-56.867	12.402	-4.585	.000	.000
6-7	-36.205	10.006	-3.618	.000	.004

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns with Attitude toward Grocery Shopping for Self-Scanning

Pairwise Comparisons of What is your attitude towards grocery shopping?



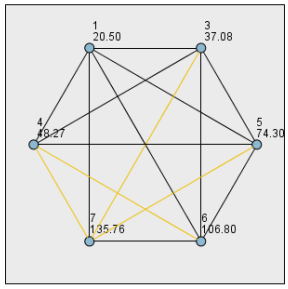
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-22.182	59.231	-.374	.708	1.000
1-3	-47.333	61.253	-.773	.440	1.000
1-5	-60.947	57.450	-1.061	.289	1.000
1-6	-80.193	57.004	-1.407	.159	1.000
1-7	-116.990	57.252	-2.043	.041	.615
4-3	25.152	28.781	.874	.382	1.000
4-5	-38.766	19.416	-1.997	.046	.688
4-6	-58.011	18.051	-3.214	.001	.020
4-7	-94.809	18.820	-5.038	.000	.000
3-5	-13.614	24.912	-.546	.585	1.000
3-6	-32.859	23.864	-1.377	.169	1.000
3-7	-69.657	24.451	-2.849	.004	.066
5-6	-19.245	10.869	-1.771	.077	1.000
5-7	-56.043	12.103	-4.631	.000	.000
6-7	-36.798	9.764	-3.769	.000	.002

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction with Attitude toward Grocery Shopping for Self-Scanning

Pairwise Comparisons of What is your attitude towards grocery shopping?



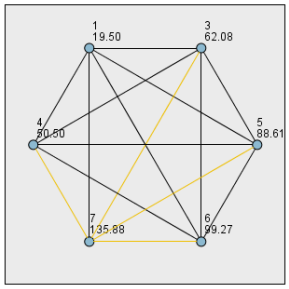
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-16.583	62.723	-.264	.791	1.000
1-4	-27.773	60.652	-.458	.647	1.000
1-5	-53.803	58.829	-.915	.360	1.000
1-6	-86.302	58.372	-1.478	.139	1.000
1-7	-115.260	58.626	-1.966	.049	.739
3-4	-11.189	29.472	-.380	.704	1.000
3-5	-37.219	25.510	-1.459	.145	1.000
3-6	-69.719	24.437	-2.853	.004	.065
3-7	-98.676	25.037	-3.941	.000	.001
4-5	-26.030	19.882	-1.309	.190	1.000
4-6	-58.529	18.485	-3.166	.002	.023
4-7	-87.487	19.272	-4.540	.000	.000
5-6	-32.499	11.130	-2.920	.003	.052
5-7	-61.457	12.393	-4.959	.000	.000
6-7	-28.958	9.999	-2.896	.004	.057

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust with Attitude toward Grocery Shopping for Self-Scanning

Pairwise Comparisons of What is your attitude towards grocery shopping?



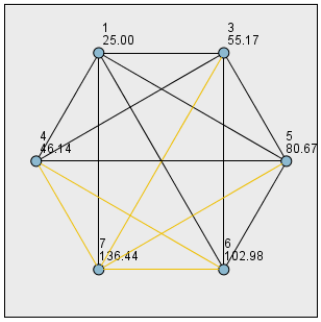
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-31.000	60.612	-.511	.609	1.000
1-3	-42.583	62.681	-.679	.497	1.000
1-5	-69.105	58.790	-1.175	.240	1.000
1-6	-79.771	58.333	-1.368	.171	1.000
1-7	-116.375	58.587	-1.986	.047	.705
4-3	11.583	29.452	.393	.694	1.000
4-5	-38.105	19.869	-1.918	.055	.827
4-6	-48.771	18.472	-2.640	.008	.124
4-7	-85.375	19.259	-4.433	.000	.000
3-5	-26.522	25.493	-1.040	.298	1.000
3-6	-37.188	24.420	-1.523	.128	1.000
3-7	-73.792	25.021	-2.949	.003	.048
5-6	-10.666	11.122	-.959	.338	1.000
5-7	-47.270	12.385	-3.817	.000	.002
6-7	-36.604	9.992	-3.663	.000	.004

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty with Attitude toward Grocery Shopping for Self-Scanning

Pairwise Comparisons of What is your attitude towards grocery shopping?



Each node shows the sample average rank of What is your attitude towards grocery shopping?.

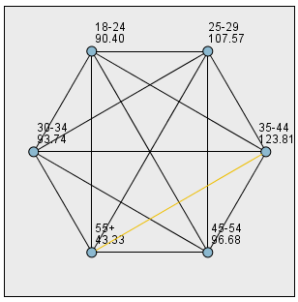
Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-21.136	59.276	-.357	.721	1.000
1-3	-30.167	61.300	-.492	.623	1.000
1-5	-55.671	57.494	-.968	.333	1.000
1-6	-77.979	57.047	-1.367	.172	1.000
1-7	-111.442	57.296	-1.945	.052	.777
4-3	9.030	28.803	.314	.754	1.000
4-5	-34.535	19.431	-1.777	.076	1.000
4-6	-56.843	18.065	-3.147	.002	.025
4-7	-90.306	18.835	-4.795	.000	.000
3-5	-25.504	24.931	-1.023	.306	1.000
3-6	-47.812	23.882	-2.002	.045	.679
3-7	-81.276	24.469	-3.322	.001	.013
5-6	-22.308	10.877	-2.051	.040	.604
5-7	-55.771	12.112	-4.605	.000	.000
6-7	-33.463	9.772	-3.424	.001	.009

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment with Attitude toward Grocery Shopping for Self-Scanning

Appendix 4 – Smart Shopping Cart Analysis

Pairwise Comparisons of Age



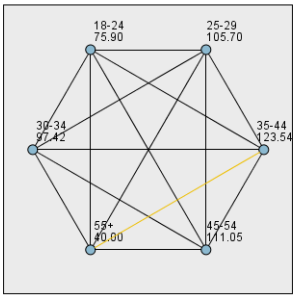
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	47.067	29.205	1.612	.107	1.000
55+-30-34	50.407	24.338	2.071	.038	.575
55+-45-54	53.348	28.703	1.859	.063	.946
55+-25-29	64.232	23.778	2.701	.007	.104
55+-35-44	80.479	25.814	3.118	.002	.027
18-24-30-34	-3.341	19.470	-.172	.864	1.000
18-24-45-54	-6.282	24.711	-.254	.799	1.000
18-24-25-29	-17.166	18.766	-.915	.360	1.000
18-24-35-44	-33.412	21.287	-1.570	.116	1.000
30-34-45-54	-2.941	18.708	-.157	.875	1.000
30-34-25-29	13.825	9.568	1.445	.148	1.000
30-34-35-44	-30.072	13.875	-2.167	.030	.453
45-54-25-29	10.884	17.975	.606	.545	1.000
45-54-35-44	27.131	20.592	1.318	.188	1.000
25-29-35-44	-16.247	12.868	-1.263	.207	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by Age for Shopping Cart

Pairwise Comparisons of Age



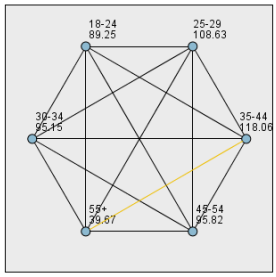
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	35.900	30.094	1.193	.233	1.000
55+-30-34	57.417	25.079	2.289	.022	.331
55+-25-29	65.697	24.502	2.681	.007	.110
55+-45-54	71.045	29.577	2.402	.016	.245
55+-35-44	83.542	26.600	3.141	.002	.025
18-24-30-34	-21.517	20.063	-1.072	.284	1.000
18-24-25-29	-29.797	19.337	-1.541	.123	1.000
18-24-45-54	-35.145	25.463	-1.380	.168	1.000
18-24-35-44	-47.642	21.935	-2.172	.030	.448
30-34-25-29	8.280	9.859	.840	.401	1.000
30-34-45-54	-13.629	19.278	-.707	.480	1.000
30-34-35-44	-26.125	14.297	-1.827	.068	1.000
25-29-45-54	-5.348	18.522	-.289	.773	1.000
25-29-35-44	-17.845	13.260	-1.346	.178	1.000
45-54-35-44	12.496	21.219	.589	.556	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by Age for Shopping Cart

Pairwise Comparisons of Age



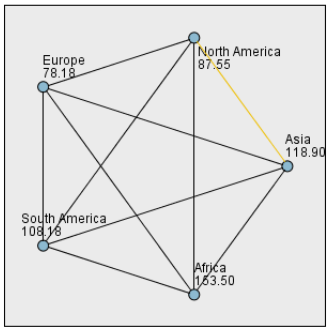
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	49.583	29.225	1.697	.090	1.000
55+-30-34	55.481	24.354	2.278	.023	.341
55+-45-54	56.152	28.722	1.955	.051	.759
55+-25-29	68.960	23.794	2.898	.004	.056
55+-35-44	78.396	25.831	3.035	.002	.036
18-24-30-34	-5.898	19.483	-.303	.762	1.000
18-24-45-54	-6.568	24.727	-.266	.791	1.000
18-24-25-29	-19.376	18.778	-1.032	.302	1.000
18-24-35-44	-28.812	21.301	-1.353	.176	1.000
30-34-45-54	-.670	18.721	-.036	.971	1.000
30-34-25-29	13.478	9.574	1.408	.159	1.000
30-34-35-44	-22.914	13.884	-1.650	.099	1.000
45-54-25-29	12.808	17.987	.712	.476	1.000
45-54-35-44	22.244	20.606	1.079	.280	1.000
25-29-35-44	-9.436	12.876	-.733	.464	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by Age for Shopping Cart

Pairwise Comparisons of Location



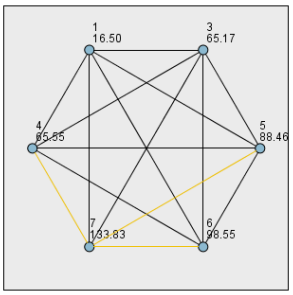
Each node shows the sample average rank of Location.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Europe-North America	-9.371	18.693	-.501	.616	1.000
Europe-South America	-29.998	21.107	-1.421	.155	1.000
Europe-Asia	40.721	18.732	2.174	.030	.297
Europe-Africa	75.318	60.931	1.236	.216	1.000
North America-South America	-20.627	13.273	-1.554	.120	1.000
North America-Asia	31.349	9.030	3.472	.001	.005
North America-Africa	65.947	58.679	1.124	.261	1.000
South America-Asia	10.722	13.328	.805	.421	1.000
South America-Africa	45.320	59.492	.762	.446	1.000
Asia-Africa	34.598	58.692	.589	.556	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by Location for Shopping Cart

Pairwise Comparisons of What is your attitude towards grocery shopping?



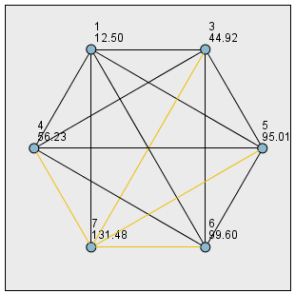
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-48.667	60.797	-.800	.423	1.000
1-4	-49.045	58.790	-.834	.404	1.000
1-5	-71.961	57.023	-1.262	.207	1.000
1-6	-82.052	56.579	-1.450	.147	1.000
1-7	-117.327	56.825	-2.065	.039	.584
3-4	-.379	28.567	-.013	.989	1.000
3-5	-23.294	24.727	-.942	.346	1.000
3-6	-33.385	23.686	-1.409	.159	1.000
3-7	-68.660	24.268	-2.829	.005	.070
4-5	-22.915	19.272	-1.189	.234	1.000
4-6	-33.007	17.917	-1.842	.065	.982
4-7	-68.281	18.680	-3.655	.000	.004
5-6	-10.092	10.788	-.935	.350	1.000
5-7	-45.366	12.013	-3.777	.000	.002
6-7	-35.275	9.692	-3.640	.000	.004

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by Attitude Toward Grocery Shopping for Shopping Cart

Pairwise Comparisons of What is your attitude towards grocery shopping?



