

## *An Updated Consumer Decision-making Model to Tackle Climate Change*

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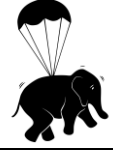
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### **Abstract**

Tapping into excessive consumption and climate change, this study introduces an updated consumer decision-making model to optimize purchases. By doing so, negative outcomes of excessive consumption on the climate change could be minimized. This theoretical research is informed by the traditional five stage decision-making model and related literature including artificial intelligence, excessive consumption, and climate change. In order to tackle harmful impact of the climate change, the research proposes an updated consumer decision-making model adopting Artificial Intelligence applications to prevent unnecessary purchases. There is not any known study observing the relationship between AI applications, consumer decision-making process, and climate change at macro level. By filling this gap in the literature, the current study aims to create an overall direction for future research. On the other hand, the main limitation of the research is the lack of empirical evidence. Hence further empirical studies are needed to test proposed model for validation.

**Keywords:** artificial intelligence, climate change, consumer behaviour, consumer decision-making process

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# *İklim Değişikliği ile Savaş İçin Tüketici Karar Verme Modelinin Yenilenmiş Versiyonu*

## **Özet**

Bu çalışma aşırı tüketim ve iklim değişikliği temelinde tüketici karar verme modelinin revize edilmiş yeni bir halini sunmaktadır. Bu revize edilmiş tüketici karar verme modeli ile birlikte aşırı tüketimden kaynaklanan olumsuz iklim değişiklikleri minimize edilebilir. Bu teorik araştırmanın temelini, geleneksel beş aşamalı tüketici karar verme modeli ile yapay zekâ, aşırı tüketim ve iklim değişikliği literatürü oluşturmaktadır. Çalışma toplam tüketimin yaklaşık toplamda satın alınan mal ve hizmetlere eşit olduğu varsayımını baz almaktadır. Bu araştırma, iklim değişikliğinin olumsuz etkileri ile savaşmak için gereksiz satın almaları önleyecek yapay zekâ uygulamalarını tüketici karar verme modeline uyarlayarak tüketici karar verme modelinin revize edilmiş yeni bir halini ortaya koymaktadır. Makro düzeyde yapay zekâ uygulamaları, tüketici karar verme süreci ve iklim değişikliğine dair bilinen bir çalışma bulunmamaktadır. Hâlihazırdaki bu çalışma, literatürdeki bu boşluğu doldurarak gelecek çalışmalar için genel bir yön belirlemeyi hedeflemektedir. Öte yandan, araştırmanın ana kısıtlaması ampirik ispatların eksikliğidir. Bu yüzden sunulan modelin test edilmesi için ampirik çalışmalara gerekmektedir.

**Anahtar Kelimeler:** yapay zekâ, iklim değişikliği, tüketici davranışları, tüketici karar verme süreci



## 1. INTRODUCTION

In common perception, the overall idea to tackle climate change is usually linked to energy saving or the usage of environmental-friendly products. Although these are quite beneficial ways to address the issue, consumption specifically excessive consumption is also part of the problem (Ehrlich and Goulder, 2007). It should be noted that every product requires a certain amount of energy used as well as natural resources, which causes the climate change because of the green gas release during the manufacturing process. Hence, every unnecessary purchases/consumption at individual level means an extra negative effect on the environment. This study proposes an updated consumer/buyer decision-making process model (Figure2) with the adoption of Artificial Intelligence-based (AI-based) applications which helps customers on reducing unnecessary purchase/ consumption with an intention to lessen the negative impacts of climate change at the individual level. Whilst there have been many interests in AI to make a change in the consumer/buyer decision-making process, there is not any known study observing the relationship between AI applications, excessive consumption, and climate change at a macro level.

