Trust Through Recommendation in E-commerce

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ABSTRACT

We explore the influence of recommender systems on trust among consumers in the fashion e-commerce domain. Anchoring on the Trust Building Model (TBM) [13], we investigate its adaptability and applicability in the context of interactive communication in recommender systems. Primarily leaning on qualitative data collection methods, namely semi-structured interviews, our work evaluates the classic TBM components – structure assurance, perceived reputation, perceived site quality, perceived web risk, trusting belief, and behavioral intention – affirming their relevance to recommender systems. Furthermore, new components, i.e., perceived service and recommendation quality, previous experience, perceived enjoyment, perceived recommendation authenticity, and intention to share interaction data, were examined in the context of recommender systems. Significantly, our study unveils that trusting beliefs can notably influence TBM's preliminary behavioral intentions, with the competence belief having the most substantial impact, challenging the conventional TBM findings. The outcomes highlight that consumers place heightened value on the tangible provisions from the company over ethics-based factors like integrity. The proposed refined TBM offers potential in enhancing recommender systems in fashion e-commerce, facilitating a better understanding of consumer behavior and trust dynamics.

CCS CONCEPTS

• **Information systems → Recommender systems**.

KEYWORDS

recommender systems, trust, trust-building model

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1 INTRODUCTION

In recent years, e-commerce platforms have witnessed unprecedented growth. By 2020, over two billion users were engaged in online purchases, accounting for more than 4.2 trillion U.S. dollars in global e-commerce sales [2]. This digital revolution has prompted fashion retailers to invest significantly in technology. Particularly, advancements in intelligent information systems are designed to enhance consumer-brand interactions, refine user experiences, and tailor offerings to consumer behavior and preferences [6].

A critical aspect within this field is the use of recommender systems, engines that analyze user data to present personalized product suggestions, thereby influencing consumer decision-making processes [18]. Nonetheless, the effectiveness of recommender systems faces notable challenges. Consumer resistance, privacy concerns, and trust issues often play a role in their acceptance [3, 12]. Drawing on the concept of trust as defined by Rousseau et al. [19] and McKnight et al. [13], this paper employs the Trust Building Model to identify how e-commerce, especially within fashion retail's recommender systems, establishes trust.

Our study augments the TBM framework by incorporating new factors and behavioral intentions aligned to the digital consumer experience. We introduce additional components like perceived service quality, recommendation authenticity, and a willingness to share interaction data, striving to present an exhaustive perspective on trust-building in e-commerce. Specifically, we explore in detail how Zalando, a European online fashion retailer, employs recommender systems to construct consumer experiences and the potential influence of these systems on trust-building processes.

In the wider scope of Interactive Communication Technologies, our research further investigates how interactivity, as delineated in works by Rafaeli [17] and others, is altering the communication dynamics between consumers and digital platforms.

At the heart of our research is the question: *"How, if at all, does the utilization of recommender systems affect trust-building among consumers through the lens of interactive communication in fashion e-commerce entities?"*

To tackle this question, we devised hypotheses grounded in the TBM framework, modified to embrace the complexities of e-commerce interactions. Through this investigation, we seek to gain insights into consumer trust in digital platforms, potentially guiding strategies for improved user engagement and continued e-commerce expansion.

2 RELATED WORK

Within e-commerce, recommender systems are key, enriching user experiences through personalized content and product suggestions. Among the algorithms employed, collaborative filtering (CF) stands out for its proficiency in utilizing user-item interaction data for customized recommendations [18]. Nonetheless, CF faces challenges with popularity bias, often overshadowing niche products by promoting popular ones [11]. Endorsing long-tail recommendations to broaden consumer choices and counteract market uniformity serves as a way of mitigating this bias [14].

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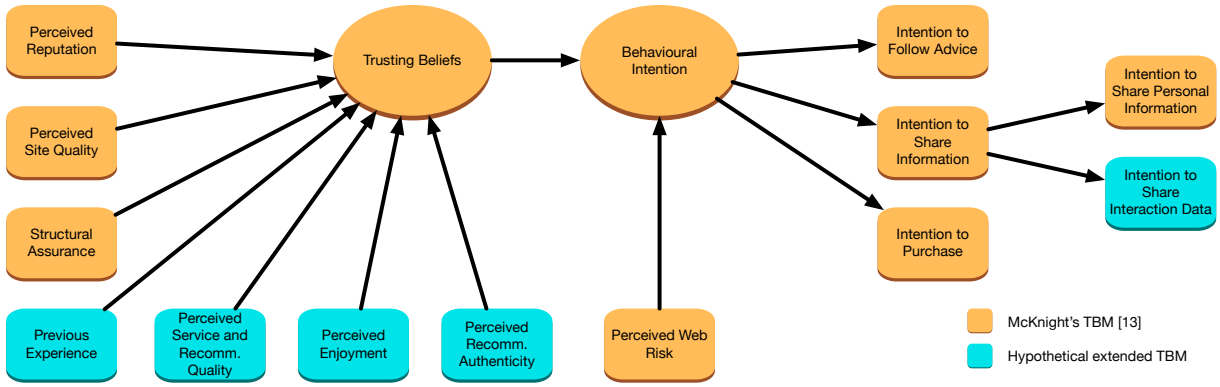

Figure 1: Trust building model, adapted from McKnight et al. [13].