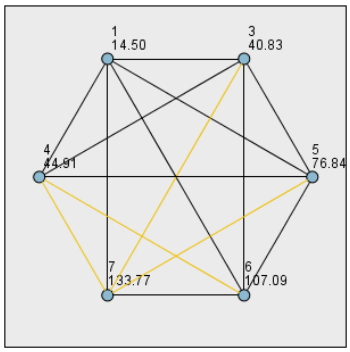
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-32.417	62.759	-.517	.605	1.000
1-4	-43.727	60.687	-.721	.471	1.000
1-5	-82.513	58.863	-1.402	.161	1.000
1-6	-87.104	58.405	-1.491	.136	1.000
1-7	-118.981	58.659	-2.028	.043	.638
3-4	-11.311	29.488	-.384	.701	1.000
3-5	-50.096	25.525	-1.963	.050	.745
3-6	-54.688	24.451	-2.237	.025	.380
3-7	-86.564	25.052	-3.455	.001	.008
4-5	-38.786	19.893	-1.950	.051	.768
4-6	-43.377	18.495	-2.345	.019	.285
4-7	-75.253	19.283	-3.903	.000	.001
5-6	-4.591	11.136	-.412	.680	1.000
5-7	-36.468	12.400	-2.941	.003	.049
6-7	-31.877	10.004	-3.186	.001	.022

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by Attitude Toward Grocery Shopping for Shopping Cart

Pairwise Comparisons of What is your attitude towards grocery shopping?



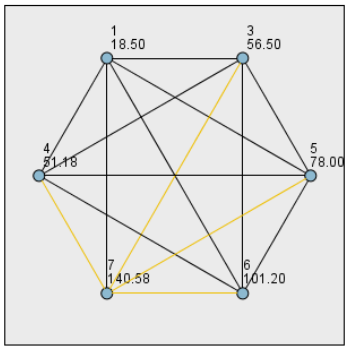
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-26.333	63.011	-.418	.676	1.000
1-4	-30.409	60.931	-.499	.618	1.000
1-5	-62.342	59.099	-1.055	.291	1.000
1-6	-92.589	58.640	-1.579	.114	1.000
1-7	-119.269	58.895	-2.025	.043	.643
3-4	-4.076	29.607	-.138	.891	1.000
3-5	-36.009	25.627	-1.405	.160	1.000
3-6	-66.255	24.549	-2.699	.007	.104
3-7	-92.936	25.152	-3.695	.000	.003
4-5	-31.933	19.973	-1.599	.110	1.000
4-6	-62.179	18.570	-3.348	.001	.012
4-7	-88.860	19.360	-4.590	.000	.000
5-6	-30.246	11.181	-2.705	.007	.102
5-7	-56.927	12.450	-4.572	.000	.000
6-7	-26.681	10.045	-2.656	.008	.119

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by Attitude Toward Grocery Shopping for Shopping Cart

Pairwise Comparisons of What is your attitude towards grocery shopping?



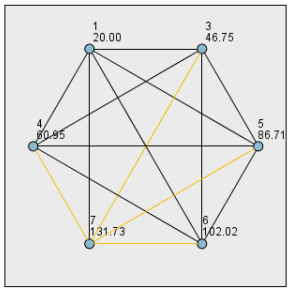
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-32.682	59.070	-.553	.580	1.000
1-3	-38.000	61.087	-.622	.534	1.000
1-5	-59.500	57.295	-1.038	.299	1.000
1-6	-82.703	56.849	-1.455	.146	1.000
1-7	-122.077	57.097	-2.138	.033	.488
4-3	5.318	28.703	.185	.853	1.000
4-5	-26.818	19.364	-1.385	.166	1.000
4-6	-50.021	18.003	-2.779	.005	.082
4-7	-89.395	18.769	-4.763	.000	.000
3-5	-21.500	24.845	-.865	.387	1.000
3-6	-44.703	23.799	-1.878	.060	.905
3-7	-84.077	24.384	-3.448	.001	.008
5-6	-23.203	10.839	-2.141	.032	.485
5-7	-62.577	12.070	-5.185	.000	.000
6-7	-39.374	9.738	-4.043	.000	.001

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by Attitude Toward Grocery Shopping for Shopping Cart

Pairwise Comparisons of What is your attitude towards grocery shopping?



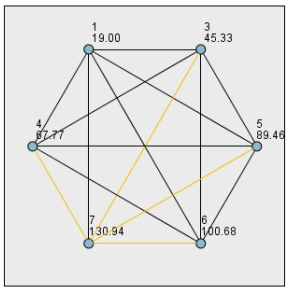
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-26.750	62.954	-.425	.671	1.000
1-4	-40.955	60.876	-.673	.501	1.000
1-5	-66.711	59.046	-1.130	.259	1.000
1-6	-82.021	58.587	-1.400	.162	1.000
1-7	-111.731	58.842	-1.899	.058	.864
3-4	-14.205	29.580	-.480	.631	1.000
3-5	-39.961	25.604	-1.561	.119	1.000
3-6	-55.271	24.527	-2.254	.024	.363
3-7	-84.981	25.130	-3.382	.001	.011
4-5	-25.756	19.955	-1.291	.197	1.000
4-6	-41.066	18.553	-2.213	.027	.403
4-7	-70.776	19.343	-3.659	.000	.004
5-6	-15.310	11.171	-1.371	.170	1.000
5-7	-45.020	12.439	-3.619	.000	.004
6-7	-29.710	10.036	-2.960	.003	.046

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by Attitude Toward Grocery Shopping for Shopping Cart

Pairwise Comparisons of What is your attitude towards grocery shopping?



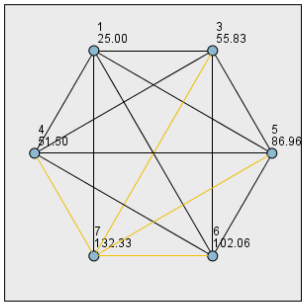
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-26.333	62.947	-.418	.676	1.000
1-4	-48.773	60.869	-.801	.423	1.000
1-5	-70.461	59.039	-1.193	.233	1.000
1-6	-81.677	58.580	-1.394	.163	1.000
1-7	-111.942	58.835	-1.903	.057	.856
3-4	-22.439	29.577	-.759	.448	1.000
3-5	-44.127	25.601	-1.724	.085	1.000
3-6	-55.344	24.524	-2.257	.024	.360
3-7	-85.609	25.127	-3.407	.001	.010
4-5	-21.688	19.953	-1.087	.277	1.000
4-6	-32.904	18.551	-1.774	.076	1.000
4-7	-63.170	19.341	-3.266	.001	.016
5-6	-11.217	11.169	-1.004	.315	1.000
5-7	-41.482	12.437	-3.335	.001	.013
6-7	-30.265	10.034	-3.016	.003	.038

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by Attitude Toward Grocery Shopping for Shopping Cart

Pairwise Comparisons of What is your attitude towards grocery shopping?



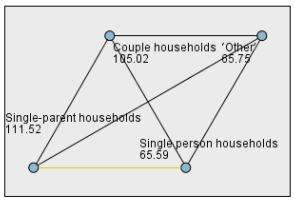
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-26.500	59.110	-.448	.654	1.000
1-3	-30.833	61.128	-.504	.614	1.000
1-5	-61.961	57.333	-1.081	.280	1.000
1-6	-77.062	56.887	-1.355	.176	1.000
1-7	-107.327	57.135	-1.878	.060	.905
4-3	4.333	28.722	.151	.880	1.000
4-5	-35.461	19.376	-1.830	.067	1.000
4-6	-50.562	18.015	-2.807	.005	.075
4-7	-80.827	18.782	-4.303	.000	.000
3-5	-31.127	24.861	-1.252	.211	1.000
3-6	-46.229	23.815	-1.941	.052	.784
3-7	-76.494	24.401	-3.135	.002	.026
5-6	-15.102	10.847	-1.392	.164	1.000
5-7	-45.366	12.078	-3.756	.000	.003
6-7	-30.264	9.744	-3.106	.002	.028

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by Attitude Toward Grocery Shopping for Shopping Cart

Pairwise Comparisons of Household Type



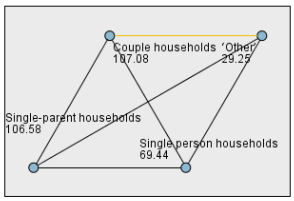
Each node shows the sample average rank of Household Type.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Single person households-'Other'	.156	32.582	.005	.996	1.000
Single person households-Couple households	39.431	15.370	2.565	.010	.062
Single person households-Single-parent households	-45.930	17.123	-2.682	.007	.044
'Other'-Couple households	-39.275	29.550	-1.329	.184	1.000
'Other'-Single-parent households	-45.774	30.498	-1.501	.133	.800
Couple households-Single-parent households	-6.499	10.237	-.635	.526	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by Household Type for Shopping Cart

Pairwise Comparisons of Household Type



Each node shows the sample average rank of Household Type.

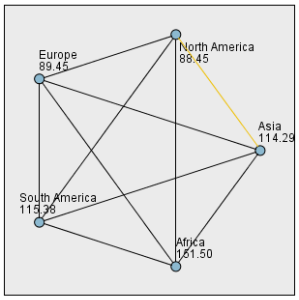
Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
'Other'-Single person households	-40.188	31.637	-1.270	.204	1.000
'Other'-Single-parent households	-77.333	29.613	-2.611	.009	.054
'Other'-Couple households	-77.831	28.692	-2.713	.007	.040
Single person households-Single-parent households	-37.146	16.626	-2.234	.025	.153
Single person households-Couple households	37.643	14.924	2.522	.012	.070
Single-parent households-Couple households	.498	9.940	.050	.960	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship commitment by Household Type for Shopping Cart

Appendix 5 – Personalized Promotion/Pricing Analysis

Pairwise Comparisons of Location



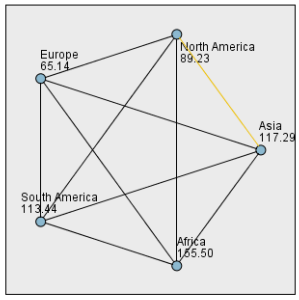
Each node shows the sample average rank of Location.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
North America-Europe	1.007	18.710	.054	.957	1.000
North America-Asia	25.846	9.038	2.860	.004	.042
North America-South America	-26.933	13.285	-2.027	.043	.426
North America-Africa	63.053	58.734	1.074	.283	1.000
Europe-Asia	24.838	18.749	1.325	.185	1.000
Europe-South America	-25.925	21.127	-1.227	.220	1.000
Europe-Africa	62.045	60.988	1.017	.309	1.000
Asia-South America	-1.087	13.340	-.082	.935	1.000
Asia-Africa	37.207	58.746	.633	.527	1.000
South America-Africa	36.120	59.548	.607	.544	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by Location for Personalized Promotion/Pricing

Pairwise Comparisons of Location



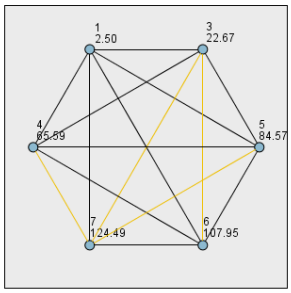
Each node shows the sample average rank of Location.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Europe-North America	-24.093	18.683	-1.290	.197	1.000
Europe-South America	-48.304	21.096	-2.290	.022	.220
Europe-Asia	52.150	18.722	2.785	.005	.053
Europe-Africa	90.364	60.899	1.484	.138	1.000
North America-South America	-24.211	13.266	-1.825	.068	.680
North America-Asia	28.057	9.025	3.109	.002	.019
North America-Africa	66.271	58.648	1.130	.258	1.000
South America-Asia	3.847	13.321	.289	.773	1.000
South America-Africa	42.060	59.461	.707	.479	1.000
Asia-Africa	38.213	58.661	.651	.515	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by Location for Personalized Promotion/Pricing

Pairwise Comparisons of What is your attitude towards grocery shopping?



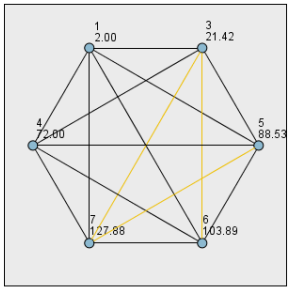
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-20.167	61.465	-.328	.743	1.000
1-4	-63.091	59.436	-1.061	.288	1.000
1-5	-82.066	57.649	-1.424	.155	1.000
1-6	-105.448	57.201	-1.843	.065	.979
1-7	-121.990	57.450	-2.123	.034	.506
3-4	-42.924	28.881	-1.486	.137	1.000
3-5	-61.899	24.998	-2.476	.013	.199
3-6	-85.281	23.947	-3.561	.000	.006
3-7	-101.824	24.535	-4.150	.000	.000
4-5	-18.975	19.483	-.974	.330	1.000
4-6	-42.357	18.114	-2.338	.019	.291
4-7	-58.899	18.885	-3.119	.002	.027
5-6	-23.382	10.906	-2.144	.032	.481
5-7	-39.925	12.145	-3.287	.001	.015
6-7	-16.542	9.798	-1.688	.091	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by attitude towards grocery shopping for Personalized Promotion/Pricing

Pairwise Comparisons of What is your attitude towards grocery shopping?



