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## **Artificial Intelligence Applications Used in On-line Retail in Canada and their Relationship to Customer Satisfaction and Loyalty**

**Ayse B. Ersoy**

Cape Breton University  
Canada

E-mail: [ayse\\_ersoy@cbu.ca](mailto:ayse_ersoy@cbu.ca),

<https://orcid.org/0000-0003-1722-9613>

### **Abstract**

Artificial Intelligence is the creation of intelligent computers and smart computer algorithms that helps machines to understand human intelligence (IBM Cloud Education, 2021). Artificial Intelligence is created by analyzing behavior and patterns of big data. Artificial intelligence has existed since 1950s (Song et al, 2019) but during recent times application of AI in various sectors like healthcare, business, entertainment, education, weather, and geology has picked up momentum. To cite a few well-known examples of Artificial Intelligence technology that are used by almost everyone in our day-to-day activities will be advanced google searches, YouTube recommendations and Alexa (Song et al, 2019).

The advent of technology has brought about innovation and transformation to every aspect of the business world, including the retail industry. The shift in the retail sector becomes obvious when big brick-and-mortar retailers scale down their physical shops and gradually move part of the business online. Consumer attitudes towards online shopping can vary based on demographics, perceived risk, perceived ease of use, and perceived usefulness. Demographic characteristics can further be classified as sex, age, educational qualification, household income, and relationship status, to name a few.

In this study, the aim is to identify artificial intelligence applications and their use in on line retail by Canadian consumers. A model has been developed to test the relationships between artificial intelligence applications used for on line shopping and customer satisfaction and loyalty.

*Key words: Artificial Intelligence, on-line retail, Canadian consumer, customer satisfaction, customer loyalty*

### **Introduction**

Artificial Intelligence (AI) can be defined in layman terms as intelligence demonstrated by machines which in turn helps in reducing manual intervention. Artificial Intelligence is the creation of intelligent computers and smart computer algorithms that helps machines to understand human intelligence (IBM Cloud Education, 2021). Artificial Intelligence is created by analyzing behavior and patterns of big data. Artificial intelligence has existed since 1950s (Song et al, 2019) but during recent times application of AI in various sectors like healthcare, business, entertainment, education, weather, and geology has picked up momentum. To cite a few well-known examples of Artificial Intelligence technology that are used by almost everyone in our day-to-day activities will be advanced google searches, YouTube recommendations and Alexa (Song et al, 2019). In brief, Artificial Intelligence has helped machines develop senses like human beings and it also helps the machine to learn new things on its own (Bernard Marr, 2019). Even though, the contribution of AI is vast, the main focus of this study will be to review 'Impact of AI in online retail in Canada'.

## **Artificial Intelligence Applications in Retail Marketing**

Artificial Intelligence (AI) has played a significant role in the evolution of Retail Marketing. Newspaper flyers, mailer coupons, and billboards were once, “Strategies to enhance visibility and target appropriate customer” (Porter, 2008), used as a tactic to entice the customer to enter the store and shop are rapidly fading as personalized advertisements are on a rise such as “Load your offers” or “You may like this” recommendation during an online shopping transaction. Companies are utilizing, “more mobile applications to facilitate the shopping experience being now able to provide a series of new services to their customers such as virtual fitting rooms, chatbots that can provide instant product recommendation and ML algorithms that search for a particular product after analysing an image provided.” (Victoria et al., 2021). Thanks to the ease-of-use of digital technology such as Cell Phones use, AI Applications such as Google Search and Facebook Messenger, have the means to compile and analyze collections of data, and where “Retailing represents the perfect environment for the use and growth of AI since it collects a significant amount of information regarding consumers and their behaviour” (Victoria et al., 2021), studying consumer habits and behaviors has never been so easy. This paper will be exploring how the utilization of Artificial Intelligence applications are used in customization of personalized advertisement towards the consumer in Retail Marketing. I will explore the topics of Retail Marketing, Artificial Intelligence, Artificial Intelligence Applications, and the Use of Artificial Intelligence Applications in Retail Marketing.