This study asserts that Artificial Intelligence applications at individual level could be utilized for the purpose of preventing excessive consumption by optimizing buying behaviour. AI apps could be integrated with the online shopping applications as a means to observe customer buying process via collection of personal data on different sort of medium. The data could be collected through online shopping patterns such as online buying apps, reviews, or social media posts and so forth. Then when customer needs to buy a new product, the application could make suggestions to make sure customer actually needs the product. For instance, if customer is prone to exhibit impulsive buying behaviour towards a very similar recently bought item, the AI-based application could create a warning to the customer by reminding a similar item was recently purchased. Furthermore, consumers themselves could also manually feed the data on AI application by entering the personal consumption patterns such as how much a certain product is consumed within a certain period of time. In this instance, it has to be highlighted that consumer might have biases and concerns against AI-applications because of privacy issues (Du and Xie, 2021). For this reason, all the privacy data standards should be met by application creators to ensure the potential users. Along with that, some mental incentives might be used in the applications with the objective to motivate consumers to adopt this type of AI-applications. These psychological incentives might differ based on each target group of consumers. For instance, if consumer group is price sensitive, the application could reveal the amount of money saved by the individual when an unnecessary purchase is prevented. Notwithstanding, if consumer group show high awareness to environmental issues, then the application could reveal how much waste or carbon footprint prevented as well as the amount of energy saved after AI-aided buying decisions.



## 2. BUYER/CONSUMER DECISION-MAKING PROCESS

Albeit there are different consumer decision-making models (Kotler and Keller, 2012; Solomon et al., 2010; Belch and Belch 2009), this study adopts widely the accepted traditional five stage consumer/buyer decision-making process model as it represented in **Figure 1** (Kotler and Keller, 2012).



**Figure 1.** Consumer decision-making process (Kotler and Keller, 2012)

In traditional consumer decision-making model, the process begins with the need recognition stage which is described as the “result of an imbalance between actual and desired needs” (Lamb et al., 2011, p.190). During this stage, marketers spend efforts to generate an imbalance between actual and desired needs through external stimulus such as advertisement. As a result, consumers recognise a need of a product or a service, which will lead them to next stage, information search, in order to fulfil the need. At this stage, information is received by consumers through various channels such as advertisement, personal selling, previous experiences, recommendations, and customer reviews. Following the information search stage, consumers begin to compare that information in the evaluation of alternatives stage. Reid and Bojanic (2009, p. 39) suggest that along with this phase “consumers consider the relative importance of each attribute of the product-service mix”. Based on the relevant attributes such as brand, product, price, quality, consumers try to find the best option. It is a widely held view that companies desire consumers to add their brand and products within the possible evaluation group. On the other hand, in the decision-making process, these three stages together before the actual purchase is also called pre-purchase stage.

The fourth stage in the consumer decision-making process corresponds to purchase when consumers make an actual purchase after ceasing the evaluation of the alternatives. In this case, consumers might postpone the purchase and need to make extra decisions based on the factors such as the time of buying, or the budget as well as the complexity of the product. The last stage of the consumer decision-making process is the post-purchase evaluation where consumers review the product/service. Throughout this stage consumers determine if the product meets the desired satisfactory levels. Found on the satisfaction level consumers can become a loyal customer or they might never repeat the purchase of the same product/service.



At this point, it should be reminded that there has been an interest on AI among scholars to utilize AI-based models to make prediction on consumer behaviour as well as making an impact on their decision-making process (Bae and Kim, 2010) In the same fashion, there have also been many researches scrutinising AI applications and their effect on consumer buying process (Nair et al., 2017; Shirdastian et al., 2019; Kumar et al., 2019; Ładyżyński et al., 2019). Although in their study, Kietzmann et al. (2018) and his colleagues investigate AI on each consumer decision-making stage, they do not tap into unnecessary purchases since they take a business point of view. On the contrary, this particular study considers AI applications to predict and optimize consumer buyer behaviour in order to ease the impact of climate change by reducing unnecessary buying and excessive consumption. Therefore, it should not be confused with the AI suggestions made by companies to affect consumer behaviour in favour of companies. Those applications encourage customers to buy might lead unnecessary purchases. Contrariwise, this study is interested in new applications which encourage consumers to watch and optimize their buying behaviour. The AI-based applications in this research refer to independent applications that could be used by customers who are environmentally sensitive and willing to help reducing the negative impacts of climate change. Although, this study investigates AI in detail as well as suggesting a new AI- integrated buying decision-model in the further sections, the relationship between excessive consumption is discussed in the following section.