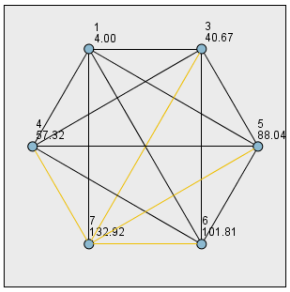
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-19.417	62.995	-.308	.758	1.000
1-4	-70.000	60.915	-1.149	.250	1.000
1-5	-86.526	59.084	-1.464	.143	1.000
1-6	-101.891	58.625	-1.738	.082	1.000
1-7	-125.885	58.880	-2.138	.033	.488
3-4	-50.583	29.599	-1.709	.087	1.000
3-5	-67.110	25.621	-2.619	.009	.132
3-6	-82.474	24.542	-3.360	.001	.012
3-7	-106.468	25.146	-4.234	.000	.000
4-5	-16.526	19.968	-.828	.408	1.000
4-6	-31.891	18.565	-1.718	.086	1.000
4-7	-55.885	19.355	-2.887	.004	.058
5-6	-15.364	11.178	-1.375	.169	1.000
5-7	-39.358	12.447	-3.162	.002	.023
6-7	-23.994	10.042	-2.389	.017	.253

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by attitude towards grocery shopping for Personalized Promotion/Pricing

Pairwise Comparisons of What is your attitude towards grocery shopping?



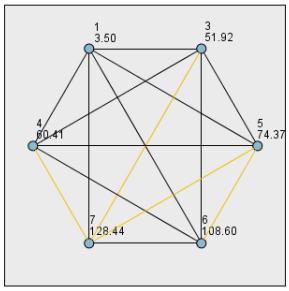
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-36.667	63.070	-.581	.561	1.000
1-4	-53.318	60.988	-.874	.382	1.000
1-5	-84.039	59.154	-1.421	.155	1.000
1-6	-97.812	58.695	-1.666	.096	1.000
1-7	-128.923	58.950	-2.187	.029	.431
3-4	-16.652	29.635	-.562	.574	1.000
3-5	-47.373	25.651	-1.847	.065	.972
3-6	-61.146	24.572	-2.488	.013	.192
3-7	-92.256	25.176	-3.664	.000	.004
4-5	-30.721	19.992	-1.537	.124	1.000
4-6	-44.494	18.587	-2.394	.017	.250
4-7	-75.605	19.378	-3.901	.000	.001
5-6	-13.773	11.191	-1.231	.218	1.000
5-7	-44.884	12.462	-3.602	.000	.005
6-7	-31.111	10.054	-3.094	.002	.030

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by attitude towards grocery shopping for Personalized Promotion/Pricing

Pairwise Comparisons of What is your attitude towards grocery shopping?



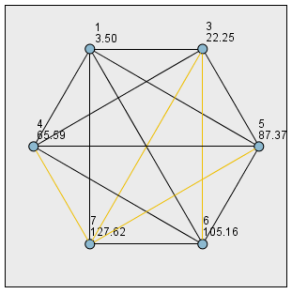
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-48.417	61.610	-.786	.432	1.000
1-4	-56.909	59.576	-.955	.339	1.000
1-5	-70.868	57.785	-1.226	.220	1.000
1-6	-105.099	57.336	-1.833	.067	1.000
1-7	-124.942	57.586	-2.170	.030	.450
3-4	-8.492	28.949	-.293	.769	1.000
3-5	-22.452	25.057	-.896	.370	1.000
3-6	-56.682	24.003	-2.361	.018	.273
3-7	-76.526	24.593	-3.112	.002	.028
4-5	-13.959	19.529	-.715	.475	1.000
4-6	-48.190	18.157	-2.654	.008	.119
4-7	-68.033	18.930	-3.594	.000	.005
5-6	-34.231	10.932	-3.131	.002	.026
5-7	-54.074	12.173	-4.442	.000	.000
6-7	-19.843	9.821	-2.020	.043	.650

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by attitude towards grocery shopping for Personalized Promotion/Pricing

Pairwise Comparisons of What is your attitude towards grocery shopping?



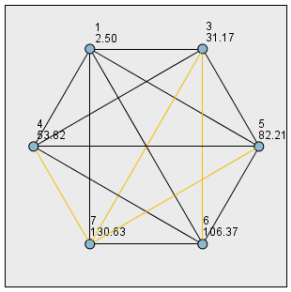
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-18.750	62.978	-.298	.766	1.000
1-4	-62.091	60.899	-1.020	.308	1.000
1-5	-83.868	59.069	-1.420	.156	1.000
1-6	-101.661	58.609	-1.735	.083	1.000
1-7	-124.115	58.864	-2.108	.035	.525
3-4	-43.341	29.592	-1.465	.143	1.000
3-5	-65.118	25.614	-2.542	.011	.165
3-6	-82.911	24.536	-3.379	.001	.011
3-7	-105.365	25.139	-4.191	.000	.000
4-5	-21.778	19.963	-1.091	.275	1.000
4-6	-39.571	18.560	-2.132	.033	.495
4-7	-62.024	19.350	-3.205	.001	.020
5-6	-17.793	11.175	-1.592	.111	1.000
5-7	-40.247	12.444	-3.234	.001	.018
6-7	-22.454	10.039	-2.237	.025	.380

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by attitude towards grocery shopping for Personalized Promotion/Pricing

Pairwise Comparisons of What is your attitude towards grocery shopping?



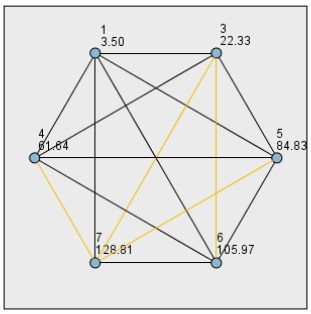
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-28.667	63.110	-.454	.650	1.000
1-4	-51.318	61.027	-.841	.400	1.000
1-5	-79.711	59.193	-1.347	.178	1.000
1-6	-103.870	58.732	-1.769	.077	1.000
1-7	-128.135	58.988	-2.172	.030	.448
3-4	-22.652	29.654	-.764	.445	1.000
3-5	-51.044	25.668	-1.989	.047	.701
3-6	-75.203	24.588	-3.059	.002	.033
3-7	-99.468	25.192	-3.948	.000	.001
4-5	-28.392	20.005	-1.419	.156	1.000
4-6	-52.552	18.599	-2.826	.005	.071
4-7	-76.816	19.391	-3.961	.000	.001
5-6	-24.159	11.198	-2.157	.031	.465
5-7	-48.424	12.470	-3.883	.000	.002
6-7	-24.265	10.061	-2.412	.016	.238

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by attitude towards grocery shopping for Personalized Promotion/Pricing

Pairwise Comparisons of What is your attitude towards grocery shopping?



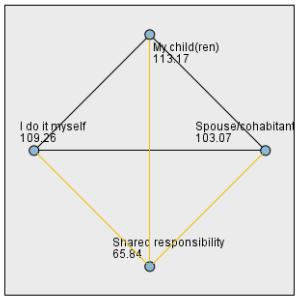
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-18.833	61.669	-.305	.760	1.000
1-4	-58.136	59.633	-.975	.330	1.000
1-5	-81.329	57.841	-1.406	.160	1.000
1-6	-102.469	57.391	-1.785	.074	1.000
1-7	-125.308	57.641	-2.174	.030	.446
3-4	-39.303	28.977	-1.356	.175	1.000
3-5	-62.496	25.082	-2.492	.013	.191
3-6	-83.635	24.026	-3.481	.000	.007
3-7	-106.474	24.617	-4.325	.000	.000
4-5	-23.193	19.548	-1.186	.235	1.000
4-6	-44.332	18.174	-2.439	.015	.221
4-7	-67.171	18.948	-3.545	.000	.006
5-6	-21.140	10.943	-1.932	.053	.801
5-7	-43.979	12.185	-3.609	.000	.005
6-7	-22.839	9.831	-2.323	.020	.303

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by attitude towards grocery shopping for Personalized Promotion/Pricing

Pairwise Comparisons of Who grocery shops in your household?



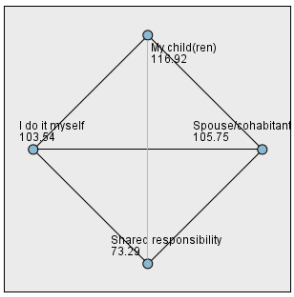
Each node shows the sample average rank of Who grocery shops in your household?.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Shared responsibility-Spouse/cohabitant	-37.229	13.385	-2.782	.005	.032
Shared responsibility-I do it myself	43.422	12.382	3.507	.000	.003
Shared responsibility-My child (ren)	47.327	14.096	3.358	.001	.005
Spouse/cohabitant-I do it myself	6.193	10.057	.616	.538	1.000
Spouse/cohabitant-My child(ren)	10.098	12.105	.834	.404	1.000
I do it myself-My child(ren)	-3.905	10.986	-.355	.722	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by who do the shopping for Personalized Promotion/Pricing

Pairwise Comparisons of Who grocery shops in your household?



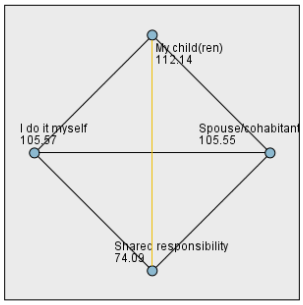
Each node shows the sample average rank of Who grocery shops in your household?.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Shared responsibility-I do it myself	30.255	12.690	2.384	.017	.103
Shared responsibility-Spouse/cohabitant	-32.469	13.718	-2.367	.018	.108
Shared responsibility-My child (ren)	43.637	14.446	3.021	.003	.015
I do it myself-Spouse/cohabitant	-2.214	10.308	-.215	.830	1.000
I do it myself-My child(ren)	-13.382	11.259	-1.189	.235	1.000
Spouse/cohabitant-My child(ren)	11.168	12.406	.900	.368	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by who do the shopping for Personalized Promotion/Pricing

Pairwise Comparisons of Who grocery shops in your household?



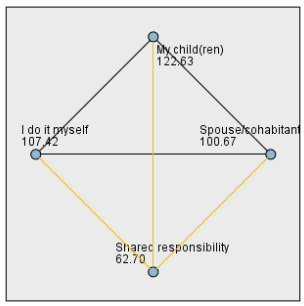
Each node shows the sample average rank of Who grocery shops in your household?.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Shared responsibility-Spouse/cohabitant	-31.460	13.416	-2.345	.019	.114
Shared responsibility-I do it myself	31.480	12.411	2.537	.011	.067
Shared responsibility-My child (ren)	38.052	14.129	2.693	.007	.042
Spouse/cohabitant-I do it myself	.021	10.081	.002	.998	1.000
Spouse/cohabitant-My child(ren)	6.592	12.133	.543	.587	1.000
I do it myself-My child(ren)	-6.571	11.012	-.597	.551	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by who do the shopping for Personalized Promotion/Pricing

Pairwise Comparisons of Who grocery shops in your household?



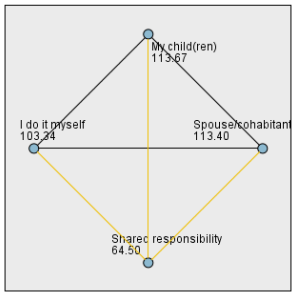
Each node shows the sample average rank of Who grocery shops in your household?.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Shared responsibility-Spouse/cohabitant	-37.970	13.714	-2.769	.006	.034
Shared responsibility-I do it myself	44.722	12.686	3.525	.000	.003
Shared responsibility-My child (ren)	59.932	14.443	4.150	.000	.000
Spouse/cohabitant-I do it myself	6.752	10.305	.655	.512	1.000
Spouse/cohabitant-My child(ren)	21.962	12.403	1.771	.077	.460
I do it myself-My child(ren)	-15.210	11.256	-1.351	.177	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by who do the shopping for Personalized Promotion/Pricing

Pairwise Comparisons of Who grocery shops in your household?



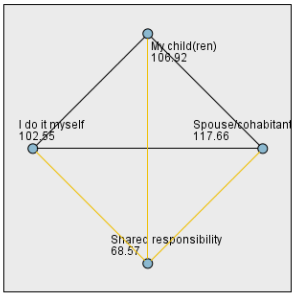
Each node shows the sample average rank of Who grocery shops in your household?.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Shared responsibility-I do it myself	38.843	12.713	3.055	.002	.013
Shared responsibility-Spouse/cohabitant	-48.902	13.743	-3.558	.000	.002
Shared responsibility-My child (ren)	49.167	14.473	3.397	.001	.004
I do it myself-Spouse/cohabitant	-10.059	10.326	-.974	.330	1.000
I do it myself-My child(ren)	-10.324	11.280	-.915	.360	1.000
Spouse/cohabitant-My child(ren)	.265	12.429	.021	.983	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by who do the shopping for Personalized Promotion/Pricing

Pairwise Comparisons of Who grocery shops in your household?