### **Types of Artificial Intelligence Tools**

In this study we have focused our investigation on the following widely used AI tools: chatbots, virtual assistants, voice assistants, and augmented reality. Chatbots provide instant assistance and personalized support to online shoppers. Customers appreciation is high due to the convenience, 24/7 availability, and quick response times offered by chatbots. Literature shows that customers also appreciate the efficiency and convenience of chatbots; (Smith et al., 2020).

Virtual assistants and voice assistants popularly known and used like Amazon's Alexa and Google Assistant has been widely used in online shopping. Voice-based product searches lead to effective recommendations and purchase. Customers seem to value particularly the hands-free and intuitive nature of virtual assistants. Despite all the positive elements related to virtual elements, privacy and security issues remain to be current challenges for further adaptation (Abdullah et al., 2019).

AR technology or Augmented Reality applications enable customers to visualize products in their real environment clearly enhancing the online shopping experience. When asked customers indicated that they find AR is reducing uncertainty about product attributes. Research suggests that AR positively influences customers' attitudes, intentions, and satisfaction in online shopping (Choi et al., 2019). Although technological barriers, limited accessibility to AR-enabled devices, and the lack of standardized AR interfaces are still challenging to be addressed in the future (Chen et al., 2021).

### **Canadian market overview of use of Artificial Intelligence in Online Retail in Canada**

In 2020 the Canadian online retail sales rose unprecedentedly by 49.2% (MarketLine, 2021). With a high digital population, the online retail sector in Canada is expected to penetrate deeply in the near future. This report is a literature review and secondary data collection of the online retail sector in Canada. Its purpose is to provide an overview of the industry and understanding of Canadian consumer behaviors, further supporting the construction of a conceptual framework on consumer satisfaction and loyalty in online shopping in Canada. The structure is as follows. First, it provides an introduction of online retail, advantages and disadvantages of this channel compared to traditional retail. The second section discusses different business models that Canadian retailers pursue, with examples of some key players. The third section takes a quick look into market analysis to confirm the potential of online retail sector. Forth partis about consumer insights to understand their distribution and preferences on online shopping. The final section concludes the paper.

Online retailing has been growing worldwide, and the Canadian online retail sector is also gaining momentum. Canada has high Internet users, with over 27 million online purchasers, approximately 72.5% of the population being digital buyers in 2021.

It is forecasted that the percentage will reach 77.6% in 2025 (Statista, 2021). The rising number of digital shoppers offers tremendous opportunities for online retailers to gain more sales on digital platforms.

For online retailing in Canada, business players are grouped into three types: marketplace platforms, pure-online retailers, and multichannel retailers.

Marketplace platforms are playing as transaction intermediaries between sellers and buyers. The marketplaces mainly rely on fees collected from sellers, such as listing fees, transaction fees, or marketing fees. Their key competitive advantage is the network effect created by the vast scale and scope of products, multiple buyers and sellers (MarketLine, 2021). A dominant player in this model is Amazon Canada. According to a 2021 report by Statista, Amazon.ca is a dominant player, with its net sales value of US\$ 7,136 in 2020 (Statista, 2021).

The second player, the pure-online retailer, exclusively focuses on online sales. This model has some competitive advantages. It does cost pure-play online retailers lower investment and overheads due to no rental for physical stores, little need for labor and costly fixed assets. Thus, it has a lower break-even point, which gives business owners higher profit margins and greater flexibility for price promotion. Moreover, the model provides online retailers with a rich data source from online transactions and consumers' browsing history. The information opens access to customer insights, preferences, and demographics that online retailers use to deploy more economical and effective marketing channels (MarketLine, 2021). Most retailers following this model are individual retailers, small and medium enterprises (SME), thanks to the advantage of low entry barriers, notably lower capital investment and fixed cost.

The third players are multichannel or omnichannel retailers who sell products both online and offline channels. Combining the advantages of digital shopping and physical shopping experiences, the multichannel model can reach all types of consumer audiences. Many prominent players in Canada are pursuing the multichannel model, such as Walmart, Costco, Home Depot. According to a report by Statista, these three players are in the top four online stores in Canada in 2020, ranked by online net sales, after the first place of the e-commerce platform Amazon.ca (Statista, 2021).

