



Comparing Algorithm-Based and Friend-Based Recommendations on Audio Streaming Platforms

Anne Mareike Flaswinkel*, Reinhold Decker

Department of Business Administration and Economics, Bielefeld University, Universitaetsstrasse 25, 33615 Bielefeld, Germany.

*Email: a.flaswinkel@uni-bielefeld.de

Received: 13 December 2023

Accepted: 22 February 2024

DOI: <https://doi.org/10.32479/irmm.15673>

ABSTRACT

With the rise of audio streaming platforms (ASPs), users face the challenge of navigating a large amount of audio content. Companies are increasingly employing algorithms to provide personalized recommendations to their customers; however, word-of-mouth research has demonstrated in numerous studies the crucial role of friend-based recommendations, particularly in the realm of experience goods. Considering the experiential factor in ASPs, existing insights into recommendations raise the question of which recommendation source holds a greater advantage in the realm of ASPs. This study deals with recommendation sources in the field of ASPs and examines in particular the effects of algorithm-based suggestions on users' listening intentions. Using a quantitative research approach, we investigate users' attitudes toward recommended content and compare the intentions to listen to suggested content in cases of algorithmic and friend-based recommendations. Our results provide valuable insights for companies planning to provide helpful recommendations to ASP users and increase their listening intentions for recommended content.

Keywords: Audio Streaming Platform, Recommendation, User Choice, Listening Intention, Algorithms, Recommendation Systems

JEL Classification: M3

1. INTRODUCTION

Audio streaming platforms (ASPs) have revolutionized music consumption by providing instant access to a variety of audio content (Wlömert and Papies, 2016). Many songs, audiobooks, podcasts and other audio media can be accessed in the blink of an eye and from any location (IFPI, 2023). Additionally, the COVID-19 pandemic certainly contributed to the recent popularity of streaming services. Streaming revenues worldwide reached USD 17.5B in 2022, the highest ever reported and more than six times the figure reported for 2015: USD 2.7B (Statista, 2023). Despite the convenience of these services, the large number of options and choices can be overwhelming for users when trying to find the right content for certain moments and moods. To assist users in this decision-making process, ASPs have implemented recommendation systems that rely on data- and/or rule-based algorithms to predict user music preferences. This is

part of a broader technological trend known as the 'algorithmic turn,' defined as the use of intelligent algorithms and big data to personalize and customize services (Kiberg and Spilker, 2023). Recommendation algorithms are nowadays used by default on many streaming platforms as well as in online marketplaces (Jannach and Jugovac, 2019), and they can be considered a subset of artificial intelligence (AI) techniques.

Recent studies investigating the impact of AI on consumer behavior have shown that recommendations generated by AI are positively evaluated and utilized by consumers in areas of utilitarian consumption (Longoni and Cian, 2022), such as for search goods (Xie et al., 2022). However, for hedonic consumption goods (or experience goods), such as music, podcasts, audiobooks, series and movies, users tend to trust human recommendations more than those generated by AI (Longoni and Cian, 2022). This preference for electronic word-of-mouth (WOM) from friends,

family, or other humans appears to contradict the massive use of algorithms on streaming services and raises the question of the effectiveness of algorithm-based recommendations in the field of audio streaming and leads to our research question: “What is the impact of algorithm-based recommendations compared to friend-based recommendations on users’ intention to listen to the recommended content on audio streaming platforms?”

By empirically examining users’ intentions to listen to recommended content, we seek to understand whether friend-based recommendations offer advantages over algorithm-based recommendations in the context of audio streaming. We further investigate the mechanisms affecting the preference for friend-based recommendations. Accordingly, our research is expected to deepen the understanding of how algorithmic precision and friendship-based wisdom influence the effectiveness of audio content recommendations on ASPs.

2. LITERATURE REVIEW AND THEORETICAL BACKGROUND

In the early 2000s, music streaming services truly began to gain traction. Services like *Rhapsody* (now *Napster*), launched in 2001, pioneered on-demand streaming by offering users access to a vast library of songs (Freedman, 2003). The emergence of other significant players, including *Pandora* (launched in 2005) and the currently very popular *Spotify* (launched in 2008), followed. The latter has accumulated over 320M active users (Spotify, 2023). Other major players in the industry, such as *Apple Music* and *Amazon Music*, have garnered substantial subscriber bases by offering vast music libraries and exclusive content. The dynamic growth of these platforms has been fuelled by digitalisation and technological advancements, positioning these types of services as many users’ preferred methods for accessing music in today’s digital world (Doerr et al., 2010; Krause and Hargreaves, 2013).