Simultaneously, trust raises significant attention in e-commerce, especially concerning customer interactions with AI-driven systems. Studies by, e.g., Wang and Benbasat [21], study trust in digital settings, underscoring the human inclination for interpersonal trust rather than trust towards technology.

McKnight et al. [13] introduced the Trust Building Model, decoding trust's influence on consumer behavior in online commerce, and specifically underscoring elements like structural assurance, perceived risk, site quality, and reputation. Importantly, TBM reveals that trust directly predicates behavioral intentions, an element central to Ajzen's theory of planned behavior [1]. In e-commerce, these behavioral intentions, e.g., the propensity to disclose personal data, follow recommendations, and perform purchases, are derivatives of trust, often joint with perceived risks [19].

However, given the advancements in web technology since the introduction of the TBM, its applicability today is not given. Recent research calls for a modernized view of consumer trust, specifically in relation to recommender systems. The skepticism towards AI suggestions, noted by Dietvorst et al. [3], underscores privacy concerns and users' reluctance to cede decision-making to AI.

Conversely, factors such as service provider reputation, ease of use, and user autonomy positively impact consumer trust in recommendation [22], and recommenders considerably influence consumer purchasing patterns and decision-making [7, 8].

This inherent tension between trust and the effectiveness of recommender systems in e-commerce signifies the need for further research, particularly in response to the dynamic nature of data privacy standards and consumer anticipations. Our study seeks to address this gap, presenting modern perspectives on the interplay between recommender systems and consumer trust.

3 RESEARCH HYPOTHESES

The underlying premise of our work revolves around understanding the dynamics of trust within of e-commerce, specifically in relation to recommender systems in fashion retail. Trust, as a multifaceted concept, relies on various elements intrinsic to the user experience, particularly in the context of online interactions (with intelligent information systems). Therefore, our hypotheses investigate how each contributes to trust among consumers. With a foundation in the model introduced by McKnight et al. [13], we hypothesize how the model could be aligned with the recommender systems in e-commerce scenario. The original model, and the hypothetical extension based on the hypotheses below is shown in Fig. 1.

Below, we outline our key hypotheses and provide a rationale for each, underscoring their significance in the broader context of consumer trust in digital platforms:

Hypothesis 1: Increased perceived authenticity of recommendations positively correlates with consumer trust.
Rationale: Authenticity in recommendations, perceived as unbiased and highly personalized, is presumed to foster a sense of reliability and integrity in the platform. Consumers are likely to trust platforms more when they feel the suggestions are genuine and not solely driven by the company's commercial interests.

Hypothesis 2: Higher levels of perceived interactivity between the consumer and the platform enhance trust.
Rationale: Interactivity contributes to a sense of engagement and personal attention, potentially leading to stronger consumer trust. Platforms that facilitate meaningful two-way communication are seen as more responsive and consumer-centric, factors often associated with increased trust.

Hypothesis 3: Concerns over privacy and data security negatively impact trust in recommender systems.
Rationale: As recommender systems require access to personal and behavioral data, concerns about data misuse or breaches can significantly erode trust. A transparent, secure approach to data handling is crucial to maintaining consumer trust.

Hypothesis 4: A positive correlation exists between the perceived service quality of the platform and user trust.
Rationale: Service quality encompasses various factors, including user interface, customer service responsiveness, and the accuracy of recommendations. Higher quality in these areas can enhance overall trust as users feel their needs are understood and prioritized.

Hypothesis 5: Willingness to share personal interaction data is higher among users who trust the platform's recommender systems.
Rationale: Trust likely encourages users to share more personal data, enhancing the personalization and effectiveness of recommender systems. This symbiotic relationship suggests that building trust can lead to enriched data sharing, further improving personalized experiences.

Table 1: Overview of interviewees with demographic information and experience of using Zalando.