Before the Covid-19 pandemic, the Canadian online retail sector grew strongly with a compound annual growth rate (CAGR) of 23.9% between 2016 and 2020 (MarketLine, 2021). Attributes for the uptrend are the rising number of internet and mobile connections around the globe. Also, the competition and transformation in the retail industry push more new sellers to opt for the online channel. On the consumer side, they are lured to the convenience of online shopping. Thus, more and more consumers join the online channel and spend tremendous income through digital shopping.

In the long term, the growth of online retail consumption will continue momentum once the Covid-19 pandemic is over. The 2020 spike in the adoption of online shopping due to lockdown measures will have long-lasting impacts. Retailers have quickly adopted the online distribution channel throughout the pandemic. Consumers become acquainted with digital shopping. This shift is shaping habits for the future. MarketLine (2021) forecasted the market value of the Canadian online retail sector in 2025 will be almost \$35 billion. The CAGR is slightly decelerated at 8.3% for the period 2020 – 2025. The penetration of online shopping will be slower for reasons that the macroeconomic situation after the pandemic will push disposable incomes downward, scaling back consumer consumption, particularly spending on non-essentials. The online sector already grew strongly in 2020, and the offline retail industry will recover and get shares back in the mid-term (MarketLine, 2021).

Before the Covid-19 pandemic, demand for online retail experienced a slight increase but not as much as the rate in other countries. The reason is the population density around several urban areas, and most consumers locate near shopping stores and department centers. Hence, the online shopping experience does not have the same effect in many other countries (IBISWorld, April 2021). However, this norm has changed since the pandemic due to the fact that physical stores were forced to close under the pressure of social distance temporarily, and consumers have left no choice but to rush into online shopping. The length of closures is nearly two years, 2020-2021, permanently shifting the behaviors of consumers. They are now familiar with the convenience of online purchases and continue the habit.

Also, online retailers have rapidly adapted and improved their online services, providing customers with enhanced shopping and payment options, delivery capacity, and customer services. An increasing number of online shoppers, larger basket sizes, and more frequent purchases are expected to boost the online retail industry's growth in 2021 and beyond (PwC, 2021).

According to a survey by PayPal, Canadian consumers are buying more online, with current monthly purchases in digital platforms increasing from about \$2 billion to almost \$5.5 billion nationally (PayPal Canada, 2021). Digital buyer penetration is forecasted to increase over the period 2021-2025. The number of digital shoppers passed over 27 million users in 2021, which means that 72.5 percent of the Canadian population shopped online. According to the Statista Digital Market Outlook, this share will increase to 77.6 percent in 2025 (Statista, 2021). After the pandemic, consumers continue enjoying and making more purchases online. PayPal surveyed that Canadian consumers will spend 39% of their buying digitally in 5 years from now (PayPal Canada, 2021) as a result of the change in online shopping behavior.

### **Distribution of Canadian online shoppers**

According to an April 2019 survey by Statista, the distribution of Canadian online shoppers by gender is relatively balanced with 51% and 49% share of women and men, respectively. Most Canadian online shoppers are located in urban and suburban areas, accounting for 79% of total respondents (Statista, 2021). When looking into the percentage share of Canadian consumers who shopped in-store and online daily or weekly in 2021, there is a different preference between the young and the older generations. Gen Z and Millennials preferred to do online, with 43% and 47% of them shopping online, compared to 32% and 40% shares shopped in-store. In contrast, Gen X and Boomer generations' online preference was just 36% and 25%, while the in-store stakes are higher, 43% and 48% in turn (Statista, 2021).

### **Shopping experiences**

The online shopping experience plays an essential role in making transactions happen. According to an October 2020 survey by Statista, almost eight out of ten Canadian online shoppers said that deals and sales were essential for an online customer experience. It is a critical fact for online retailers if they want to build competitive advantages and lure customers into their sites. Other important factors for customer experience were a fully stocked and wide variety of products, fast loading time on websites, diverse payment options, all being selected by over half of respondents in the survey (Statista, 2021). Beyond the speed and convenience, online shoppers also demand more fun and personalized shopping experiences. An April 2021 survey by PayPal revealed that consumers expect to see more advanced experiences such as drone deliveries, facial recognition for payment, VR fitting rooms, or holographic representation of products (PayPal Canada, 2021). With the increasing demand for excellent experiences, retailers need to stay on beat and innovate their businesses.