### 3. ENVIRONMENTAL ISSUES AS A RESULT OF EXCESSIVE CONSUMPTION

In their study Ehrlich and Goulder asserts that “the level of consumption is roughly equivalent to the total amount of overall spending on consumer goods and services” (Ehrlich and Goulder, 2007, p. 1146). In the same study the authors suggest that with the constantly increasing population and the consumption, the environmental issues such as climate change and air pollution will continue to increase. On the contrary, some researchers explore the consumption and its impact on environment within more specific contexts (Cohen et al., 2011; Bajželj et al., 2014). In their study, for instance, Cohen et al. (2011) and his colleagues draw attention to frequently made short distance flying habits and its negative impact on the climate change. In the same manner, another study reveals that in order to decrease air pollution, it is necessary to lessen the food waste while making improvements on personal diets (Bajželj et. al, 2014). On the other hand, other scholars argue the integration of Artificial Intelligence means such as machine learning to tackle environmental issues while creating sustainability (Nabavi-Pelesaraei et al., 2018; Huntingford et al., 2019; Nishant et al., 2020).

Nonetheless, considering consumption at individual level, artificial intelligence and interpretation of personal data collected from various resources such as tweets, vlogs, google search has already been used by marketers and advertisers to communicate intended messages including encouragement of consumers to make a purchase (Kietzmann et al., 2018). In a similar way, companies benefit machine learning software interpreting data from previous purchases to make new product suggestions (Kumar et al., 2019). In contrast to benefiting from



AI-based applications in favour of companies, these data can also be interpreted by independent AI-based applications to help consumers during decision-making process while preventing unnecessary and impulsive buying behaviour. Before discussing the updated consumer decision-making model, the next section explains the notion of artificial intelligence to create a better understanding of the current research as well as proposed conceptual model.

#### 4. ARTIFICIAL INTELLIGENCE

Artificial intelligence concept has been exponentially growing on both practical and academic areas. In a parallel way, AI is one of the main subjects in this particular study. An industrial study (IDC, 2019) reveals the estimated increase in industrial realm in order to get a greater level of understanding on the practical applications of AI. According to the same report approximately 93 billion dollars will be spent on AI services by 2023 among 32 countries (e.g., United States, PRC, Canada, Japan) and 19 industries (e.g., retail, banking, insurance, manufacturing, health, education). Because of the fact that there is an unpreventable rise on AI applications, many scholars have been investigating the subject from an academic point of view (Davenport et al., 2020; Chiang and Yang, 2018; Erevelles et al., 2016; Ekici and Aksoy, 2009). In some of these studies, definitions and the main antecedents of the AI were given in details. In his study Shankar (2018, p.6) defines AI as “programs, algorithms, systems and machines that demonstrate intelligence”. On top of that AI’s capability to mimic and exhibit intelligent human behaviour was highlighted by other scholars (Huang and Rust 2018, Syam and Sharma 2018). In addition to those, one of the early definitions given by Pomerol (1997, p.23) suggests that AI is “the science of designing a building computer-based artifact performing various human tasks”. It is also contended that because of the intelligent systems providing automated solutions to the tasks that require skills, AI replaces humans in the process of execution those tasks (Negnevitsky, 2005). The technologies and intelligent systems mentioned above might encompass “machine learning, natural language processing, rule-based expert systems, neural networks, deep learning, physical robots, and robotic process automation” (Davenport et al., 2020, p. 26). On the other hand, AI plays a significant part in the world as well as exhibits exponential growth in both industrial and research areas, specifically after the 4.0 Industrial Revolution (Schwab, 2017). This enormous growth makes AI really hard to be categorized in limited number of applications and classifications. However, some scholars attempt to categorize AI based on the certain standpoints like business context. For instance, Davenport and his colleagues et al. (2020) divides AI applications in three unique groups based on multiple cases in their conceptual research. They assert that AI could be used as business automation process, meaningful interpretation process, and customer engagement process (ibid). At this point it should be noted that even though there are countless numbers of areas in which AI is investigated, this particular study takes marketing and management realms as a standpoint to observe the AI notion.