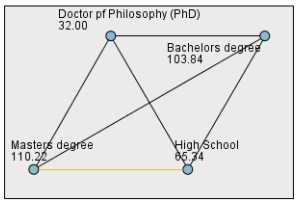
Each node shows the sample average rank of Who grocery shops in your household?.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Shared responsibility-I do it myself	33.981	12.423	2.735	.006	.037
Shared responsibility-My child (ren)	38.352	14.142	2.712	.007	.040
Shared responsibility-Spouse/cohabitant	-49.085	13.429	-3.655	.000	.002
I do it myself-My child(ren)	-4.371	11.022	-.397	.692	1.000
I do it myself-Spouse/cohabitant	-15.105	10.091	-1.497	.134	.807
My child(ren)-Spouse/cohabitant	-10.734	12.145	-.884	.377	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by who do the shopping for Personalized Promotion/Pricing

Pairwise Comparisons of Education



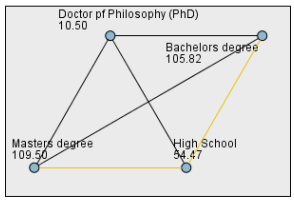
Each node shows the sample average rank of Education.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Doctor pf Philosophy (PhD)-High School	-33.344	58.657	-.568	.570	1.000
Doctor pf Philosophy (PhD)-Bachelors degree	71.836	57.138	1.257	.209	1.000
Doctor pf Philosophy (PhD)-Masters degree	-78.223	57.342	-1.364	.173	1.000
High School-Bachelors degree	38.492	15.131	2.544	.011	.066
High School-Masters degree	-44.879	15.881	-2.826	.005	.028
Bachelors degree-Masters degree	-6.387	8.739	-.731	.465	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by Education for Personalized Promotion/Pricing

Pairwise Comparisons of Education



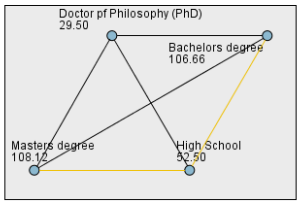
Each node shows the sample average rank of Education.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Doctor pf Philosophy (PhD)-High School	-43.969	60.117	-.731	.465	1.000
Doctor pf Philosophy (PhD)-Bachelors degree	95.324	58.560	1.628	.104	.621
Doctor pf Philosophy (PhD)-Masters degree	-99.000	58.769	-1.685	.092	.552
High School-Bachelors degree	51.355	15.507	3.312	.001	.006
High School-Masters degree	-55.031	16.276	-3.381	.001	.004
Bachelors degree-Masters degree	-3.676	8.956	-.410	.681	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by Education for Personalized Promotion/Pricing Promotion/PricingPromotion/PricingPromotion

Pairwise Comparisons of Education



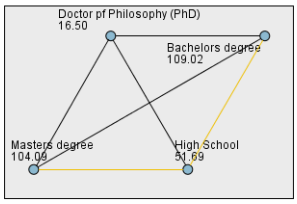
Each node shows the sample average rank of Education.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Doctor pf Philosophy (PhD)-High School	-23.000	60.188	-.382	.702	1.000
Doctor pf Philosophy (PhD)-Bachelors degree	77.160	58.630	1.316	.188	1.000
Doctor pf Philosophy (PhD)-Masters degree	-78.623	58.839	-1.336	.181	1.000
High School-Bachelors degree	54.160	15.526	3.488	.000	.003
High School-Masters degree	-55.623	16.296	-3.413	.001	.004
Bachelors degree-Masters degree	-1.463	8.967	-.163	.870	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by Education for Personalized Promotion/Pricing Promotion/PricingPromotion/PricingPromotion

Pairwise Comparisons of Education



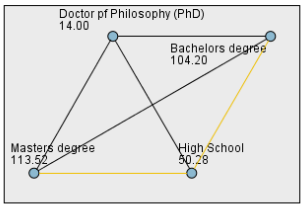
Each node shows the sample average rank of Education.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Doctor pf Philosophy (PhD)-High School	-35.188	58.795	-.598	.550	1.000
Doctor pf Philosophy (PhD)-Masters degree	-87.592	57.477	-1.524	.128	.765
Doctor pf Philosophy (PhD)-Bachelors degree	92.520	57.273	1.615	.106	.637
High School-Masters degree	-52.405	15.919	-3.292	.001	.006
High School-Bachelors degree	57.333	15.166	3.780	.000	.001
Masters degree-Bachelors degree	4.928	8.759	.563	.574	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by Education for Personalized Promotion/Pricing Promotion/PricingPromotion/PricingPromotion

Pairwise Comparisons of Education



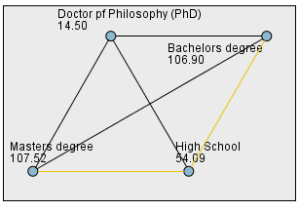
Each node shows the sample average rank of Education.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Doctor pf Philosophy (PhD)-High School	-36.281	60.101	-.604	.546	1.000
Doctor pf Philosophy (PhD)-Bachelors degree	90.205	58.545	1.541	.123	.740
Doctor pf Philosophy (PhD)-Masters degree	-99.515	58.753	-1.694	.090	.542
High School-Bachelors degree	53.924	15.503	3.478	.001	.003
High School-Masters degree	-63.234	16.272	-3.886	.000	.001
Bachelors degree-Masters degree	-9.310	8.954	-1.040	.298	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by Education for Personalized Promotion/Pricing

Pairwise Comparisons of Education



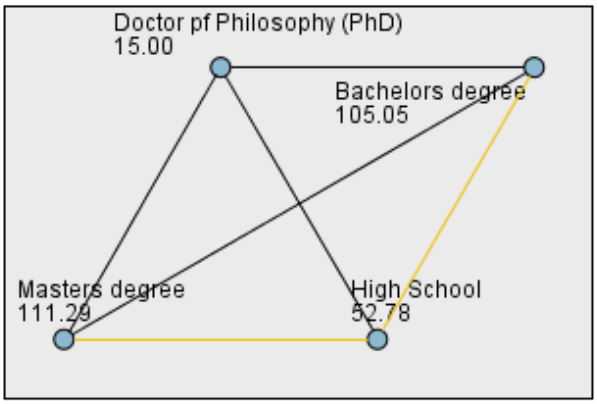
Each node shows the sample average rank of Education.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Doctor pf Philosophy (PhD)-High School	-39.594	60.227	-.657	.511	1.000
Doctor pf Philosophy (PhD)-Bachelors degree	92.398	58.668	1.575	.115	.692
Doctor pf Philosophy (PhD)-Masters degree	-93.015	58.876	-1.580	.114	.685
High School-Bachelors degree	52.804	15.536	3.399	.001	.004
High School-Masters degree	-53.422	16.306	-3.276	.001	.006
Bachelors degree-Masters degree	-.618	8.972	-.069	.945	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by Education for Personalized Promotion/Pricing

Pairwise Comparisons of Education



Each node shows the sample average rank of Education.

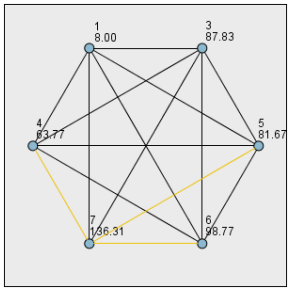
Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Doctor pf Philosophy (PhD)-High School	-37.781	58.852	-.642	.521	1.000
Doctor pf Philosophy (PhD)-Bachelors degree	90.053	57.328	1.571	.116	.697
Doctor pf Philosophy (PhD)-Masters degree	-96.292	57.532	-1.674	.094	.565
High School-Bachelors degree	52.272	15.181	3.443	.001	.003
High School-Masters degree	-58.511	15.934	-3.672	.000	.001
Bachelors degree-Masters degree	-6.239	8.768	-.712	.477	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by Education for Personalized Promotion/Pricing

Appendix 6 – Mobile Apps Analysis

Pairwise Comparisons of What is your attitude towards grocery shopping?



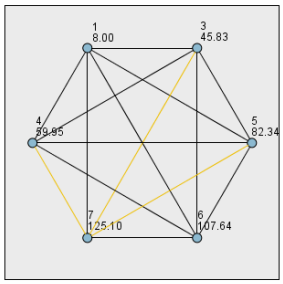
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-55.773	58.889	-.947	.344	1.000
1-5	-73.671	57.119	-1.290	.197	1.000
1-3	-79.833	60.900	-1.311	.190	1.000
1-6	-90.771	56.675	-1.602	.109	1.000
1-7	-128.308	56.922	-2.254	.024	.363
4-5	-17.898	19.304	-.927	.354	1.000
4-3	24.061	28.615	.841	.400	1.000
4-6	-34.998	17.947	-1.950	.051	.768
4-7	-72.535	18.712	-3.876	.000	.002
5-3	6.162	24.769	.249	.804	1.000
5-6	-17.100	10.806	-1.582	.114	1.000
5-7	-54.637	12.033	-4.541	.000	.000
3-6	-10.938	23.726	-.461	.645	1.000
3-7	-48.474	24.310	-1.994	.046	.692
6-7	-37.537	9.708	-3.867	.000	.002

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by attitude towards grocery shopping for Mobile Apps

Pairwise Comparisons of What is your attitude towards grocery shopping?



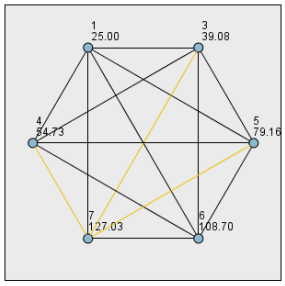
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-37.833	61.511	-.615	.539	1.000
1-4	-51.955	59.480	-.873	.382	1.000
1-5	-74.342	57.692	-1.289	.198	1.000
1-6	-99.641	57.244	-1.741	.082	1.000
1-7	-117.096	57.493	-2.037	.042	.625
3-4	-14.121	28.902	-.489	.625	1.000
3-5	-36.509	25.017	-1.459	.144	1.000
3-6	-61.807	23.964	-2.579	.010	.149
3-7	-79.263	24.553	-3.228	.001	.019
4-5	-22.388	19.498	-1.148	.251	1.000
4-6	-47.686	18.127	-2.631	.009	.128
4-7	-65.142	18.899	-3.447	.001	.009
5-6	-25.299	10.914	-2.318	.020	.307
5-7	-42.754	12.154	-3.518	.000	.007
6-7	-17.456	9.806	-1.780	.075	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by attitude towards grocery shopping for Mobile Apps

Pairwise Comparisons of What is your attitude towards grocery shopping?



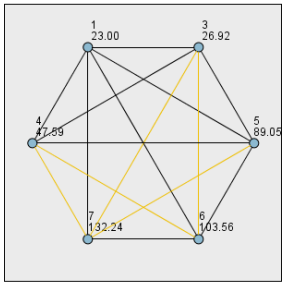
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-14.083	63.040	-.223	.823	1.000
1-4	-29.727	60.959	-.488	.626	1.000
1-5	-54.158	59.126	-.916	.360	1.000
1-6	-83.698	58.667	-1.427	.154	1.000
1-7	-102.029	58.922	-1.732	.083	1.000
3-4	-15.644	29.621	-.528	.597	1.000
3-5	-40.075	25.639	-1.563	.118	1.000
3-6	-69.615	24.560	-2.834	.005	.069
3-7	-87.946	25.164	-3.495	.000	.007
4-5	-24.431	19.983	-1.223	.221	1.000
4-6	-53.971	18.578	-2.905	.004	.055
4-7	-72.302	19.369	-3.733	.000	.003
5-6	-29.540	11.186	-2.641	.008	.124
5-7	-47.871	12.456	-3.843	.000	.002
6-7	-18.331	10.049	-1.824	.068	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by attitude towards grocery shopping for Mobile Apps

Pairwise Comparisons of What is your attitude towards grocery shopping?