Innovative retailers who invest and improve customers' experience will succeed in the complex online retail industry.

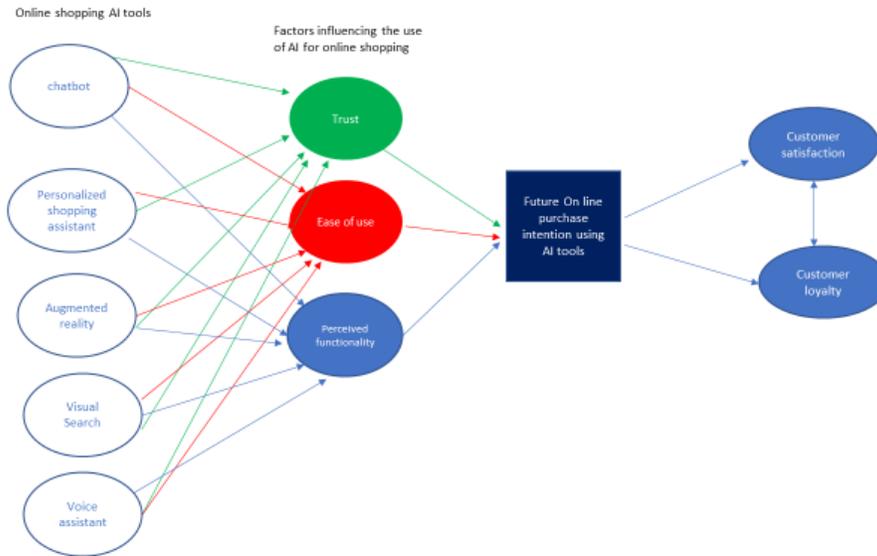
### **Barriers/concerns to buying online**

While Canadian shoppers might opt for online channels, they still have concerns holding them back from making more frequent online purchases. Among these concerns, payment security ranges at the top. Almost one out of five Canadians said they worry about digital payment methods (PayPal Canada, 2021). Consumers want secure and trustworthy payment options. Also, they want to safeguard their purchases and financial information. PwC revealed that 51% of Canadians worry about data privacy when shopping online (PwC, 2021). Customers wonder how their data is being used and whether the payment information is hacked illegally by hackers. Consequently, consumers tend to find well-known and trusted retailers for online purchases with the hope that these retailers can guarantee their safety.

The next challenge is shipping concern. Cost of shipping, fast and reliable delivery solution, the option of curbside pick-up are the most concerned problems. According to the PayPal survey, more than half the consumers polled these as deterrents to shopping online (PayPal Canada, 2021). For retailers who want to create a seamless platform and deliver an engaging online experience, a good strategy is to invest and innovate superior supply chains that can provide customers with quick and advanced shipping options.

## Theoretical Model

Figure 1



### Methodology:

The study recruited participants from Canada. A total of 231 respondents' answers were collected using Survey Monkey platform. individuals successfully participated in the survey. The survey was administered online in April 2022. Participants were provided with the necessary instructions and informed consent before proceeding with the survey.

The survey consisted of several sections, each addressing different aspects of online shopping behavior and attitudes towards AI tools. Participants were asked to indicate the frequency of their online shopping activities per month using a 5-point Likert scale. The response options ranged from "Never" (1) to "More than once a week" (10). Next, they were asked to select the categories of products they usually shop for online. Multiple selections were allowed, and response options were provided for various product categories, including clothes, electronics, toys, furniture, personal care, and others. Participants were asked to indicate the category of products they usually shop for most frequently online. Options were provided for each product category mentioned in the previous question. Respondents were provided with information about various AI tools used in online retail, including chatbots, virtual assistants, augmented reality, visual search, and voice assistants, and were asked to read the information to familiarize themselves with these tools.