Participant	Gender	Age	Profession	Previous experience	Frequency of use	Has purchased
A	M	35	Portfolio manager	Yes	3 times a month	No
B	F	24	Student	Yes	Once or twice	N/A
C	F	24	Student	Yes	A few times	No
D	F	31	Digital marketer	Yes	Frequently	No
E	F	25	Student	Yes	Monthly	Yes
F	F	25	Social media specialist	Yes	A few times	Yes
G	M	25	Finance controller	Yes	Every three months	Yes
H	M	25	Student	No	3 times a month	No
I	F	32	Student	No	N/A	N/A
J	F	30	Architect	Yes	Once a month	No
K	F	28	Student	Yes	Every 4-5 months	Yes
L	M	57	Retired	No	N/A	N/A
M	M	33	Debt collector	Yes	Once a year	No
N	F	27	Self-employed	Yes	3 times	Yes
O	F	24	Student	Yes	3 times a month	Yes
P	F	30	Music teacher	Yes	3 times or more	Yes
Q	F	56	Portfolio manager	Yes	At least 1 time	Yes

Hypothesis 6: The transparency of the recommender system's mechanisms positively influences consumer trust.
Rationale: Understanding how recommendations are formulated helps consumers feel less manipulated by hidden agendas. Transparency demystifies the process, potentially fostering a sense of control and informed consent among users.

Our work aims to dissect the multifaceted nature of trust in the digital consumer area, particularly focusing on elements that enhance or impede trust within the context of e-commerce interactions. Each hypothesis contributes to a comprehensive framework that could guide future enhancements in user experience, particularly concerning the personalization and ethical considerations inherent in recommender systems.

4 METHOD

Leveraging a qualitative approach, we aimed to explore consumer trust in recommender systems, specifically in the context of fashion e-commerce. The approach integrated elements of grounded theory, thematic analysis, and qualitative data quantification to ensure comprehensive, multifaceted insights.

The theoretical grounding was the Trust Building Model, supplemented by three novel factors identified through literature review to tailor the TBM to recommender systems, i.e., perceived service and recommendation quality, previous experience, and perceived enjoyment. The modified model served as a basis for our data collection and analysis, focusing on both existing TBM components and the new factors.

We conducted semi-structured interviews, targeting consumers of the fashion e-commerce platform Zalando[1], ensuring demographic diversity reflective of Zalando's customer base.

Two new questions were introduced, informed by preliminary analysis, to explore emergent themes. The interview design followed a semi-structured format, providing the flexibility necessary for in-depth exploration of consumer attitudes and behaviors. This approach facilitated rich, nuanced data, capturing participants' experiences and perceptions with the recommender systems.

The iterative process adhered to grounded theory's canonical steps, involving initial coding, concept identification, category saturation, and hypothesis testing, with data collection and analysis proceeding concurrently. The study did not restrict itself to initial trust, thus involving consumers with varying degrees of familiarity with Zalando, offering a more holistic view of trust dynamics.

Participants were selected through purposive and snowball sampling, leveraging professional networks to recruit individuals fitting Zalando's customer profile. This sampling, while limiting randomness, was essential given the study's specific contextual focus and the nuanced nature of the trust construct in e-commerce.

Ethical considerations were highly prioritized, with all participants providing informed consent, ensuring confidentiality and data security in line with institutional research guidelines.

5 DATA

Data was collected through in-person interviews both online (16) and on-site (1) during April 2022. A total of 17 interviews were conducted, recorded, and transcribed. While we do not present the transcriptions in detail, Table 1 presents an overview of the participants including basic demographic information an experience of using Zalando, Fig. 2 shows the gender distribution of participants, and Table 1 shows data about the ages of the participants. The data is a biased towards younger female participants (female-to-male ratio 3:1), with only very few participants being older than 40. This bias is, however, in line with Zalando's core demographics which consists of 65% female shoppers with a target age of 25-40 years [4]. While the data is aligned with the target demographic of Zalando, it may not be suitable for an analysis of the entire population of e-commerce customers.

6 ANALYSIS & RESULTS

This section outlines the insights of our structured interview analysis, focusing initially on the factors contributing to trust building.

[1]http://www.zalando.com

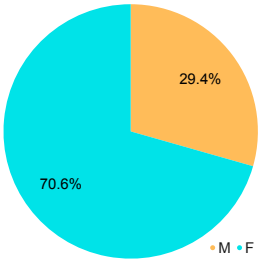

Figure 2: The gender distribution of the interview participants.

Table 2: Age-related data of interview participants.

Data	Value
Average age	31.2
Median age	28
Standard deviation of age	10.2

The study analyzed Trust Building Factors by first explaining factors identified in the initial Trust Building Model, followed by the introduction of newly proposed factors, which emerged during the interviews. Subsequently, the trust-building process is discussed, particularly trust beliefs and behavioral intentions, emphasizing the original TBM's three intentions: sharing information, following advice, and making purchases. Finally, we introduce a new behavioral intention - the willingness to share interaction data - along with an exploration of its implications aligned with the initial TBM intentions.