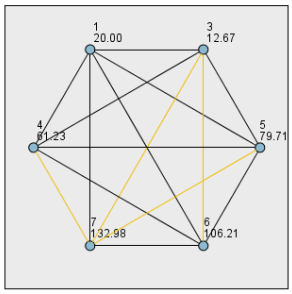
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-3.917	61.415	-.064	.949	1.000
1-4	-24.591	59.388	-.414	.679	1.000
1-5	-66.053	57.603	-1.147	.252	1.000
1-6	-80.557	57.155	-1.409	.159	1.000
1-7	-109.240	57.404	-1.903	.057	.856
3-4	-20.674	28.857	-.716	.474	1.000
3-5	-62.136	24.978	-2.488	.013	.193
3-6	-76.641	23.927	-3.203	.001	.020
3-7	-105.324	24.516	-4.296	.000	.000
4-5	-41.462	19.468	-2.130	.033	.498
4-6	-55.966	18.099	-3.092	.002	.030
4-7	-84.649	18.870	-4.486	.000	.000
5-6	-14.505	10.898	-1.331	.183	1.000
5-7	-43.188	12.135	-3.559	.000	.006
6-7	-28.683	9.790	-2.930	.003	.051

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by attitude towards grocery shopping for Mobile Apps

Pairwise Comparisons of What is your attitude towards grocery shopping?



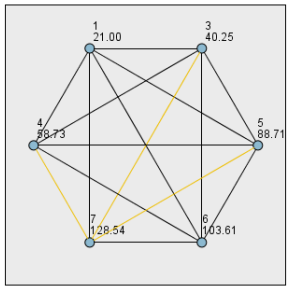
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
3-1	7.333	62.782	.117	.907	1.000
3-4	-48.561	29.499	-1.646	.100	1.000
3-5	-67.044	25.534	-2.626	.009	.130
3-6	-93.547	24.460	-3.825	.000	.002
3-7	-120.314	25.061	-4.801	.000	.000
1-4	-41.227	60.709	-.679	.497	1.000
1-5	-59.711	58.884	-1.014	.311	1.000
1-6	-86.214	58.427	-1.476	.140	1.000
1-7	-112.981	58.681	-1.925	.054	.813
4-5	-18.483	19.901	-.929	.353	1.000
4-6	-44.986	18.502	-2.431	.015	.226
4-7	-71.753	19.290	-3.720	.000	.003
5-6	-26.503	11.140	-2.379	.017	.260
5-7	-53.270	12.405	-4.294	.000	.000
6-7	-26.767	10.008	-2.675	.007	.112

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by attitude towards grocery shopping for Mobile Apps

Pairwise Comparisons of What is your attitude towards grocery shopping?



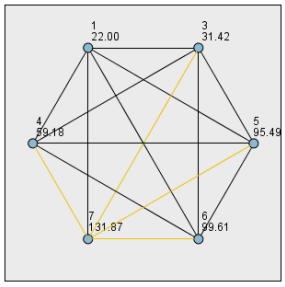
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-19.250	62.966	-.306	.760	1.000
1-4	-37.727	60.887	-.620	.536	1.000
1-5	-67.711	59.057	-1.147	.252	1.000
1-6	-82.609	58.598	-1.410	.159	1.000
1-7	-107.538	58.853	-1.827	.068	1.000
3-4	-18.477	29.586	-.625	.532	1.000
3-5	-48.461	25.609	-1.892	.058	.877
3-6	-63.359	24.531	-2.583	.010	.147
3-7	-88.288	25.135	-3.513	.000	.007
4-5	-29.983	19.959	-1.502	.133	1.000
4-6	-44.882	18.556	-2.419	.016	.234
4-7	-69.811	19.347	-3.608	.000	.005
5-6	-14.899	11.173	-1.334	.182	1.000
5-7	-39.828	12.441	-3.201	.001	.021
6-7	-24.929	10.038	-2.484	.013	.195

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by attitude towards grocery shopping for Mobile Apps

Pairwise Comparisons of What is your attitude towards grocery shopping?



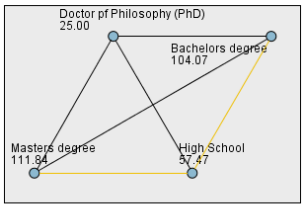
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-9.417	61.138	-.154	.878	1.000
1-4	-37.182	59.119	-.629	.529	1.000
1-5	-73.487	57.342	-1.282	.200	1.000
1-6	-77.615	56.896	-1.364	.173	1.000
1-7	-109.865	57.144	-1.923	.055	.818
3-4	-27.765	28.727	-.967	.334	1.000
3-5	-64.070	24.865	-2.577	.010	.150
3-6	-68.198	23.819	-2.863	.004	.063
3-7	-100.449	24.405	-4.116	.000	.001
4-5	-36.305	19.380	-1.873	.061	.915
4-6	-40.433	18.018	-2.244	.025	.372
4-7	-72.684	18.785	-3.869	.000	.002
5-6	-4.128	10.848	-.380	.704	1.000
5-7	-36.379	12.080	-3.011	.003	.039
6-7	-32.251	9.746	-3.309	.001	.014

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by attitude towards grocery shopping for Mobile Apps

Pairwise Comparisons of Education



Each node shows the sample average rank of Education.

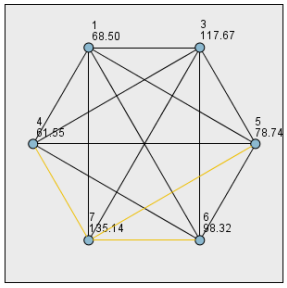
Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Doctor pf Philosophy (PhD)-High School	-32.469	60.160	-.540	.589	1.000
Doctor pf Philosophy (PhD)-Bachelors degree	79.066	58.602	1.349	.177	1.000
Doctor pf Philosophy (PhD)-Masters degree	-86.838	58.811	-1.477	.140	.839
High School-Bachelors degree	46.597	15.518	3.003	.003	.016
High School-Masters degree	-54.370	16.288	-3.338	.001	.005
Bachelors degree-Masters degree	-7.773	8.962	-.867	.386	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by Education for Mobile Apps

Appendix 7 – Smart Shelves Analysis

Pairwise Comparisons of What is your attitude towards grocery shopping?



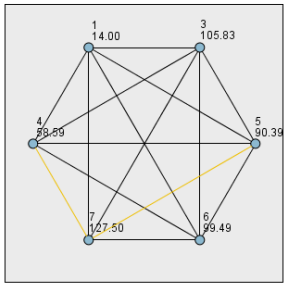
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
4-1	6.955	59.359	.117	.907	1.000
4-5	-17.191	19.458	-.884	.377	1.000
4-6	-36.777	18.091	-2.033	.042	.631
4-3	56.121	28.843	1.946	.052	.775
4-7	-73.599	18.861	-3.902	.000	.001
1-5	-10.237	57.575	-.178	.859	1.000
1-6	-29.823	57.127	-.522	.602	1.000
1-3	-49.167	61.385	-.801	.423	1.000
1-7	-66.644	57.376	-1.162	.245	1.000
5-6	-19.586	10.892	-1.798	.072	1.000
5-3	38.930	24.966	1.559	.119	1.000
5-7	-56.407	12.129	-4.651	.000	.000
6-3	19.344	23.916	.809	.419	1.000
6-7	-36.821	9.786	-3.763	.000	.003
3-7	-17.478	24.503	-.713	.476	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by attitude towards grocery shopping for Smart Shelves

Pairwise Comparisons of What is your attitude towards grocery shopping?



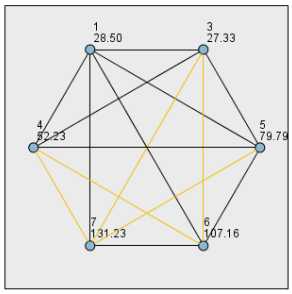
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-44.591	60.791	-.734	.463	1.000
1-5	-76.395	58.964	-1.296	.195	1.000
1-6	-85.495	58.506	-1.461	.144	1.000
1-3	-91.833	62.867	-1.461	.144	1.000
1-7	-113.500	58.760	-1.932	.053	.801
4-5	-31.804	19.928	-1.596	.110	1.000
4-6	-40.904	18.527	-2.208	.027	.409
4-3	47.242	29.539	1.599	.110	1.000
4-7	-68.909	19.316	-3.567	.000	.005
5-6	-9.100	11.155	-.816	.415	1.000
5-3	15.439	25.569	.604	.546	1.000
5-7	-37.105	12.422	-2.987	.003	.042
6-3	6.339	24.493	.259	.796	1.000
6-7	-28.005	10.022	-2.794	.005	.078
3-7	-21.667	25.095	-.863	.388	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by attitude towards grocery shopping for Smart Shelves

Pairwise Comparisons of What is your attitude towards grocery shopping?



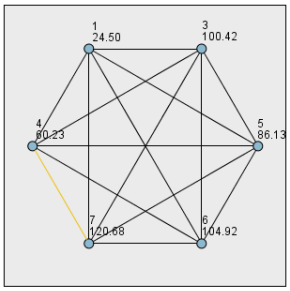
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
3-1	1.167	63.048	.019	.985	1.000
3-4	-24.894	29.624	-.840	.401	1.000
3-5	-52.456	25.642	-2.046	.041	.612
3-6	-79.823	24.563	-3.250	.001	.017
3-7	-103.897	25.167	-4.128	.000	.001
1-4	-23.727	60.966	-.389	.697	1.000
1-5	-51.289	59.134	-.867	.386	1.000
1-6	-78.656	58.674	-1.341	.180	1.000
1-7	-102.731	58.929	-1.743	.081	1.000
4-5	-27.562	19.985	-1.379	.168	1.000
4-6	-54.929	18.580	-2.956	.003	.047
4-7	-79.003	19.372	-4.078	.000	.001
5-6	-27.367	11.187	-2.446	.014	.217
5-7	-51.441	12.457	-4.129	.000	.001
6-7	-24.075	10.051	-2.395	.017	.249

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by attitude towards grocery shopping for Smart Shelves

Pairwise Comparisons of What is your attitude towards grocery shopping?



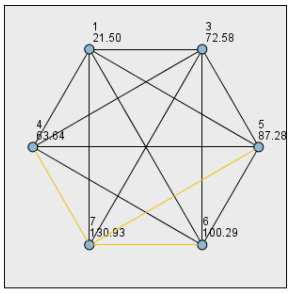
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-35.727	59.298	-.603	.547	1.000
1-5	-61.632	57.515	-1.072	.284	1.000
1-3	-75.917	61.322	-1.238	.216	1.000
1-6	-80.417	57.068	-1.409	.159	1.000
1-7	-96.183	57.317	-1.678	.093	1.000
4-5	-25.904	19.438	-1.333	.183	1.000
4-3	40.189	28.814	1.395	.163	1.000
4-6	-44.689	18.072	-2.473	.013	.201
4-7	-60.455	18.842	-3.209	.001	.020
5-3	14.285	24.940	.573	.567	1.000
5-6	-18.785	10.881	-1.726	.084	1.000
5-7	-34.551	12.116	-2.852	.004	.065
3-6	-4.500	23.891	-.188	.851	1.000
3-7	-20.266	24.478	-.828	.408	1.000
6-7	-15.766	9.775	-1.613	.107	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by attitude towards grocery shopping for Smart Shelves

Pairwise Comparisons of What is your attitude towards grocery shopping?



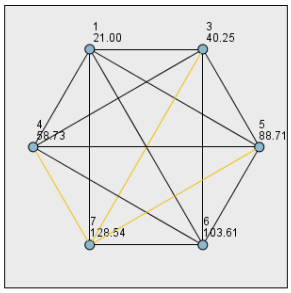
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-42.136	61.053	-.690	.490	1.000
1-3	-51.083	63.138	-.809	.418	1.000
1-5	-65.776	59.218	-1.111	.267	1.000
1-6	-78.792	58.758	-1.341	.180	1.000
1-7	-109.433	59.014	-1.854	.064	.955
4-3	8.947	29.667	.302	.763	1.000
4-5	-23.640	20.014	-1.181	.238	1.000
4-6	-36.655	18.607	-1.970	.049	.733
4-7	-67.296	19.399	-3.469	.001	.008
3-5	-14.693	25.679	-.572	.567	1.000
3-6	-27.708	24.598	-1.126	.260	1.000
3-7	-58.349	25.203	-2.315	.021	.309
5-6	-13.015	11.203	-1.162	.245	1.000
5-7	-43.656	12.475	-3.499	.000	.007
6-7	-30.641	10.065	-3.044	.002	.035

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by attitude towards grocery shopping for Smart Shelves

Pairwise Comparisons of What is your attitude towards grocery shopping?