The data was organized and cleaned for hypothesis testing. Statistical methods used were descriptive statistics, chi square analysis, and ordinal regression. SPSS was utilized to test hypotheses.

### Results

#### Hypothesis 1: Exposure to AI tools causes further intention to use them?

- **Null Hypothesis** - Being exposed to AI applications does not cause further intention to use.
- **Alternate Hypothesis** - Being exposed to AI applications causes further intention to use.

Cross tabulation between how often the respondents make online purchase and intention to use AI tools in the future:

Do you intend to use artificial intelligence tools in online shopping in the future?				
Indicator		Yes	No	Total
Less than 1 purchase each month, less than 12 purchases a year	Count	36	27	63
	Expected Count	42.3	20.7	63
Roughly 1-5 purchases each month, 12-60 purchases a year	Count	94	37	131
	Expected Count	87.9	43.1	131
More than 5 purchases each month, more than 60 purchases a year	Count	25	12	37
	Expected Count	24.8	12.2	37
Total	Count	155	76	231
	Expected Count	155	76	231

Chi-Square Tests between how often the respondents make online purchase and intention to use AI tools in the future:

Indicators	Value	df	Asymptotic Significance (2-sided)
<b>Pearson Chi-Square</b>	<b>4.119</b>	<b>2</b>	<b>0.128</b>
<b>Likelihood Ratio</b>	<b>4.037</b>	<b>2</b>	<b>0.133</b>
<b>Linear-by-Linear Association</b>	<b>1.93</b>	<b>1</b>	<b>0.165</b>
<b>N of Valid Cases</b>	<b>231</b>		

Hypothesis 1 conclusion - ACCEPT H0: Being exposed to AI applications does not cause further intention to use.

**Hypothesis 2: Does using AI applications increases customer satisfaction?**

- **Null Hypothesis** - Using AI applications does not increase customer satisfaction.
- **Alternate Hypothesis** - Using AI applications increase customer satisfaction.

**Table 13: Regression Analysis between AI Tools Used and S01**

Pseudo R-square = .034

AI Tools	Estimates	Sig.	Decision
None Of The Above	-.237	.571	Not Significant
Chatbots	.548	.049	Significant
Virtual Assistant	.697	.014	Significant
Personalized Product Recommendation	.323	.243	Not Significant
Personalized Offers with Augmented Reality View	-.207	.512	Not Significant
Virtual Search Solution	.297	.397	Not Significant
Smart Display	-.048	.885	Not Significant
Aisle Kiosks	-.202	.603	Not Significant

**Table 14: Regression Analysis between AI Tools Used and S02**

Pseudo R-square = .034

Locations	Estimates	Sig.	Decision
None Of The Above	-.036	.931	Not Significant
Chatbots	.087	.754	Not Significant
Virtual Assistant	.663	.019	Significant
Personalized Product Recommendation	.257	.352	Not Significant
Personalized Offers with Augmented Reality View	.535	.095	Not Significant
Virtual Search Solution	.809	.024	Significant
Smart Display	.035	.916	Not Significant
Aisle Kiosks	-.456	.244	Not Significant

**Table 15: Regression Analysis between AI Tools Used and S03**

Pseudo R-square = .038

Locations	Estimates	Sig.	Decision
None Of The Above	-.634	.134	Not Significant
Chatbots	-.299	.282	Not Significant
Virtual Assistant	.713	.012	Significant
Personalized Product Recommendation	-.182	.508	Not Significant
Personalized Offers with Augmented Reality View	.249	.430	Not Significant
Virtual Search Solution	.629	.073	Not Significant
Smart Display	.411	.218	Not Significant
Aisle Kiosks	-.792	.043	Significant

**Table 16: Regression Analysis between AI Tools Used and S04**

Pseudo R-square = .041

Locations	Estimates	Sig.	Decision
None Of The Above	-.405	.350	Not Significant
Chatbots	.307	.280	Not Significant
Virtual Assistant	.679	.018	Significant
Personalized Product Recommendation	.357	.206	Not Significant
Personalized Offers with Augmented Reality View	.276	.397	Not Significant
Virtual Search Solution	-.163	.647	Not Significant
Smart Display	.283	.406	Not Significant
Aisle Kiosks	.235	.558	Not Significant