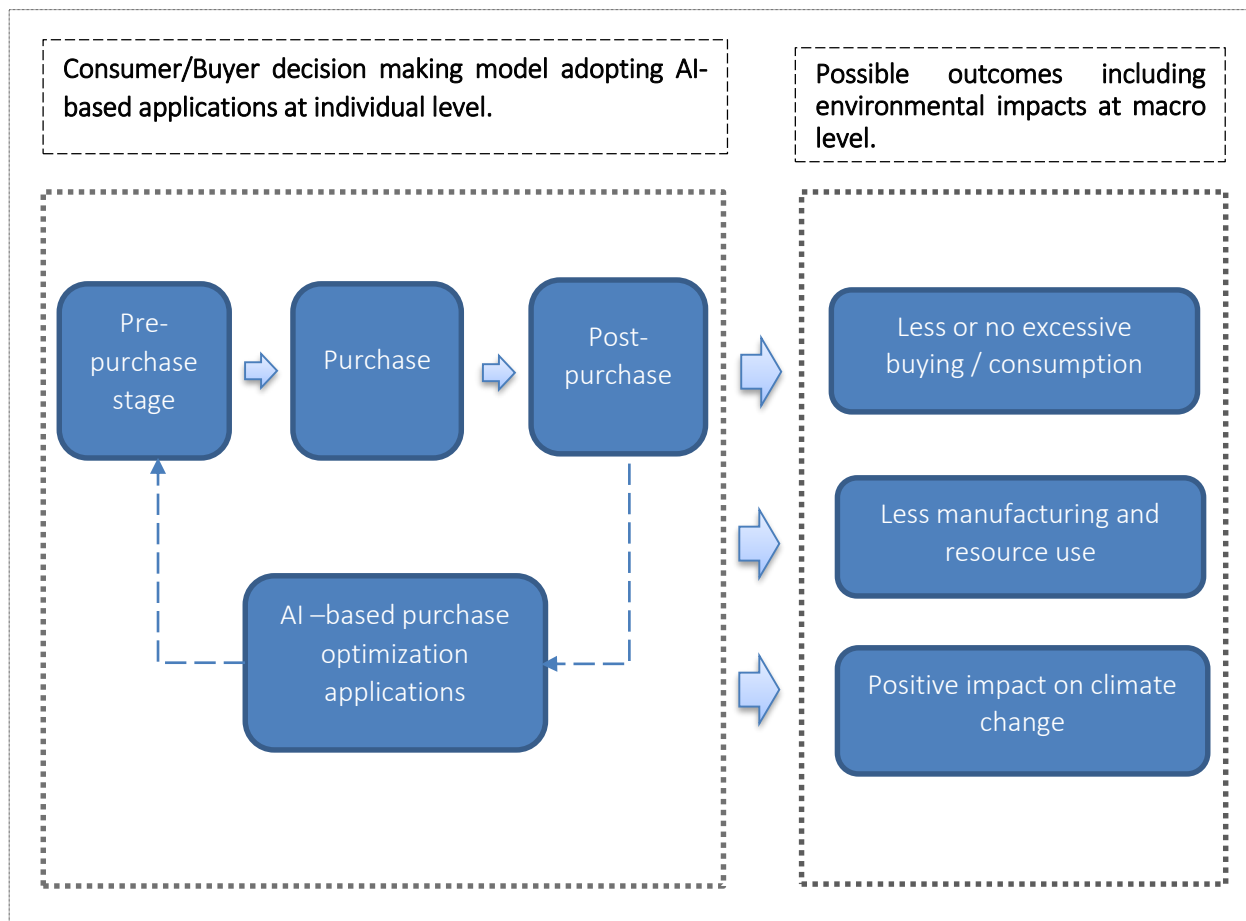
On the other hand, it should also be pointed out that some researchers have drawn attention to possible negative impacts of AI pertaining to ethical issues (Du and Xie, 2021). Because of the



growing concern on privacy and personal data as well as the speedily increasing nature of the AI technologies, the need of ethical discussion around AI applications rises more comparing to other technologies (Etzioni and Etzioni, 2017). For instance, if a company gives clear information on its AI-based application, the bias towards the AI could decrease whilst leading more endorsement among people. Thus, the ethical issues should be considered carefully while designing any sort of AI related products.