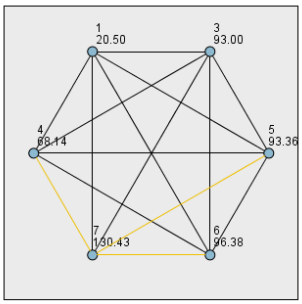
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-19.250	62.966	-.306	.760	1.000
1-4	-37.727	60.887	-.620	.536	1.000
1-5	-67.711	59.057	-1.147	.252	1.000
1-6	-82.609	58.598	-1.410	.159	1.000
1-7	-107.538	58.853	-1.827	.068	1.000
3-4	-18.477	29.586	-.625	.532	1.000
3-5	-48.461	25.609	-1.892	.058	.877
3-6	-63.359	24.531	-2.583	.010	.147
3-7	-88.288	25.135	-3.513	.000	.007
4-5	-29.983	19.959	-1.502	.133	1.000
4-6	-44.882	18.556	-2.419	.016	.234
4-7	-69.811	19.347	-3.608	.000	.005
5-6	-14.899	11.173	-1.334	.182	1.000
5-7	-39.828	12.441	-3.201	.001	.021
6-7	-24.929	10.038	-2.484	.013	.195

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by attitude towards grocery shopping for Smart Shelves

Pairwise Comparisons of What is your attitude towards grocery shopping?



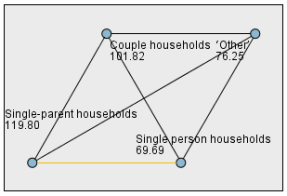
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-47.636	59.074	-.806	.420	1.000
1-3	-72.500	61.091	-1.187	.235	1.000
1-5	-72.855	57.298	-1.272	.204	1.000
1-6	-75.875	56.853	-1.335	.182	1.000
1-7	-109.933	57.100	-1.925	.054	.813
4-3	24.864	28.705	.866	.386	1.000
4-5	-25.219	19.365	-1.302	.193	1.000
4-6	-28.239	18.004	-1.568	.117	1.000
4-7	-62.296	18.770	-3.319	.001	.014
3-5	-.355	24.846	-.014	.989	1.000
3-6	-3.375	23.801	-.142	.887	1.000
3-7	-37.433	24.386	-1.535	.125	1.000
5-6	-3.020	10.840	-.279	.781	1.000
5-7	-37.077	12.071	-3.072	.002	.032
6-7	-34.058	9.739	-3.497	.000	.007

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by attitude towards grocery shopping for Smart Shelves

Pairwise Comparisons of Household Type



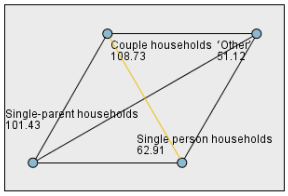
Each node shows the sample average rank of Household Type.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Single person households-'Other'	6.562	32.630	.201	.841	1.000
Single person households-Couple households	32.133	15.393	2.088	.037	.221
Single person households-Single-parent households	-50.110	17.148	-2.922	.003	.021
'Other'-Couple households	-25.570	29.594	-.864	.388	1.000
'Other'-Single-parent households	-43.548	30.544	-1.426	.154	.924
Couple households-Single-parent households	-17.977	10.253	-1.753	.080	.477

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by household type for Smart Shelves

Pairwise Comparisons of Household Type



Each node shows the sample average rank of Household Type.

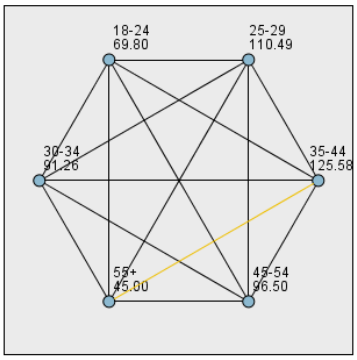
Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
'Other'-Single person households	-11.781	32.677	-.361	.718	1.000
'Other'-Single-parent households	-50.304	30.587	-1.645	.100	.600
'Other'-Couple households	-57.600	29.636	-1.944	.052	.312
Single person households-Single-parent households	-38.522	17.173	-2.243	.025	.149
Single person households-Couple households	45.819	15.415	2.972	.003	.018
Single-parent households-Couple households	7.297	10.267	.711	.477	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by household type for Smart Shelves

Appendix 8 – Smart Robot Analysis

Pairwise Comparisons of Age



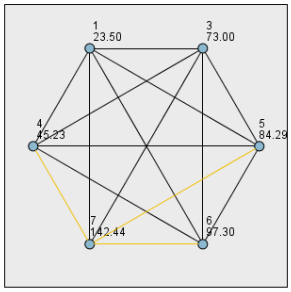
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	24.800	29.203	.849	.396	1.000
55+-30-34	46.259	24.336	1.901	.057	.860
55+-45-54	51.500	28.701	1.794	.073	1.000
55+-25-29	65.490	23.777	2.754	.006	.088
55+-35-44	80.583	25.812	3.122	.002	.027
18-24-30-34	-21.459	19.469	-1.102	.270	1.000
18-24-45-54	-26.700	24.709	-1.081	.280	1.000
18-24-25-29	-40.690	18.765	-2.168	.030	.452
18-24-35-44	-55.783	21.285	-2.621	.009	.132
30-34-45-54	-5.241	18.707	-.280	.779	1.000
30-34-25-29	19.231	9.567	2.010	.044	.666
30-34-35-44	-34.324	13.874	-2.474	.013	.200
45-54-25-29	13.990	17.973	.778	.436	1.000
45-54-35-44	29.083	20.591	1.412	.158	1.000
25-29-35-44	-15.093	12.867	-1.173	.241	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by Age for Smart Robot

Pairwise Comparisons of What is your attitude towards grocery shopping?



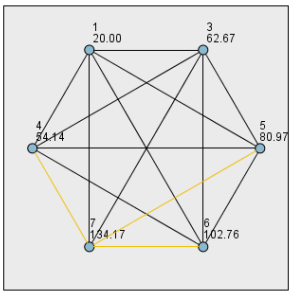
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-21.727	58.967	-.368	.713	1.000
1-3	-49.500	60.980	-.812	.417	1.000
1-5	-60.789	57.195	-1.063	.288	1.000
1-6	-73.802	56.750	-1.300	.193	1.000
1-7	-118.942	56.997	-2.087	.037	.554
4-3	27.773	28.653	.969	.332	1.000
4-5	-39.062	19.330	-2.021	.043	.649
4-6	-52.075	17.971	-2.898	.004	.056
4-7	-97.215	18.737	-5.189	.000	.000
3-5	-11.289	24.801	-.455	.649	1.000
3-6	-24.302	23.758	-1.023	.306	1.000
3-7	-69.442	24.342	-2.853	.004	.065
5-6	-13.013	10.820	-1.203	.229	1.000
5-7	-58.153	12.049	-4.826	.000	.000
6-7	-45.140	9.721	-4.644	.000	.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by towards grocery shopping for Smart Robot

Pairwise Comparisons of What is your attitude towards grocery shopping?



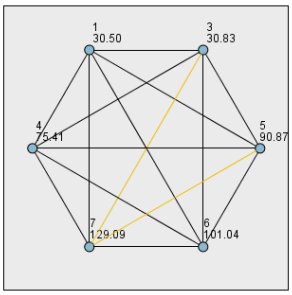
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-34.136	60.859	-.561	.575	1.000
1-3	-42.667	62.937	-.678	.498	1.000
1-5	-60.974	59.030	-1.033	.302	1.000
1-6	-82.755	58.571	-1.413	.158	1.000
1-7	-114.173	58.826	-1.941	.052	.784
4-3	8.530	29.572	.288	.773	1.000
4-5	-26.837	19.950	-1.345	.179	1.000
4-6	-48.619	18.548	-2.621	.009	.131
4-7	-80.037	19.338	-4.139	.000	.001
3-5	-18.307	25.597	-.715	.474	1.000
3-6	-40.089	24.520	-1.635	.102	1.000
3-7	-71.506	25.123	-2.846	.004	.066
5-6	-21.782	11.168	-1.950	.051	.767
5-7	-53.199	12.435	-4.278	.000	.000
6-7	-31.418	10.033	-3.131	.002	.026

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by towards grocery shopping for Smart Robot

Pairwise Comparisons of What is your attitude towards grocery shopping?



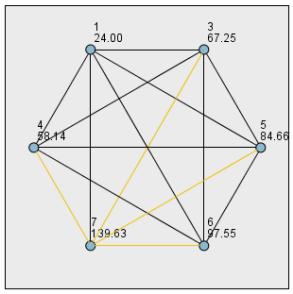
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-.333	63.025	-.005	.996	1.000
1-4	-44.909	60.944	-.737	.461	1.000
1-5	-60.368	59.112	-1.021	.307	1.000
1-6	-70.536	58.653	-1.203	.229	1.000
1-7	-98.587	58.908	-1.674	.094	1.000
3-4	-44.576	29.614	-1.505	.132	1.000
3-5	-60.035	25.633	-2.342	.019	.288
3-6	-70.203	24.554	-2.859	.004	.064
3-7	-98.253	25.158	-3.905	.000	.001
4-5	-15.459	19.978	-.774	.439	1.000
4-6	-25.627	18.574	-1.380	.168	1.000
4-7	-53.677	19.365	-2.772	.006	.084
5-6	-10.168	11.183	-.909	.363	1.000
5-7	-38.218	12.453	-3.069	.002	.032
6-7	-28.050	10.047	-2.792	.005	.079

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by towards grocery shopping for Smart Robot

Pairwise Comparisons of What is your attitude towards grocery shopping?



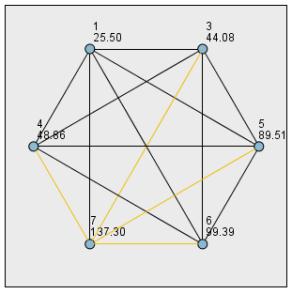
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-34.136	59.528	-.573	.566	1.000
1-3	-43.250	61.561	-.703	.482	1.000
1-5	-60.658	57.739	-1.051	.293	1.000
1-6	-73.552	57.290	-1.284	.199	1.000
1-7	-115.635	57.539	-2.010	.044	.667
4-3	9.114	28.926	.315	.753	1.000
4-5	-26.522	19.514	-1.359	.174	1.000
4-6	-39.416	18.142	-2.173	.030	.447
4-7	-81.498	18.915	-4.309	.000	.000
3-5	-17.408	25.037	-.695	.487	1.000
3-6	-30.302	23.984	-1.263	.206	1.000
3-7	-72.385	24.573	-2.946	.003	.048
5-6	-12.894	10.923	-1.180	.238	1.000
5-7	-54.977	12.163	-4.520	.000	.000
6-7	-42.083	9.813	-4.288	.000	.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by towards grocery shopping for Smart Robot

Pairwise Comparisons of What is your attitude towards grocery shopping?



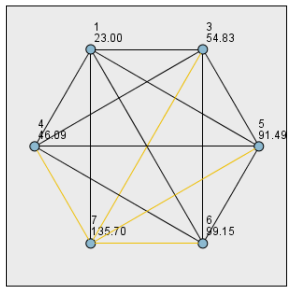
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-18.583	63.063	-.295	.768	1.000
1-4	-23.364	60.981	-.383	.702	1.000
1-5	-64.013	59.148	-1.082	.279	1.000
1-6	-73.891	58.688	-1.259	.208	1.000
1-7	-111.798	58.944	-1.897	.058	.868
3-4	-4.780	29.631	-.161	.872	1.000
3-5	-45.430	25.648	-1.771	.077	1.000
3-6	-55.307	24.569	-2.251	.024	.366
3-7	-93.215	25.173	-3.703	.000	.003
4-5	-40.650	19.990	-2.034	.042	.630
4-6	-50.527	18.585	-2.719	.007	.098
4-7	-88.434	19.376	-4.564	.000	.000
5-6	-9.877	11.190	-.883	.377	1.000
5-7	-47.785	12.460	-3.835	.000	.002
6-7	-37.907	10.053	-3.771	.000	.002

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by towards grocery shopping for Smart Robot

Pairwise Comparisons of What is your attitude towards grocery shopping?



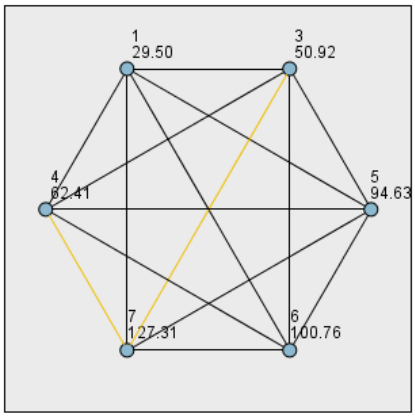
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-4	-23.091	60.929	-.379	.705	1.000
1-3	-31.833	63.009	-.505	.613	1.000
1-5	-68.487	59.098	-1.159	.247	1.000
1-6	-76.146	58.638	-1.299	.194	1.000
1-7	-112.702	58.893	-1.914	.056	.835
4-3	8.742	29.606	.295	.768	1.000
4-5	-45.396	19.973	-2.273	.023	.345
4-6	-53.055	18.569	-2.857	.004	.064
4-7	-89.611	19.360	-4.629	.000	.000
3-5	-36.654	25.626	-1.430	.153	1.000
3-6	-44.312	24.548	-1.805	.071	1.000
3-7	-80.869	25.152	-3.215	.001	.020
5-6	-7.659	11.180	-.685	.493	1.000
5-7	-44.215	12.450	-3.552	.000	.006
6-7	-36.556	10.044	-3.639	.000	.004

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by towards grocery shopping for Smart Robot

Pairwise Comparisons of What is your attitude towards grocery shopping?