**Table 17: Regression Analysis between AI Tools Used and S05**

Pseudo R-square = .010

Locations	Estimates	Sig.	Decision
None Of The Above	-.195	.642	Not Significant
Chatbots	.209	.449	Not Significant
Virtual Assistant	.054	.846	Not Significant
Personalized Product Recommendation	-.257	.348	Not Significant
Personalized Offers with Augmented Reality View	-.218	.486	Not Significant
Virtual Search Solution	.233	.501	Not Significant
Smart Display	.284	.390	Not Significant
Aisle Kiosks	-.778	.045	Significant

**Table 18: Regression Analysis between AI Tools Used and S06**

Pseudo R-square = .034

**Table 19: Regression Analysis between AI Tools Used and S07**

Pseudo R-square = .040

Locations	Estimates	Sig.	Decision
None Of The Above	-.688	.112	Not Significant
Chatbots	-.098	.728	Not Significant
Virtual Assistant	.207	.469	Not Significant
Personalized Product Recommendation	.874	.002	Significant
Personalized Offers with Augmented Reality View	.182	.572	Not Significant
Virtual Search Solution	.015	.966	Not Significant
Smart Display	-.372	.273	Not Significant
Aisle Kiosks	.133	.739	Not Significant

**Table 20: Regression Analysis between AI Tools Used and S08**

Pseudo R-square = .055

**Hypothesis 2 Conclusion:**

For Personalized Product Recommendation, Personalized Offers with Augmented Reality View, Smart Display, and Aisle Kiosks:

ACCEPT H0: Using AI applications does not increase customer satisfaction.

For Chatbots, Virtual Assistant and Virtual Search Solution:

REJECT H0: Using AI applications increases customer satisfaction.

**Hypothesis 3 - Does using AI applications increase customer loyalty?**

- **Null Hypothesis** - Using AI applications does not increase customer loyalty.
- **Alternate Hypothesis** – Using AI applications increases customer loyalty.

**Table 21: Regression Analysis between AI Tools Used and L01**

Pseudo R-square = .041

Locations	Estimates	Sig.	Decision
None Of The Above	-.657	.114	Not Significant
Chatbots	-.408	.137	Not Significant
Virtual Assistant	.064	.815	Not Significant
Personalized Product Recommendation	-.256	.344	Not Significant
Personalized Offers with Augmented Reality View	.781	.013	Significant
Virtual Search Solution	1.010	.004	Significant
Smart Display	.300	.361	Not Significant
Aisle Kiosks	-.830	.031	Significant

**Table 22: Regression Analysis between AI Tools Used and L02**

Pseudo R-square = .015

Locations	Estimates	Sig.	Decision
None Of The Above	.646	.120	Not Significant
Chatbots	.441	.107	Not Significant
Virtual Assistant	.396	.151	Not Significant
Personalized Product Recommendation	.429	.116	Not Significant
Personalized Offers with Augmented Reality View	-.124	.690	Not Significant
Virtual Search Solution	.021	.951	Not Significant
Smart Display	.192	.558	Not Significant
Aisle Kiosks	.351	.365	Not Significant

**Table 23: Regression Analysis between AI Tools Used and L03**

Pseudo R-square = .024

Locations	Estimates	Sig.	Decision
None Of The Above	.090	.830	Not Significant
Chatbots	.528	.059	Not Significant
Virtual Assistant	.313	.265	Not Significant
Personalized Product Recommendation	-.012	.965	Not Significant
Personalized Offers with Augmented Reality View	.137	.665	Not Significant
Virtual Search Solution	.759	.032	Significant
Smart Display	.093	.779	Not Significant
Aisle Kiosks	.008	.984	Not Significant

**Table 24: Regression Analysis between AI Tools Used and L04**

Pseudo R-square = .026

Locations	Estimates	Sig.	Decision
None Of The Above	-1.052	.012	Significant
Chatbots	-.387	.156	Not Significant
Virtual Assistant	.567	.040	Significant
Personalized Product Recommendation	-.353	.191	Not Significant
Personalized Offers with Augmented Reality View	-.229	.458	Not Significant
Virtual Search Solution	.207	.544	Not Significant
Smart Display	-.001	.997	Not Significant
Aisle Kiosks	.125	.743	Not Significant

**Hypothesis 3 Conclusion:**

For Chatbots, Personalized Product Recommendation, Smart Display, and Aisle Kiosks:

ACCEPT H0: Using AI applications does not increase customer loyalty.