With a huge number of audio items easily available, consumers frequently face the challenge of selecting from a huge range of offers what to listen next. This is where recommendations come into play.

ASPs have implemented recommendation systems that utilize algorithms to offer personalized music suggestions (Lu et al., 2015). By means of machine learning techniques, these algorithms process user data, such as listening histories and preferences, in order to curate content tailored to individual tastes. As a result, users receive personalised recommendations based on their favourite artists and songs. Over the years, ASPs have continuously improved their algorithmic recommendations, considering factors such as individual listening habits as well as time-of-day and location.

Many studies in consumer behaviour have demonstrated that recommendations coming from friends, in particular, are likely to influence consumer decisions (see, e.g., Chu and Kim, 2011 and See-To and Ho, 2014). Consumers typically regard these personal

recommendations as trustworthy, with the trust stemming from the recommendation source’s social ties as friends are perceived to have no vested interest in promoting a product, whereas experts and, particularly, companies are perceived to be biased or to have ulterior motives (Cheung et al., 2008; Li et al., 2018). According to a study by Chen et al. (2011), consumers are more likely to share and respond to online WOM from friends (vs. strangers or experts) because it aligns with their social connections and dependencies. This ‘social connection’ is often lacking with algorithmic recommendations, which can feel impersonal and detached.

Studies have explored the impact of recommendations on business value (Jannach and Jugovac, 2019), satisfaction (Shin, 2020) and preference for AI-based recommendations (Kim et al., 2023). Several studies have demonstrated that the effectiveness of AI-based recommendations depends on the product category (Xie et al., 2022; Longoni and Cian, 2022).

Xie et al. (2022) investigate the effect of AI versus human recommenders on consumers’ preferences for search versus experience goods in e-commerce. Their findings suggest that consumers are more likely to trust algorithms when it comes to recommendations for search goods versus recommendations for experience goods. Recently, Longoni and Cian (2022) examined the role of AI-generated recommendations in consumer decision-making, revealing that consumers greatly value recommender systems in cases of utilitarian consumption. However, with hedonic consumption, consumers consider AI recommenders to be less competent (Longoni and Cian, 2022).

The just mentioned categorizations “search versus experience” and “hedonic versus utilitarian” are perhaps the two most common purpose-oriented categorizations of consumption in consumer behaviour research (Li et al., 2020). That is, it is more suitable to categorise ASPs as hedonic products, as listening provides emotional gratification, experiential consumption, pleasure and excitement (Hirschman and Holbrook, 1982). Users predominantly engage with these platforms to seek entertainment and personal enjoyment through music, podcasts and audiobooks. Accordingly, we assume that the inherent hedonic nature of music consumption leads to friend-based recommendations being more influential and appealing to users than recommendations generated by algorithms.

Contrary to the prevalence of algorithmic recommendations on ASPs, research suggests that users tend to rely more on recommendations from friends for subjective and personal consumption goods, such as music (Longoni and Cian, 2022; Xie et al., 2022). Therefore, we arrive at our first hypothesis:

H₁: Users of ASPs will show higher intentions to listen to content coming from friend-based recommendations as opposed to content coming from algorithm-based recommendations.

The impact of a recommendation can be influenced by the impression held by the recipients about the source. The impact of a recommendation can be influenced by the impression held by the recipients about the source. This notion aligns with Chaiken

and Eagly's (1976) claim that the persuasive power of a message is, in part, influenced by the characteristics the receiver attributes to the sender. According to Cheung et al. (2008), the assessment of a source's credibility defines the anticipated value of the information it conveys.

Applying this sentiment to our research topic, where algorithms are the recommendation source, the attitudes users have towards algorithms in general are expected to influence their attitudes about the recommendations provided. These attitudes are influenced by the perceived value, which refers to the customers' overall evaluation of a product's or service's usefulness and influenced by the views of the benefits acquired and the expenses incurred (Zeithaml, 1988). Ortega and Ferreira (2021) found that users consider the costs they will incur and the benefits they will derive from a technology when making usage or consumption decisions, and Zeithaml et al. (2020) claimed that perceived value is the basis for all marketing decisions. Therefore, in this study, we expect that the value participants attribute to algorithms (i.e., perceived value of algorithms (PVA)) will influence their willingness to listen to the recommended content or not. Accordingly, we arrive at our second hypothesis.