6.1 Trust Building Factors

The TBM centers around factors that build and establish trust. These are the findings from our analysis in regards to the factors' used in the context of recommender systems in e-commerce, both those established by McKnight et al. [13] and new ones introduced in Section 3.

6.1.1 *Factors From the Trust Building Model.*

Perceived Reputation. An inquiry into Zalando's reputation among participants revealed that 13 had heard of the company from their peers and other sources, including colleagues (A, E, M), friends and family (B, G, N), social media (D, H), documentaries (C), and other sources (K, O, P, Q). Eight participants (A, B, C, E, G, K, N, O) described the brand positively, two (L, Q) neutrally, and four (F, I, J, L) were unaware of any third-party opinions.

Perceived Site Quality. Participants offered divided opinions on the site's quality. Positive attributes included efficient navigation and attractive visual design, whereas negative feedback referred to the style and presentation. Overall, 12 participants (A, B, D, E, F, H, J, K, M, N, O, P) praised the site's high quality, whereas two participants (C, I) expressed discontent with the site's quality. Specific comments included statements such as "…for me doesn't look nice. So doesn't look very reliable. I think I will probably not buy from them". Still, the majority expressed a positive sentiment towards the site's overall quality.

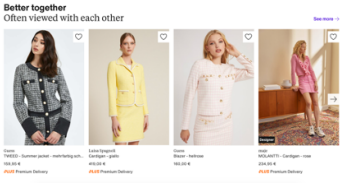

Figure 3: An example of the "Better together" section on Zalando's website.

Perceived Web Risk. The majority of interview participants (13) perceived low risk in sharing personal data with Zalando, citing its established reputation and secure payment options, as highlighted by participants E, H, and P. However, participant M expressed reservations, underscoring the perceived necessity of online information sharing. Other comments included a sentiment of professionalism and credibility due to the site containing "a lot of information" (F, O), and references to the external payment options (H, P, E) as indicators of low risk/high trust.

Structural Assurance. Information about safeguards appeared to enhance trust among six participants (D, E, F, H, M, O), with D ("totally, totally") and H particularly affirming ("…will trust more this site …") the sentiment. Conversely, three participants (A, G, K), felt neutral, citing either established trust or the irrelevance of such measures. Specifically, participant K stated that structural assurance had no impact on their use of the site.

6.1.2 *Proposed New Factors.*

Previous Experience. Of the 17 participants, 15 had prior experience with Zalando, with 12 recounting positive encounters. While none of the participants expressed negative experiences with the website, participants D and M expressed neutral experiences. G predicted that Zalando would continue to have "good" recommendations because of his previous experiences as a long-term customer at Zalando. He further stated that his trust in Zalando has been built over many years, with no occurring issues, and therefore he does not check the safeguard information anymore.

Perceived Service and Recommendation Quality. To reflect on the service and recommendation quality, participants had been asked to find three products when provided with a link to the website. Having completed this step, they were asked to review the recommendations from the *Better together* and *Tip to toe* sections of the website, as shown in Fig. 3 and Fig. 4 respectively. The analysis revealed a split preference among participants, five (A, E, N, P, Q) considered the recommendations from *Top to toe* better than those from *Better together*, whereas four (D, H, I, L) felt the opposite. Those preferring *Top to toe* expressed there being a better match in terms of what they would wear (A, Q) and a positive sentiment on how well garments fit together (N, P). Conversely, those preferring *Better together* felt the recommendation better reflected their style (D) or that the garments fit better together (H, I).

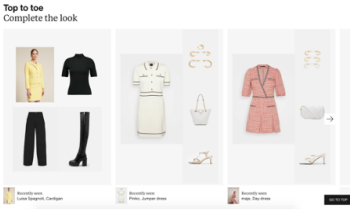

Figure 4: An example of the "Top to toe" section on Zalando's website.

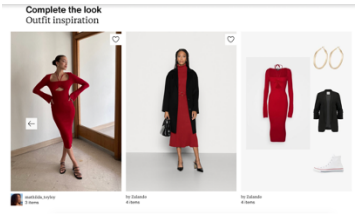

Figure 5: A hypothetical influencer-endorsed "Complete the look" recommendation section shown to female interview participants. A similar image, with a male influencer and garments for men, was shown to male participants. The leftmost photo depicts an influence wearing the garment, the photo in the center depicts a model, and the rightmost photo depicts the garment itself.

Helpfulness of the Recommendations. A majority (A, B, C, D, E, F, H, K, M, N) found both types (Fig. 3 and Fig. 4) of recommendations useful, though four participants (J, O, P, Q) disagreed, highlighting the subjective nature of utility in this context. Participant I referred to the context of the recommendation having an impact on which recommendation was preferred, whereas L expressed a neutral sentiment saying the recommendations were helpful to 50%.