Although AI has been observed within a growing number of subjects, the possible impact of AI on the relationship between excessive consumption and climate change at consumer level has not been addressed by scholars at a macro level. At this point, in the following section builds up an updated consumer decision-making model to lessen the impacts of climate change at individual level by optimizing buying behaviour.

### 5. AN UPDATED CONSUMER DECISION-MAKING MODEL ADOPTING AI-BASED APPLICATIONS



**Figure 2.** Consumer decision-making model adopting AI-based applications and its possible outcomes.

The first stage of the consumer decision-making process (Figure 1) begins when customers recognize their needs while the whole process ends with customers assessing their purchase



which is called as post-purchase phase (Kotler and Keller, 2012). The need recognition happens when there is a difference between actual needs and desired needs (Lamb et al., 2011, p.190). Whereas this difference could occur naturally, companies could also create a contrast between actual and desired needs through numerous means such as advertisement, sponsorships and so on. The need recognition period is followed by the information search phase where customers receive information from different resources such as advertisement, previous experiences, and customer reviews. Then consumers evaluate the alternatives to satisfy their needs. After ranking different features of different sort of products, consumers decide to choose one of them and make the actual purchase. Finally, consumers review the purchase to see if the product satisfy their needs, which forms the last stage of consumer decision-making process of post-purchase evaluation.

On the other hand, if consumers do not optimize their purchases based on their actual needs, there could be an excessive consumption which adds on harmful climate change (Ehrlich and Goulder, 2007). At this point, personal AI-based applications could help consumers to prevent unnecessary purchases. For that reason, this research proposes an updated consumer decision-making process model (Figure 2) to address the relationship between unnecessary buying behaviour and climate change while including AI-based solutions into buying process. In spite of that, consumers might have ethical concerns regarding with the usage of personal data. On top of that some consumers might not be willing to use those type of applications in the first place. However, if privacy standards are met, consumers might show tendency to endorse these sorts of applications. Another way of motivating customers to adopt those applications could be various motivational incentives such as how much money is saved for price sensitive customers, how much calories saved for the customers who are interested in calory counting, or how much less green gas released after preventing an unnecessary purchase. Thus, app creators should observe the target audience in detail and find the right motivational items.

## 5. CONCLUSION

The present study argues that if individuals could optimize their purchases, the excessive consumption and its negative impacts on climate could be decreased as the amount of consumption approximately equal to the total amount of purchases (Ehrlich and Goulder, 2007). To do so, consumers should be warned during the pre-purchase stages including need recognition, information of search and evaluation of alternatives. Although it could be seen in the relevant literature that AI was explored at each stage of the consumer decision-making stages within the advertisement realm (Kietzmann et al., 2018), there is no study addressing the unnecessary purchases. In order to optimize purchases at the individual level this study proposes an updated version of traditional consumer/buyer decision-making model (Kotler and Keller, 2012) by adopting AI-based applications (Figure 2). These applications could help individuals to optimize their purchases based on the data of previous buying patterns. On the other hand, in order to reassure consumers on ethical issues, application should meet the privacy standards.





It should also be emphasized that buying behaviour in this study might be perceived as reference to only online shopping context. Even though AI-based applications interpreting data could be easier to integrate in online purchase, offline purchases could also be used as a data with features like receipt/invoice scanner within the same AI applications. Accordingly, if possible, offline purchases should also be integrated in AI-based applications to address the excessive consumption and its impact on climate change in a broader perspective. In closing, it should also be recognised that the conceptual model proposed in this study is limited to literature review. Hence, the conceptual model requires to be tested via empirical studies for further validations.

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