H₂: The intention to listen to recommended content is moderated by PVA, where a higher PVA will increase listening intentions for algorithm-based recommended content.

3. METHOD AND DATA COLLECTION

To investigate the effectiveness of algorithm-based recommendations on ASPs, compared to recommendations provided by friends, an online experiment with two scenarios was set up via the online survey tool *Qualtrics*. Participants were recruited using the *Prolific* online panel¹. The survey was completed by 216 participants from the US (105 male, 104 female, 7 other, 57.8% between 25 and 44 years of age, 16.7% between 18 and 24 and 25.5% older than 45. 51% of the participants working full-time). The participants were randomly assigned to one of two conditions: algorithm-based recommendation ($n = 104$) or friend-based recommendation ($n = 112$).

After a brief introduction which specified the context for the scenarios (participants were instructed to imagine themselves in a typical situation where they decide to listen to music in the afternoon, and consequently open the app of one of their preferred streaming services), the participants were presented with one of the two scenarios each. These scenarios depicted the recommendation being provided either by a friend or by an algorithm and were each accompanied by a picture (Figure 1).

The participants were instructed to keep the described situation in mind while responding to a series of questions which assessed various aspects related to the participants' intentions, attitudes, and preferences regarding the recommended content and the recommendation source. We measured the construct "Intention to listen to the recommended content" with three items (adapted

from Picazo-Vela et al. (2010), Cronbach's $\alpha = 0.89$) on a seven-point Likert scale (1 = I entirely disagree, 7 = I entirely agree). To retrieve the value the participants generally attribute to algorithms (PVA), we modified the scale of Lu et al.'s (2015) construct "Perceived value of using algorithms" using 4 items (Cronbach's $\alpha = 0.95$). The constructs and their corresponding items are depicted in Table 1.

In order to examine whether possible covariates had an impact on the study results, we also collected information on the respondents' listening behavior and use of streaming services. We also included a question in our survey asking the participants, "Which of the following options would most likely convince you to listen to the recommended audio content?" to gain further insight into preferred audio content recommendation sources.

4. FINDINGS AND DISCUSSION

To test the causal relationship between the type of recommendation (algorithm-based vs. friend-based) and the users' listening intentions, we conducted an analysis of variance (ANOVA). Our analysis revealed a substantial difference in the users' intention to listen to recommended content between the two recommendation sources (p -value $< .001$, see Appendix). The participants showed a significantly higher intention to engage with content recommended by friends compared to content recommended by algorithms. These findings confirm and support our hypothesis H1, stating that that ASPs users are more inclined to follow recommendations from friends than algorithmic suggestions (Figure 2).

The model was also estimated with covariates: listening behavior, number of streaming service subscriptions and main device(s) for listening to audio content. Since the analysis with the covariates did not show any changes in the results, we only report the results of the ANOVA (Table 2).

To assess the moderating role of PVA on the effect of source of recommendation and the intention to listen to the recommended content, we performed a moderation analysis using the SPSS PROCESS macro (Hayes and Holbrook, 2013). The results show a significant moderating effect of PVA on the relationship between the recommendation source and the intention to listen to the recommended content (P -value = 0.053). We furthermore found that the positive effect of friend-based recommendations on users' intentions to listen to the recommended content weakens with higher PVA levels (Figure 3), which supports hypothesis H2.

The responses the participants gave to the additional question asked related to the most convincing source of recommendations support our findings. Once again, recommendations from friends emerged as the preferred option among the respondents (Figure 4), followed by content which is featured in a playlist users follow.

Our findings corroborate existing WOM research, underscoring the influential role of interpersonal recommendations in shaping user behaviour and further support recent findings (Longoni and Cian, 2022; Xie et al., 2022), suggesting that even in the presence of

¹ *Prolific* is an on-demand survey platform located in Oxford, United Kingdom.