Perceived Enjoyment. When considering whether their previous interactions with Zalando were enjoyable, 10 participants expressed a positive sentiment. Participants C, H, and Q, however, expressed dissatisfaction. While this indicates that perceived enjoyment of the service may be an indicator of trust, for some users, this is not necessarily true.

Perceived Recommendation Authenticity. Emerging from the responses, particularly participant C's insights, was the potential trust-building factor of authentic recommendations. When asked about the recommendations, C specifically brought up a photo of a social media influencer wearing a garment available from Zalando. In reference to the photo, C stated "Like you can see something real right? So like I can see here, how, for example, the fabric stretches a little bit here on the calf . . . " indicating a more real-life-like and possibly less polished representation of the garment. C further stated that a section were customers would be allowed to upload their own images of the garments would make Zalando "a little bit more human". Given C's answers, in latter interviews (D through Q), two additional questions including a hypothetical influencer-endorsed recommendation section (see Fig. 5) were added to the interview (refer to Q20 and Q21 in Appendix A). To summarize, participants showed a preference for realistic portrayals in fashion e-commerce, valuing customer reviews and influencer endorsements for their authenticity. When asked whether a hypothetical section showing customers' photos and reviews of the displayed garments would have an impact on their decision to purchase or not, all participants responded in harmony that this would indeed affect their decisions and have an impact on their perceived trustworthiness of the website.

6.2 Additional Factors Influencing Trust

Beyond previously discussed factors, participants identified additional elements influencing their trust in online recommendations, notably visual presentations (F), price (I), and the redundancy of options (P) to name a few. Participant F suggested that enhanced visual content, such as 360° images and videos, could improve their understanding of the garments. Participant I emphasized that displaying price information could positively affect purchase decisions. Conversely, Participant P noted that an overwhelming variety of options on Zalando's platform could diminish trust and purchase intention.

6.3 Understanding Trusting Beliefs

Participants' trusting beliefs were explored through four dimensions: benevolence, integrity, competence, and predictability.

6.3.1 Benevolence. Participants were queried regarding Zalando's motivation behind their recommender system. A majority (C, D, E, F, G, K, M, N, Q) felt the system served mutual benefits for customer as well as the vendor. However, six participants (A, B, H, I, J, O) expressed skepticism, doubting Zalando's commitment to consumer well-being, viewing the system as a primarily sales-driven tool. Finally, two participants (H, O), specifically pointed out that they did not like the recommendations and did not perceive the recommender system beneficial to the customer.

6.3.2 Integrity. On Zalando's honesty, participants offered mixed reviews. While eight participants (D, E, F, J, L, M, N, Q) showed a moderate level of trust, citing reasons ranging from Zalando's market presence to previous positive experiences, two participants (A, C) criticized Zalando for lack of transparency, particularly concerning data usage. Participant A mentioned that while they perceived Zalando as not being "honest and open" with their collection of consumer data, it did not imply they are not safe and reliable to purchase from.

6.3.3 Competence. When exploring perceived competence, we evaluated whether interviewees believed that the trustee, Zalando, could fulfill the trustor's requirements. Participants were questioned about their reliance on Zalando's recommendations for styling and sizing when seeking products for specific occasions. Notably, six participants (A, G, I, K, L, O) expressed reluctance to depend on Zalando's suggestions. Participant O specifically highlighted a mismatch between personal preferences and Zalando's recommendations, undermining the perceived competence of the trustee. In contrast, reasons from A and G were more aligned with

their purchasing behaviors, thus being in tune with their precise criteria during shopping. Skepticism regarding Zalando's competence was primarily substantiated by O's feedback.

Conversely, four participants (E, F, J, N) commended Zalando's recommender systems accuracy. Participant F, for instance, recognized Zalando's strategy of accumulating user interaction data, expressing a willingness to contribute more personal data to enhance the system's accuracy. This trust was boosted by N's comment, attributing to their confidence in the recommendations and Zalando's reputation at being accurate regarding product sizing.

6.3.4 Predictability. 40% of the participants expressed that Zalando's recommendations were predictable and reliable. Their confidence stemmed from both the quality of past recommendations (F, G, J) and second-hand accounts of Zalando's reputation (M). Specifically, participant M, lacking direct experience with Zalando, formed a positive opinion based on feedback from Zalando's customers. Conversely, participants B, D, and I offered conditional feedback. Although B and D recognized the importance of recommendation quality in influencing predictability, they expressed reservations about the actual quality of Zalando's recommendations.

6.4 Behavioral Intentions

We further investigated participants' behavioral intentions concerning data sharing and adherence to Zalando's recommendations.

6.4.1 Intention to Share Information. Most participants (14) were amenable to sharing personal information. Participant E highlighted two primary reasons for their comfort: Zalando's transparency regarding their privacy policy and her knowledge about the stringent GDPR laws in Europe, which E believes protects customer data. However, participants C, D, and I indicated conditional sharing. Both participants C and I would share only select information, excluding their national identity number (or equivalent).