Each node shows the sample average rank of What is your attitude towards grocery shopping?.

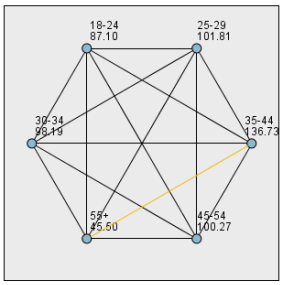
Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-21.417	61.083	-.351	.726	1.000
1-4	-32.909	59.067	-.557	.577	1.000
1-5	-65.132	57.291	-1.137	.256	1.000
1-6	-71.255	56.846	-1.253	.210	1.000
1-7	-97.808	57.093	-1.713	.087	1.000
3-4	-11.492	28.701	-.400	.689	1.000
3-5	-43.715	24.843	-1.760	.078	1.000
3-6	-49.839	23.798	-2.094	.036	.544
3-7	-76.391	24.383	-3.133	.002	.026
4-5	-32.222	19.362	-1.664	.096	1.000
4-6	-38.346	18.001	-2.130	.033	.497
4-7	-64.899	18.768	-3.458	.001	.008
5-6	-6.124	10.839	-.565	.572	1.000
5-7	-32.676	12.069	-2.707	.007	.102
6-7	-26.552	9.737	-2.727	.006	.096

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/ Relationship Commitment by towards grocery shopping for Smart Robot

Appendix 9 – Smart Fridge Analysis

Pairwise Comparisons of Age



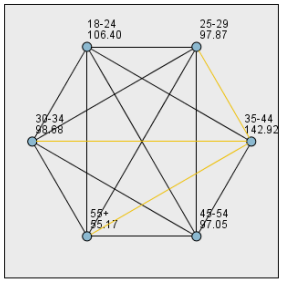
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	41.600	29.254	1.422	.155	1.000
55+-30-34	52.694	24.378	2.162	.031	.460
55+-45-54	54.773	28.751	1.905	.057	.852
55+-25-29	56.308	23.818	2.364	.018	.271
55+-35-44	91.229	25.857	3.528	.000	.006
18-24-30-34	-11.094	19.502	-.569	.569	1.000
18-24-45-54	-13.173	24.752	-.532	.595	1.000
18-24-25-29	-14.708	18.797	-.782	.434	1.000
18-24-35-44	-49.629	21.322	-2.328	.020	.299
30-34-45-54	-2.078	18.740	-.111	.912	1.000
30-34-25-29	3.614	9.584	.377	.706	1.000
30-34-35-44	-38.535	13.898	-2.773	.006	.083
45-54-25-29	1.535	18.004	.085	.932	1.000
45-54-35-44	36.456	20.627	1.767	.077	1.000
25-29-35-44	-34.921	12.889	-2.709	.007	.101

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by Age for Smart Fridge

Pairwise Comparisons of Age



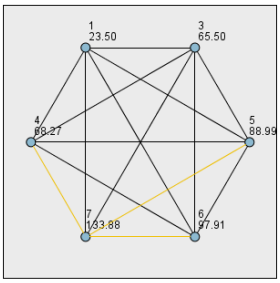
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-45-54	41.879	29.510	1.419	.156	1.000
55+-25-29	42.702	24.447	1.747	.081	1.000
55+-30-34	43.509	25.022	1.739	.082	1.000
55+-18-24	51.233	30.027	1.706	.088	1.000
55+-35-44	87.750	26.540	3.306	.001	.014
45-54-25-29	.823	18.480	.045	.964	1.000
45-54-30-34	1.630	19.235	.085	.932	1.000
45-54-18-24	9.355	25.406	.368	.713	1.000
45-54-35-44	45.871	21.172	2.167	.030	.454
25-29-30-34	-.807	9.837	-.082	.935	1.000
25-29-18-24	8.531	19.294	.442	.658	1.000
25-29-35-44	-45.048	13.230	-3.405	.001	.010
30-34-18-24	7.724	20.018	.386	.700	1.000
30-34-35-44	-44.241	14.265	-3.101	.002	.029
18-24-35-44	-36.517	21.885	-1.669	.095	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by Age for Smart Fridge

Pairwise Comparisons of What is your attitude towards grocery shopping?



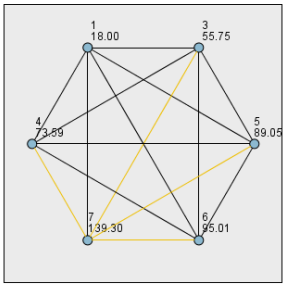
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-42.000	61.189	-.686	.492	1.000
1-4	-44.773	59.169	-.757	.449	1.000
1-5	-65.487	57.390	-1.141	.254	1.000
1-6	-74.406	56.944	-1.307	.191	1.000
1-7	-110.385	57.192	-1.930	.054	.804
3-4	-2.773	28.751	-.096	.923	1.000
3-5	-23.487	24.886	-.944	.345	1.000
3-6	-32.406	23.839	-1.359	.174	1.000
3-7	-68.385	24.425	-2.800	.005	.077
4-5	-20.714	19.396	-1.068	.286	1.000
4-6	-29.634	18.033	-1.643	.100	1.000
4-7	-65.612	18.800	-3.490	.000	.007
5-6	-8.919	10.857	-.822	.411	1.000
5-7	-44.898	12.090	-3.714	.000	.003
6-7	-35.978	9.754	-3.689	.000	.003

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by attitude towards grocery shopping for Smart Fridge

Pairwise Comparisons of What is your attitude towards grocery shopping?



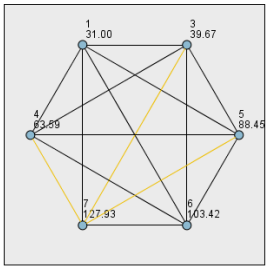
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-37.750	62.805	-.601	.548	1.000
1-4	-55.591	60.732	-.915	.360	1.000
1-5	-71.053	58.906	-1.206	.228	1.000
1-6	-77.005	58.448	-1.317	.188	1.000
1-7	-121.298	58.703	-2.066	.039	.582
3-4	-17.841	29.510	-.605	.545	1.000
3-5	-33.303	25.543	-1.304	.192	1.000
3-6	-39.255	24.469	-1.604	.109	1.000
3-7	-83.548	25.070	-3.333	.001	.013
4-5	-15.462	19.908	-.777	.437	1.000
4-6	-21.414	18.509	-1.157	.247	1.000
4-7	-65.707	19.297	-3.405	.001	.010
5-6	-5.953	11.144	-.534	.593	1.000
5-7	-50.245	12.409	-4.049	.000	.001
6-7	-44.293	10.012	-4.424	.000	.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by attitude towards grocery shopping for Smart Fridge

Pairwise Comparisons of What is your attitude towards grocery shopping?



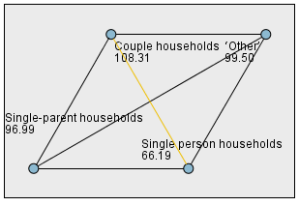
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-8.667	63.021	-.138	.891	1.000
1-4	-32.591	60.941	-.535	.593	1.000
1-5	-57.447	59.109	-.972	.331	1.000
1-6	-72.417	58.649	-1.235	.217	1.000
1-7	-96.933	58.905	-1.646	.100	1.000
3-4	-23.924	29.612	-.808	.419	1.000
3-5	-48.781	25.631	-1.903	.057	.855
3-6	-63.750	24.553	-2.596	.009	.141
3-7	-88.266	25.156	-3.509	.000	.007
4-5	-24.856	19.977	-1.244	.213	1.000
4-6	-39.826	18.573	-2.144	.032	.480
4-7	-64.342	19.364	-3.323	.001	.013
5-6	-14.969	11.182	-1.339	.181	1.000
5-7	-39.485	12.452	-3.171	.002	.023
6-7	-24.516	10.046	-2.440	.015	.220

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by attitude towards grocery shopping for Smart Fridge

Pairwise Comparisons of Household Type



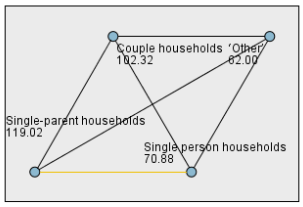
Each node shows the sample average rank of Household Type.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Single person households-Single-parent households	-30.801	16.643	-1.851	.064	.385
Single person households-'Other'	33.312	31.668	1.052	.293	1.000
Single person households-Couple households	42.119	14.939	2.819	.005	.029
Single-parent households-'Other'	2.512	29.643	.085	.932	1.000
Single-parent households-Couple households	11.318	9.950	1.137	.255	1.000
'Other'-Couple households	-8.806	28.721	-.307	.759	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by attitude household type Smart Fridge

Pairwise Comparisons of Household Type



Each node shows the sample average rank of Household Type.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
'Other'-Single person households	-8.875	32.617	-.272	.786	1.000
'Other'-Couple households	-40.317	29.581	-1.363	.173	1.000
'Other'-Single-parent households	-57.024	30.531	-1.868	.062	.371
Single person households-Couple households	31.442	15.386	2.043	.041	.246
Single person households-Single-parent households	-48.149	17.141	-2.809	.005	.030
Couple households-Single-parent households	-16.707	10.248	-1.630	.103	.618

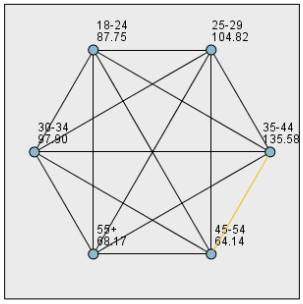
Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by attitude household type Smart Fridge

Appendix 10 – Just Walk Out Analysis

‘Just Walk Out’

Pairwise Comparisons of Age



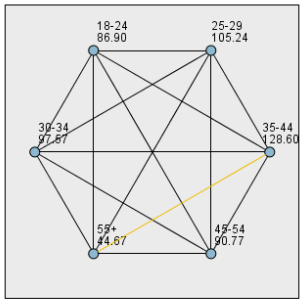
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
45-54-55+	-4.030	28.581	-.141	.888	1.000
45-54-18-24	23.614	24.606	.960	.337	1.000
45-54-30-34	33.762	18.629	1.812	.070	1.000
45-54-25-29	40.687	17.898	2.273	.023	.345
45-54-35-44	71.447	20.505	3.484	.000	.007
55+-18-24	19.583	29.081	.673	.501	1.000
55+-30-34	29.731	24.234	1.227	.220	1.000
55+-25-29	36.657	23.677	1.548	.122	1.000
55+-35-44	67.417	25.704	2.623	.009	.131
18-24-30-34	-10.148	19.387	-.523	.601	1.000
18-24-25-29	-17.073	18.686	-.914	.361	1.000
18-24-35-44	-47.833	21.196	-2.257	.024	.360
30-34-25-29	6.925	9.527	.727	.467	1.000
30-34-35-44	-37.685	13.816	-2.728	.006	.096
25-29-35-44	-30.760	12.813	-2.401	.016	.245

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by Age for Just Walk Out

Pairwise Comparisons of Age



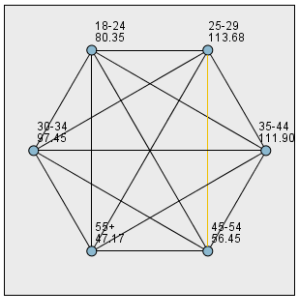
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-18-24	42.233	30.098	1.403	.161	1.000
55+-45-54	46.106	29.581	1.559	.119	1.000
55+-30-34	52.907	25.082	2.109	.035	.524
55+-25-29	60.576	24.505	2.472	.013	.202
55+-35-44	83.938	26.603	3.155	.002	.024
18-24-45-54	-3.873	25.466	-.152	.879	1.000
18-24-30-34	-10.674	20.065	-.532	.595	1.000
18-24-25-29	-18.342	19.340	-.948	.343	1.000
18-24-35-44	-41.704	21.938	-1.901	.057	.859
45-54-30-34	6.801	19.281	.353	.724	1.000
45-54-25-29	14.470	18.524	.781	.435	1.000
45-54-35-44	37.831	21.222	1.783	.075	1.000
30-34-25-29	7.668	9.860	.778	.437	1.000
30-34-35-44	-31.030	14.299	-2.170	.030	.450
25-29-35-44	-23.362	13.261	-1.762	.078	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by Age for Just Walk Out