Figure 1: Pictures of the Two Scenarios

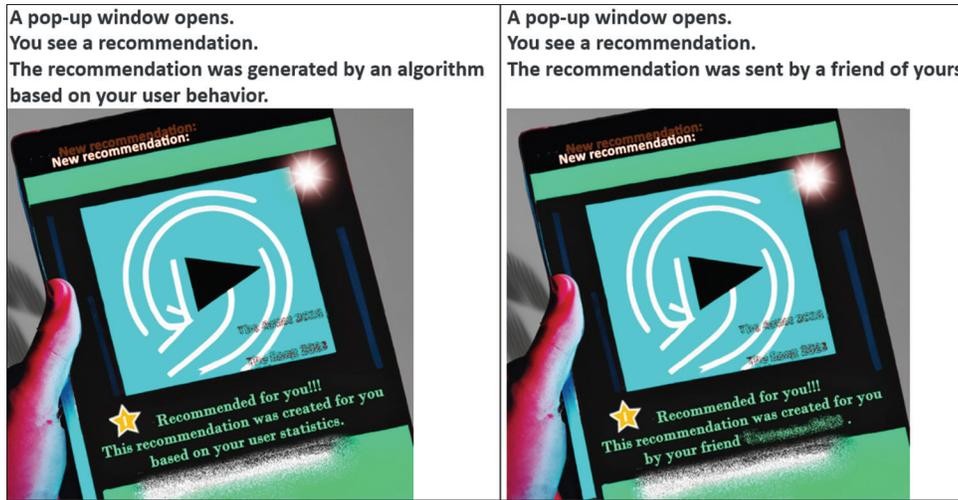


Figure 2: Relationship between the recommendation source and the intention to listen to the recommended content.

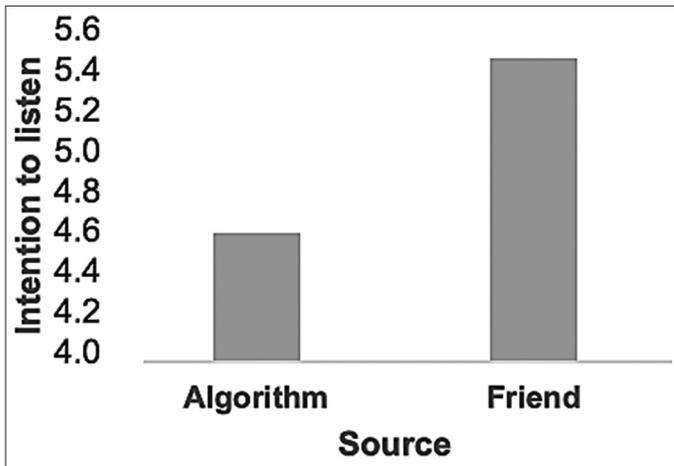
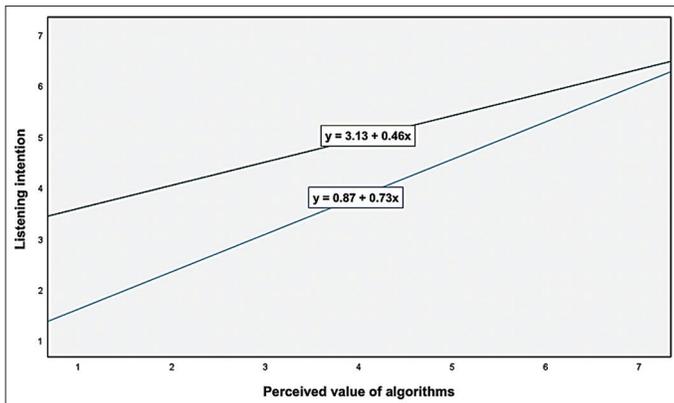


Figure 3: Moderation effect of PVA

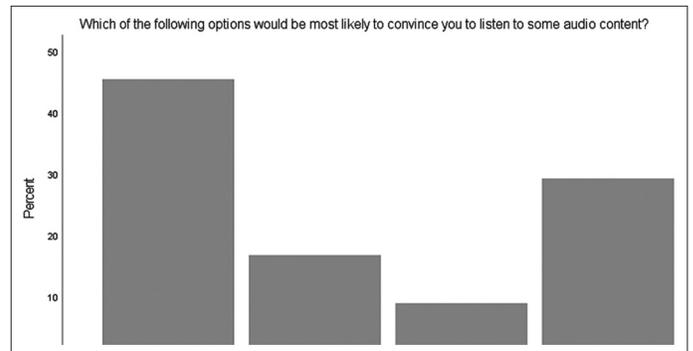


algorithm-based personalized recommendations, some users still value the human touch when it comes to audio content.