In regards to sharing interaction data, 12 (of 16 respondents) were comfortable with Zalando collecting their online activity for recommendation purposes. Among them, six (B, E, F, G, I, N) viewed this positively, recognizing benefits such as improved product recommendations and enhanced service quality. Seven participants had a neutral stance, attributing such data collection to common business practices. Three were against this practice, with participant H expressing decreased trust if Zalando displayed products from other websites they had visited.

When considering sharing data for tailored recommendations, four participants (A, B, E, F) were agreeable. Participant F associated this with a better shopping experience. Conversely, five participants were not in favor, with reasons ranging from sustainability concerns to a desire for privacy. Four participants limited their comfort to sharing data only within Zalando's platform. Three remained undecided, with participant O expressing mixed feelings due to uncertainties about Zalando's data collection scope but acknowledging the appeal of personalized recommendations.

6.4.2 Intention to Follow Advice. Most participants expressed a willingness to follow Zalando's guidance on size and style. Reasons for this included prior satisfactory experiences with Zalando's size suggestions (E) and the belief that size predictions are reliably deduced from available datasets (G). However, several participants expressed concerns over style guidance due to perceived low precision in the recommendations (A) and doubts about accurate style predictions from the datasets (G).

Two respondents (L, O) expressed reservations about following recommendations. Particularly, O conveyed skepticism towards online size suggestions and raised concerns about the quality of style recommendations. Additionally, both C and N conveyed that their responses were contingent on certain factors. For instance, C mentioned that she would not follow sizing advice if these deviated from her typical size, and would ultimately erode her trust in Zalando.

6.4.3 Intention to Purchase. When asked about their propensity to purchase a garment after receiving recommendations when browsing the webiste, a substantial portion (A, E, F, G, H, I, K, L, N, P, Q) of participants responded positively. For instance, E believed there was a "30% increased chance" of her making a purchase on Zalando after getting a recommendation. Several participants (E, F, P) attributed their willingness to purchase to the recommendations providing a complete outfit. This sentiment was echoed by H, who found it convenient to visualize the outfits on himself. Others (G, I, L) found the recommendations introduced them to items they had not initially considered. N emphasized the importance of recommendation quality, recounting one particular suggestion by Zalando resonated with her taste and would therefore persuade her to puchase.

Conversely, O perceived the recommendation as lacking in quality and precision, thus influencing her not to purchase. B expressed she would not fully trust the recommendations, emphasizing the recommendations needed to align with her personal style.

7 DISCUSSION

Our results point to several interesting aspects of the trust building model when applied to recommendation in e-commerce. In this section, we discuss the results and analysis from Section 6, link them to the hypotheses posed in Section 3, and answer the research question presented in Section 1.

7.1 Trust Building Factors

We first evaluated the application of the Trust Building Model to recommender systems, examining the potential impact of initial TBM factors on trusting beliefs and behaviors. Furthermore, additional factors theorized to influence trust were assessed for their potential bearing on trusting beliefs and behavioral intentions.

7.1.1 Perceived Reputation. Reputation, as defined by McKnight et al. [13], signifies one's interpretation of a trustee based on external information. Our findings suggest a potential link between perceived reputation and trust, substantiated by seven out of 13 interview responses. Notably, interviewee M's feedback indicated that external reputation can shape trust, even in the absence of personal experience with the entity in question.

7.1.2 Structural Assurance. McKnight et al. [13] posited that structural assurance engenders a sense of security. From the data, six out of ten responses indicated a positive relationship between structural assurance and trust. However, the data remains inconclusive about

the definitive impact of structural assurance on trusting beliefs or behavioral intentions.

7.1.3 Perceived Site Quality. In the context of TBM, perceived site quality encompasses subtle cues consumers recognize, such as the trustee's voice and visual appeal. Contrary to McKnight et al. [13], our data implies that site quality might more significantly affect behavioral intention rather than trusting beliefs.

7.1.4 Perceived Web Risk. Perceived web risk, as described by McKnight et al. [13], pertains to users' apprehensions about potential online threats. Our interviews revealed that 13 out of 16 participants viewed Zalando as possessing minimal web risk. Interestingly, even among those with reservations, the perceived risk did not deter them from engaging with the site, suggesting a nuanced relationship between perceived risk, trust, and behavioral intent.

To summarize the discussion on trust building factors, we find that H1 is supported by our analysis - all initial TBM factors are applicable in impacting consumer trust in recommender systems. H2 is only partly supported as perceived reputation only impacted trusting beliefs, and perceived site quality and perceived web risk could only have possible impact on behavioral intentions. Structural assurance could possibly impact the general trust, however, the data does not support whether it impacts trusting beliefs or behavioral intentions.