Pairwise Comparisons of Age



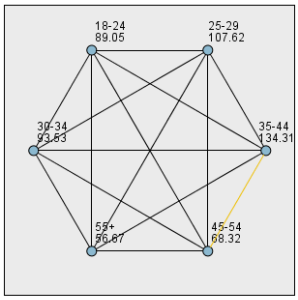
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-45-54	9.288	29.598	.314	.754	1.000
55+-18-24	33.183	30.115	1.102	.271	1.000
55+-30-34	50.287	25.096	2.004	.045	.676
55+-35-44	64.729	26.618	2.432	.015	.225
55+-25-29	66.515	24.519	2.713	.007	.100
45-54-18-24	23.895	25.481	.938	.348	1.000
45-54-30-34	40.999	19.292	2.125	.034	.503
45-54-35-44	55.441	21.234	2.611	.009	.135
45-54-25-29	57.227	18.535	3.088	.002	.030
18-24-30-34	-17.104	20.077	-.852	.394	1.000
18-24-35-44	-31.546	21.950	-1.437	.151	1.000
18-24-25-29	-33.332	19.351	-1.723	.085	1.000
30-34-35-44	-14.442	14.307	-1.009	.313	1.000
30-34-25-29	16.228	9.866	1.645	.100	1.000
35-44-25-29	1.786	13.269	.135	.893	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by Age for Just Walk Out

Pairwise Comparisons of Age



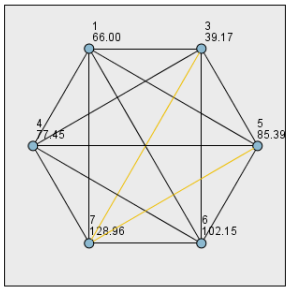
Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
55+-45-54	11.652	29.561	.394	.693	1.000
55+-18-24	32.383	30.079	1.077	.282	1.000
55+-30-34	36.861	25.065	1.471	.141	1.000
55+-25-29	50.949	24.489	2.080	.037	.562
55+-35-44	77.646	26.586	2.921	.003	.052
45-54-18-24	20.732	25.450	.815	.415	1.000
45-54-30-34	25.210	19.268	1.308	.191	1.000
45-54-25-29	39.298	18.512	2.123	.034	.507
45-54-35-44	65.994	21.208	3.112	.002	.028
18-24-30-34	-4.478	20.052	-.223	.823	1.000
18-24-25-29	-18.566	19.327	-.961	.337	1.000
18-24-35-44	-45.262	21.923	-2.065	.039	.584
30-34-25-29	14.088	9.854	1.430	.153	1.000
30-34-35-44	-40.785	14.289	-2.854	.004	.065
25-29-35-44	-26.696	13.253	-2.014	.044	.659

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by Age for Just Walk Out

Pairwise Comparisons of What is your attitude towards grocery shopping?



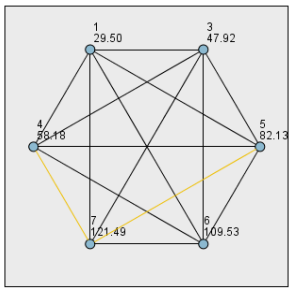
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
3-1	26.833	60.827	.441	.659	1.000
3-4	-38.288	28.581	-1.340	.180	1.000
3-5	-46.228	24.739	-1.869	.062	.925
3-6	-62.979	23.698	-2.658	.008	.118
3-7	-89.795	24.281	-3.698	.000	.003
1-4	-11.455	58.819	-.195	.846	1.000
1-5	-19.395	57.051	-.340	.734	1.000
1-6	-36.146	56.608	-.639	.523	1.000
1-7	-62.962	56.854	-1.107	.268	1.000
4-5	-7.940	19.281	-.412	.680	1.000
4-6	-24.691	17.926	-1.377	.168	1.000
4-7	-51.507	18.689	-2.756	.006	.088
5-6	-16.751	10.793	-1.552	.121	1.000
5-7	-43.567	12.019	-3.625	.000	.004
6-7	-26.816	9.697	-2.765	.006	.085

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Justice/Fairness Perception by attitude towards grocery shopping for Just Walk Out

Pairwise Comparisons of What is your attitude towards grocery shopping?



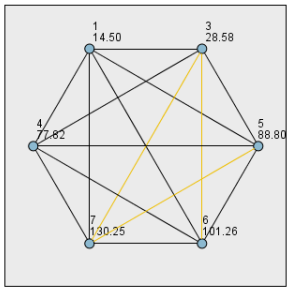
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-18.417	62.955	-.293	.770	1.000
1-4	-28.682	60.877	-.471	.638	1.000
1-5	-52.632	59.047	-.891	.373	1.000
1-6	-80.026	58.588	-1.366	.172	1.000
1-7	-91.990	58.843	-1.563	.118	1.000
3-4	-10.265	29.581	-.347	.729	1.000
3-5	-34.215	25.604	-1.336	.181	1.000
3-6	-61.609	24.527	-2.512	.012	.180
3-7	-73.574	25.130	-2.928	.003	.051
4-5	-23.950	19.956	-1.200	.230	1.000
4-6	-51.344	18.553	-2.767	.006	.085
4-7	-63.309	19.343	-3.273	.001	.016
5-6	-27.394	11.171	-2.452	.014	.213
5-7	-39.359	12.439	-3.164	.002	.023
6-7	-11.964	10.036	-1.192	.233	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Value Perception by attitude towards grocery shopping for Just Walk Out

Pairwise Comparisons of What is your attitude towards grocery shopping?



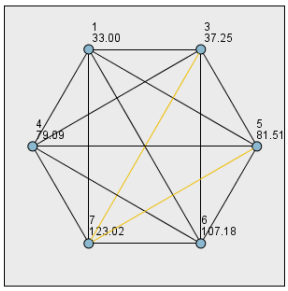
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-14.083	62.991	-.224	.823	1.000
1-4	-63.318	60.911	-1.040	.299	1.000
1-5	-74.303	59.080	-1.258	.209	1.000
1-6	-86.755	58.621	-1.480	.139	1.000
1-7	-115.750	58.876	-1.966	.049	.739
3-4	-49.235	29.598	-1.663	.096	1.000
3-5	-60.219	25.619	-2.351	.019	.281
3-6	-72.672	24.541	-2.961	.003	.046
3-7	-101.667	25.144	-4.043	.000	.001
4-5	-10.984	19.967	-.550	.582	1.000
4-6	-23.437	18.564	-1.263	.207	1.000
4-7	-52.432	19.354	-2.709	.007	.101
5-6	-12.453	11.177	-1.114	.265	1.000
5-7	-41.447	12.446	-3.330	.001	.013
6-7	-28.995	10.041	-2.888	.004	.058

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Privacy Concerns by attitude towards grocery shopping for Just Walk Out

Pairwise Comparisons of What is your attitude towards grocery shopping?



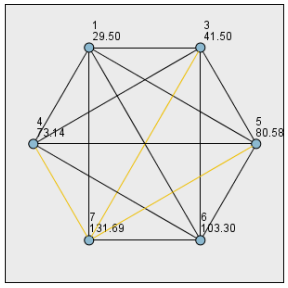
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-4.250	61.950	-.069	.945	1.000
1-4	-46.091	59.905	-.769	.442	1.000
1-5	-48.513	58.104	-.835	.404	1.000
1-6	-74.177	57.652	-1.287	.198	1.000
1-7	-90.019	57.903	-1.555	.120	1.000
3-4	-41.841	29.108	-1.437	.151	1.000
3-5	-44.263	25.196	-1.757	.079	1.000
3-6	-69.927	24.135	-2.897	.004	.056
3-7	-85.769	24.729	-3.468	.001	.008
4-5	-2.422	19.637	-.123	.902	1.000
4-6	-28.086	18.257	-1.538	.124	1.000
4-7	-43.928	19.034	-2.308	.021	.315
5-6	-25.664	10.992	-2.335	.020	.293
5-7	-41.506	12.240	-3.391	.001	.010
6-7	-15.842	9.876	-1.604	.109	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Satisfaction by attitude towards grocery shopping for Just Walk Out

Pairwise Comparisons of What is your attitude towards grocery shopping?



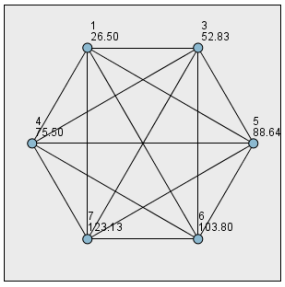
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-12.000	62.949	-.191	.849	1.000
1-4	-43.636	60.871	-.717	.473	1.000
1-5	-51.079	59.042	-.865	.387	1.000
1-6	-73.802	58.582	-1.260	.208	1.000
1-7	-102.192	58.837	-1.737	.082	1.000
3-4	-31.636	29.578	-1.070	.285	1.000
3-5	-39.079	25.602	-1.526	.127	1.000
3-6	-61.802	24.525	-2.520	.012	.176
3-7	-90.192	25.128	-3.589	.000	.005
4-5	-7.443	19.954	-.373	.709	1.000
4-6	-30.166	18.551	-1.626	.104	1.000
4-7	-58.556	19.341	-3.027	.002	.037
5-6	-22.723	11.170	-2.034	.042	.629
5-7	-51.113	12.438	-4.110	.000	.001
6-7	-28.390	10.035	-2.829	.005	.070

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Trust by attitude towards grocery shopping for Just Walk Out

Pairwise Comparisons of What is your attitude towards grocery shopping?



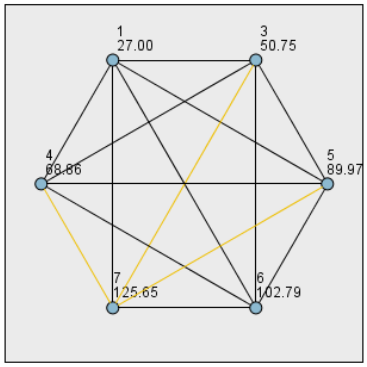
Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-26.333	62.914	-.419	.676	1.000
1-4	-49.000	60.837	-.805	.421	1.000
1-5	-62.145	59.008	-1.053	.292	1.000
1-6	-77.297	58.549	-1.320	.187	1.000
1-7	-96.635	58.804	-1.643	.100	1.000
3-4	-22.667	29.561	-.767	.443	1.000
3-5	-35.811	25.588	-1.400	.162	1.000
3-6	-50.964	24.511	-2.079	.038	.564
3-7	-70.301	25.114	-2.799	.005	.077
4-5	-13.145	19.943	-.659	.510	1.000
4-6	-28.297	18.541	-1.526	.127	1.000
4-7	-47.635	19.331	-2.464	.014	.206
5-6	-15.152	11.163	-1.357	.175	1.000
5-7	-34.490	12.431	-2.775	.006	.083
6-7	-19.338	10.029	-1.928	.054	.808

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Loyalty by attitude towards grocery shopping for Just Walk Out

Pairwise Comparisons of What is your attitude towards grocery shopping?



Each node shows the sample average rank of What is your attitude towards grocery shopping?.

Sample 1-Sam...	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
1-3	-23.750	60.901	-.390	.697	1.000
1-4	-41.864	58.890	-.711	.477	1.000
1-5	-62.974	57.120	-1.102	.270	1.000
1-6	-75.792	56.676	-1.337	.181	1.000
1-7	-98.654	56.923	-1.733	.083	1.000
3-4	-18.114	28.615	-.633	.527	1.000
3-5	-39.224	24.769	-1.584	.113	1.000
3-6	-52.042	23.727	-2.193	.028	.424
3-7	-74.904	24.310	-3.081	.002	.031
4-5	-21.110	19.304	-1.094	.274	1.000
4-6	-33.928	17.948	-1.890	.059	.881
4-7	-56.790	18.712	-3.035	.002	.036
5-6	-12.818	10.806	-1.186	.236	1.000
5-7	-35.680	12.033	-2.965	.003	.045
6-7	-22.862	9.708	-2.355	.019	.278

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Pairwise Comparison of Relationship Commitment by attitude towards grocery shopping for Just Walk Out

Appendix 11 – Statement of ethics approval

Kristiania University College

15th of May 2021

STATEMENT OF ETHICS APPROVAL

Proposer: Herman Wettre and Sverre Willumsen

The school´s research ethics committee has considered your submitted proposal. Acting under delegated authority, the committee is satisfied that there is no objection on ethical grounds to the proposed study.

Approval is given on the understanding that you will adhere to the terms agreed with participants and to inform the committee of any change of plans in relation to the information provided in the application form.

Yours sincerely,

Asle Fagerstrøm
Professor