5. IMPLICATIONS AND FUTURE RESEARCH

This research extends the recent literature on AI-based recommendations (Longoni and Cian, 2022, Xie et al. 2022;

Figure 4: Most convincing source of recommendations



Kiberg and Spilker, 2023) by showing that, for users of ASPs, the intention to listen to recommended content is higher when the recommendation comes from a friend than when it comes from an algorithm. The findings contribute to a deeper understanding of the dynamics between algorithmic precision and friend-based wisdom in the realm of music recommendations on ASPs and have implications for the adequate design of ASPs as they shape their recommendation strategies. Understanding this differential impact allows the operators of ASPs to tailor their recommendation algorithms and incorporate social elements effectively.

Based on an online study, we could reveal that in the context of ASPs, algorithm-based recommendations lead to lower intentions to listen to the recommended content compared to friend-based recommendations. Furthermore, this study showed that the differences in the intention to listen to the recommended content weaken for higher levels of PVA. This implies that for users who generally attribute a high value to algorithms, the positive effect of friend-based recommendations decreases, making them more likely to listen to content recommended by an algorithm. While the variation in the intention to listen to recommended contents is still significant at high levels of PVA, the gaps nonetheless become smaller, which opens opportunities for further research. Increasing the value users ascribe to algorithms in general can lead to higher intentions among users to listen to content from algorithm-based recommendations. The above-presented results provide additional avenues for future research.

Table 1: Constructs and Corresponding Items

Intention to listen to recommended content (items adapted from Picazo-Vela et al., 2010)		
Cronbach's α	Cronbach's α (Based on standardized items)	Number of items
0.892	0.895	3
<ul style="list-style-type: none"> • I intend to listen to the recommended content. • I desire to listen to the recommended content. • I am likely to listen to the recommended content. 		
Perceived value of using algorithms (PVA) (items adapted from Lu et al., 2015)		
Cronbach's α	Cronbach's α (Based on standardized items)	Number of items
0.945	0.947	4
<ul style="list-style-type: none"> • I believe that using algorithms to obtain recommendations is valuable. • I believe that using algorithms to obtain recommendations is worthwhile. • I believe that using algorithms to obtain recommendations is beneficial. • Overall, using algorithms to obtain recommendations delivers high value. 		

Table 2: ANOVA – Listening intention

Design	Sum of squares	df	Mean square	F	Sig.
Between groups	38.048	1	38.048	22.263	< 0.001
Within groups	365.726	214	1.709		
Total	403.773	215			

As the vast amount of audio content necessitates recommendations for users to organize their preferences, ASP operators may question how algorithmic recommendations can be presented in a manner that is equally or more accepted by users than recommendations from friends. Related to the social and empathy components, generative AI approaches can provide ways to modify recommendations in streaming services. Recent research has looked at numerous ways that humans can collaborate with generative AI (Nah et al., 2023). By incorporating empathy as well as insight on user preferences, these AI systems could create personalized suggestions that close the gap between algorithmic recommendations and those from friends. Summing up, the study points to potential problem for algorithmic recommendations on ASPs and opens a wide field for further research in order to enhance the effectiveness of recommendation mechanisms.