7.2 Proposed New Trust Building Factors

7.2.1 Previous Experience. Nilashi et al. [15] posited that positive past experiences can increase consumer trust in recommender systems. In our analysis (Section 6.1.2), 7 of 15 participants displayed a link between prior experience and trust, while 8 did not, leading to ambiguous conclusions about the correlation. A pattern emerged where positive experiences appeared to influence trusting beliefs. For instance, Interviewee G expressed sustained trust over years of satisfactory interactions. Given similar insights from other participants, there are indications that prior experiences have effect on predicting behavioral intentions.

7.2.2 Perceived Service and Recommendation Quality. Trust development is influenced by recommendation quality [9]. Our analysis found (Section 6.1.2) correlations between perceived service quality and trust. Some participants, attributed predictability to recommendation quality. Others linked low recommendation quality with distrust. This highlights the crucial nature of perceived service and recommendation quality in shaping trusting beliefs and behavioral intentions.

7.2.3 Perceived Enjoyment. We found inconclusive connections between perceived enjoyment, trusting beliefs, and behavioral intentions. Some participants found valuable connections between enjoyment and trust, whereas some did not, suggesting limited impact of perceived enjoyment on overall trust.

7.2.4 Perceived Recommendation Authenticity. Introduced as an effect of the interview with C (Section 6.1.2), this factor underscores the authenticity of recommendations. This is in line with existing literature on brand authenticity, e.g., Frank [5], Potter [16]. We introduced the sub-factors influencer endorsement and customer review as a result of participant input. Analyses showed varying degrees of connections between these sub-factors, trusting beliefs, and behavioral intentions. The customer review sub-factor, in particular, showed a robust relationship with trust, emphasizing its role in shaping consumer perceptions.

Summarizing the discussion on the new factors, we found that H3 and H4 were partly supported by the interviews. Previous experience, perceived service and recommendation quality are considered factors for consumer trust in recommender systems. Previous experience could affect behavioral intentions, and perceived service and recommendation quality could affect trusting beliefs. Perceived enjoyment appears not to be a factor as there are no significant relational connections. Regarding perceived recommendation authenticity, we only found the sub-factor, customer review, to be considered a factor, while the sub-factor, influencer endorsement, was not. The customer review of perceived recommendation authenticity could only impact the general trust; our data did not support whether it impacts trusting beliefs or behavioral intentions.

7.3 Trust Building Process

In terms of the interplay between trusting beliefs and TBM behavioral intentions. Within TBM, behavioral intentions include consumers' intent to follow advice, share personal data, or make a purchase.

From the collected interviews, we found that there might be a linkage between trusting beliefs and initial TBM behavioral intentions. Specifically, the intention to purchase demonstrated the most robust connection, whereas the intention to follow advice showed the least. Competence surfaced as the most influential factor.

Additionally, regional factors, such as GDPR, may have influenced the results. One participant cited the GDPR's protective nature as a reason for her willingness to share personal details with Zalando.

Our analysis also touched on the potential impact of consumer trust on their willingness to share interaction data with recommender systems. However, the findings showcased a limited association between intention to share interaction data and established behavioral intentions or trusting beliefs. Nonetheless, patterns emerged hinting at a potential tie between benevolence and intent to share interaction data. Some participants expressed their willingness to share data, perceiving tangible benefits in return, aligning with findings from Song and Kim [20]. Another theme that surfaced related to information privacy. While a subset of participants felt they lacked control over personal information, others felt empowered to manage data sharing.

Despite these insights, the most compelling discovery was that of the Privacy Paradox – the contrast between users' privacy attitudes and their actions online [10].

In conclusion, we found support of H5: trusting beliefs indeed play a role in shaping initial TBM behavioral intentions. Conversely, we found no support for H6: trusting beliefs do not significantly influence the newly proposed behavioral intent — intention to share interaction data.

8 CONCLUSIONS

This work emphasized the importance of trust elements in recommender systems within e-commerce, utilizing the TBM [13] as its

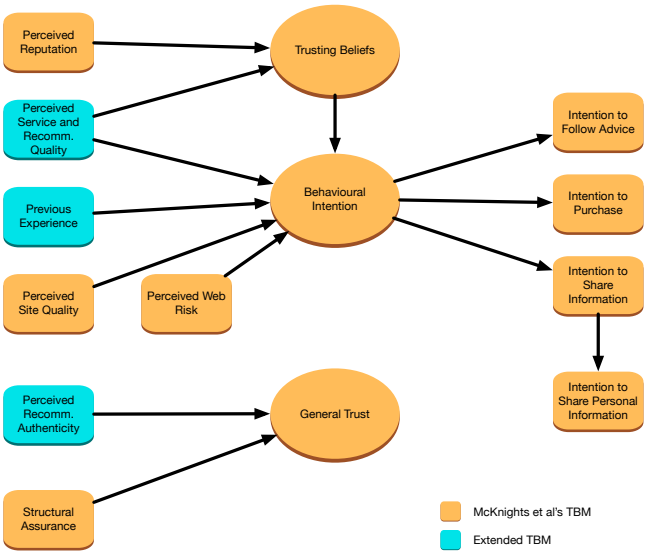

Figure 6: The extended TBM based on the findings.

foundational framework. The core TBM factors—perceived reputation, site quality, web risk, and structural assurance—alongside their associated processes (trusting beliefs and behavioral intentions), served as the central subjects of investigation.