For Personalized Offers with Augmented Reality View, Virtual Assistant and Virtual Search Solution:

REJECT H0: Using AI applications increases customer loyalty.

**Hypothesis 4 - Does using AI applications increase customer loyalty?**

- **Null Hypothesis** – Level of usage of AI application is not related to customer loyalty.
- **Alternate Hypothesis** – Level of usage of AI application is related to customer loyalty.

The analysis shows that according to the respondents in the survey data, Virtual Assistance Device, Personalized offers with AR view, Virtual Search Solution are applications which enhance customer loyalty while shopping online with 0.028, 0.004 and 0.013, respectively.

Analysis for each of the AI applications' relation to customer loyalty:		
AI Application that you have used while shopping online (Independent variable)	Pearson Chi-Square value	Asymptotic Significance (2-sided)
Chatbots	2.320	0.677
Virtual Assistance Device	10.841	0.028
Personalized Product Recommendation	6.525	0.163
Personalized offers with AR view	15.299	0.004
Virtual Search Solution	12.745	0.013
Smart Display	5.727	0.220
Aisle Kiosks	4.885	0.299

Most used application – Total 231 respondents

- ❖ 119 used Chatbots
- ❖ Virtual assistance device gained second highest popularity with 87 respondents, which is 1% more than the personalized product.
- ❖ Aisle Kiosks least popular tools 200 respondents.

Frequency table:

AI Application that you have used while shopping online	Frequency	
	Yes	No
Chatbots	119	112
Virtual Assistance Device	87	144
Personalized Product Recommendation	83	148
Personalized offers with AR view	48	183
Virtual Search Solution	39	192
Smart Display	48	183
Aisle Kiosks	31	200

**Hypothesis 4 conclusion** - Hence, we can say that majority of respondents are neutral using it and are neither loyal nor dissatisfied with all the AI tools.

**Hypothesis 5 - Does Level of Income affect a person’s incidence to online shopping?**

- **Null Hypothesis** – Level of Income is not related to online shopping incidence.
- **Alternate Hypothesis** – Level of Income is related to online shopping incidence.

		What is your annual income range?	How often do you make online purchases?
N	Valid	231	231
	Missing	0	0
Mean		2.68	1.89
Median		3.00	2.00
Mode		2	2
Std. Deviation		.890	.650
Variance		.793	.422
Skewness		.117	.114
Std. Error of Skewness		.160	.160
Minimum		1	1
Maximum		4	3

- ❖ The range is income is converted into ordinal values from 1 to 4.
- ❖ The range is income is converted into ordinal values from 1 to 3.
- ❖ Most customers have income above average.
- ❖ More than 50% of customers prefer online shopping.
- ❖ Median value shows the data is right skew.

**Hypothesis testing using Spearman’s Correlation**

			What is your annual income range?	How often do you make online purchase?
Spearman's rho	What is your annual income range?	Correlation Coefficient	1.000	.130*
		Sig. (2-tailed)	.	.049
		N	231	231
	How often do you make online purchase?	Correlation Coefficient	.130*	1.000
		Sig. (2-tailed)	.049	.
		N	231	231

\* Correlation is significant at the 0.05 level (2-tailed)