REFERENCES

- Chaiken, S., Eagly, A.H. (1976), Communication modality as a determinant of message persuasiveness and message comprehensibility. *Journal of Personality and Social Psychology*, 34(4), 605.
- Chen, Y., Fay, S., Wang, Q. (2011), The role of marketing in social media: How online consumer reviews evolve. *Journal of Interactive Marketing*, 25(2), 85-94.
- Cheung, C.M.K., Lee, M., Rabjohn, N. (2008), The impact of electronic word-of-mouth. *Internet Research*, 18(3), 229-247.
- Chu, S.C., Kim, Y. (2011), Determinants of consumer engagement in electronic word-of-mouth (eWOM) in social networking sites. *International Journal of Advertising*, 30(1), 47-75.
- Doerr, J., Benlian, A., Vetter, J., Hess, T. (2010), Pricing of content services-an empirical investigation of music as a service. In: *Lecture Notes in Business Information Processing*. Berlin, Heidelberg: Springer. pp13-24.
- Freedman, D. (2003), Managing pirate culture: Corporate responses to peer-to-peer networking. *International Journal on Media Management*, 5(3), 173-179.
- Hayes, A.F., Preacher, K.J. (2013), Conditional Process Modeling: Using Structural Equation Modeling to Examine Contingent Causal Processes. Charlotte: Information Age Publishing.
- Hirschman, E.C., Holbrook, M.B. (1982), Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing*, 46(3), 92-101.
- IFPI. (2023), IFPI Global Music Report 2023-State of the Industry. Available from: <https://globalmusicreport.ifpi.org> [Last accessed on 2024 Jan 06].
- Jannach, D., Jugovac, M. (2019), Measuring the business value of recommender systems. *ACM Transactions on Management Information Systems*, 10(4), 1-23.
- Kiberg, H., Spilker, H.S. (2023), One more turn after the algorithmic turn? Spotify's colonisation of the online audio space. *Popular Music and Society*, 46(2), 151-171.
- Kim, J., Kim, J.H., Kim, C., Park, J. (2023), Decisions with ChatGPT: Reexamining choice overload in ChatGPT recommendations. *Journal of Retailing and Consumer Services*, 75, 103494.
- Krause, A.E., Hargreaves, D.J. (2013), MyTunes: Digital music library users and their self-images. *Psychology of Music*, 41(5), 531-544.
- Li, J., Abbasi, A., Cheema, A., Abraham, L.B. (2020), Path to purpose? How online customer journeys differ for hedonic versus utilitarian purchases. *Journal of Marketing*, 84(4), 127-146.
- Li, X., Chen, X., Liang, X. (2018), To trust or not to trust: The influence of eWOM source on consumers' purchase intention. *Journal of Consumer Behaviour*, 17(4), 338-348.
- Longoni, C., Cian, L. (2020), Artificial intelligence in utilitarian vs. Hedonic contexts: The 'word-of-machine' effect. *Journal of Marketing*, 86(1), 91-108.
- Lu, J., Wu, D., Mao, M., Wang, W., Zhang, G. (2015), Recommender system application developments: A survey. *Decision Support Systems*, 74, 12-32.
- Nah, F.F., Zheng, R., Cai, J., Siau, K., Chen, L. (2023), Generative AI and ChatGPT: Applications, challenges and AI-human collaboration. *Journal of Information Technology Case and Application Research*, 25, 277-304.
- Ortega, B.H., Ferreira, I. (2021), How smart experiences build service loyalty: The importance of consumer love for smart voice assistants. *Psychology and Marketing*, 38(7), 1122-1139.
- Picazo-Vela, S., Chou, S.Y., Melcher, A.J., Pearson, J.M. (2010), Why provide an online review? An extended theory of planned behaviour and the role of big-five personality traits. *Computers in Human Behaviour*, 26(4), 685-696.
- See-To, E.W.K., Ho, K. (2014), Value co-creation and purchase intention

- in social network sites: The role of electronic word-of-mouth and trust-a theoretical analysis. *Computers in Human Behaviour*, 31, 182-189.
- Shin, D. (2020), How do users interact with algorithm recommender systems? The interaction of users, algorithms and performance. *Computers in Human Behaviour*, 109, 106344.
- Spotify. (2023), Number of Spotify Monthly Active Users (MAUs) Worldwide From 1st Quarter 2015 to 1st Quarter 2023 (in Millions) [Graph]. Hamburg: Statista. Available from: <https://www.statista.com/statistics/367739/spotify-global-mau> [Last accessed on 2024 Jan 06].
- Statista. (2023), Music Streaming-worldwide. Statista Market Forecast. Available from: <https://www.statista.com/outlook/dmo/digital-media/digital-music/music-streaming/worldwide> [Last accessed on 2024 Jan 06].
- Wlömert, N., Papiés, D. (2016), On-demand streaming services and music industry revenues-insights from Spotify's market entry. *International Journal of Research in Marketing*, 33(2), 314-327.
- Xie, Z., Yu, Y., Zhang, J., Chen, M. (2022), The searching artificial intelligence: Consumers show less aversion to algorithm-recommended search product. *Psychology and Marketing*, 39(10), 1902-1919.
- Zeithaml, V.A. (1988), Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, 52(3), 2-22.
- Zeithaml, V.A., Verleye, K., Hatak, I., Koller, M., Zauner, A. (2020), Three decades of customer value research: Paradigmatic roots and future research avenues. *Journal of Service Research*, 23(4), 409-432.