**Output for hypothesis testing –**

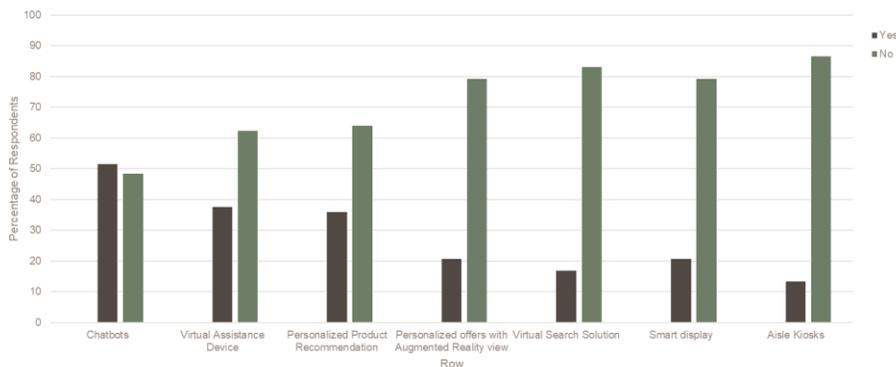
- ❖ There is a weak positive correlation between income and online shopping incidence.
- ❖ The level of significance is slightly smaller than 0.05. Therefore, we reject null hypothesis.
- ❖ Since we’ve rejected null hypothesis, we accept alternate hypothesis, mentioning that income and online shopping incidence are weakly dependent on each other with a correlation of 13%.

**Hypothesis 6 - Do Artificial Intelligence powered applications enhance shopping experience effectiveness?**

H0: ‘AI powered applications do not enhance shopping experience effectiveness’

H1: ‘AI powered applications enhance shopping experience effectiveness’

Statistical significance (acceptable level of risk) = 0.05



**Statistical Analysis**

- Univariate Test was used to test the hypothesis.
- A test value of 3 was chosen which was halfway between the 5-point Likert scale of 1 = Strongly Disagree and 5 = Strongly Agree.
- The table shows the results of the One-Sample T-Test with a t value of 5.260 and statistical significance of 0.001.
- Since the statistical significance value is less than 0.05, it can be concluded that the null hypothesis is rejected, and the alternate hypothesis is accepted.
- This means that the AI powered applications do enhance the shopping experience effectiveness.
- Bivariate cross-tabulation test was used to understand if there is a relationship between the dependent variable ‘AI powered applications enhance my effectiveness in shopping’ and the independent variables mentioned in the table.
- Chatbots and Virtual Assistance Device have statistical significance values of 0.014 and 0.024 respectively which are below the standard criterion of 0.05.
- This means that these two variables are related to the dependent variable ‘AI powered applications enhance my effectiveness in shopping’.

AI Application that you have used while shopping online (Independent variable)	Pearson Chi-Square value	Asymptotic Significance (2-sided)
Chatbots	12.438	0.014
Virtual Assistance Device	11.235	0.024
Personalized Product Recommendation	6.244	0.182
Personalized offers with AR view	3.850	0.427
Virtual Search Solution	4.227	0.376
Smart Display	2.005	0.735
Aisle Kiosks	8.203	0.084

### Conclusions and Recommendations

- The Virtual Assistance Device, Personalized offers with AR view, Virtual Search Solution are applications which are related to customer loyalty.
- In hypothesis 8, we found that income and online shopping incidence were related to each other but had a weak relationship.
- In the analysis for hypothesis 9, we found that AI applications do enhance shopping experience effectiveness.
- Chatbots proved to be the most popular among the AI applications in online retail in Canada.
- Online retailers who are not using AI applications should look at incorporating Chatbots into their system which would attract more shoppers and increase their revenue.
- Online retailers who are using other AI applications could replace them with Chatbots until the popularity of other applications picks up.
- The results revealed that young professionals in the metropolitan area tend to be more inclined towards AI tools for their transactions.
- Consumers are still neutral in terms of their satisfaction level in using AI tools as they are concerned with the data issues rather than services.
- Customers establish their loyalty if they feel that their information is secured and will not be used for other purposes.
- Virtual Assistant, Virtual Search Solution, Personalized Product recommendations were significantly associated with the level of satisfaction and loyalty.
- The design, model and being user friendly online retail store should consistently be experienced across generations especially the senior groups.
- Data privacy should be a priority among these enterprises.
- Companies using these AI tools can educate the public regarding their platform which can give a lot of reasons to patronize their business
- Companies should invest on improving and maintaining their services on AI tools while maintaining its effectiveness and convenience to their target consumers.

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