Our analysis indicated that the four principal TBM factors influence consumer trust in recommender systems. Specific findings revealed that perceived reputation predominantly affects trusting beliefs. In contrast, perceived site quality and web risk largely influence behavioral intentions. The role of structural assurance in influencing general trust was confirmed, although its direct effect on trusting beliefs or behavioral intentions remains inconclusive.

Beyond the original TBM attributes, three additional factors were suggested: perceived service quality and recommendations, prior experience, and perceived enjoyment. Through the grounded theory approach, an emergent factor, perceived recommendation authenticity, surfaced during data collection. Results suggested that both previous experience and perceived service quality have tangible relationships with trust formation. Contrarily, perceived enjoyment did not exhibit any significant correlation. Among the findings, perceived recommendation authenticity showed partial support — specifically, the customer review sub-factor emerged as relevant, whereas influencer endorsement did not. When exploring these novel factors' influence on trusting beliefs and new behavioral intentions, we found that prior experience influences behavioral intentions, while perceived service quality affects trusting beliefs.

Addressing trust formation mechanisms, we incorporated trust beliefs and behavioral intentions from McKnight et al. [13]. Recognizing the evolving nature of interactive communication, an additional behavioral intention — intention to share interaction data — was proposed. Notably, this study differentiated between trusting intentions and behavioral intentions, the latter revealing a stronger influence from competence belief over other trust beliefs. This suggests a consumer emphasis on a company's offerings rather than purely ethical considerations.

In summary, the original TBM framework's applicability to recommender systems was confirmed, with certain proposed model extensions also gaining empirical support. While the new extended model is shown in Fig. 6, its full applicability to recommender systems is left as future work.

8.1 Limitations

This study's outcomes may be perceived as subjective due to its reliance on semi-structured interviews and subsequent qualitative analysis. The process of categorizing responses (e.g., positive, negative, neutral) might introduce potential biases based on the researchers' perceptions. Additionally, distinctions between mixed, neutral, uncertain, and conditional categories were not deeply explored. Concerns about the generalizability arise from the study's sample size, which, despite its qualitative nature, is smaller than typical quantitative investigations, necessitating further research.

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A INTERVIEW QUESTIONS WITH GUIDE

Category: **Introduction**

Q1 What is your profession? (Work title and/or field of studies)
Q2 Which country are you currently living in?
Q3 What is your age?

Category: **Previous Experience**

Q4 Have you used or browsed the Zalando web page or app before?
Q5 Have you purchased anything from Zalandos web page or app before?
Q6 **If Yes:** What is your age?
Q7 **If Yes:** What is you overall experience with using Zalando's webpage for purchases and /or browsing?

Category: **Perceived Enjoyment**

Q8 **If Yes:** If yes, when browsing or shopping at Zalando's website do you find it enjoyable? (if yes/no, why?)

Category: **Perceived Reputation**

Q9 Have you heard about Zalando from others? If so, how would you describe its reputation?

Category: **Perceived Service and Reputation Quality**

Instructions: Direct participants to Zalando's website, ask them to click on three items they find appealing on the website. Ask them to view the section of "Better Together" (Fig. 3), and "Top to Toe" (Fig. 4).

Q10 What do you think of the recommendations you just saw on the website?
Q11 Could you share your thoughts in terms of the quality of the recommendation?
Q12 Would you consider the recommendations to be helpful IF YES/ IF NO why or why not?

Category: **Behavioral Intention - Intention to share information**

Q13 If you are unsure about which size you should get for an item, and Zalando requests you to share personal information (your height, weight etc), will you be willing and comfortable to share?
Q13 In order to make a purchase, Zalando requests you to share information of your social security number, card number, and address. Will you be willing to share?

Category: **Perceived Web Risk**

Q15 If not, why do you feel it is risky?/ If YES, why do you feel it's safe?
Q16 Are there any website risks you usually consider when browsing or purchasing on Zalando's website?

Category: **Behavioral Intention - Intention to Follow Advice**

Q17 Would you say you will feel comfortable to follow the recommendations Zalando gives (e.g. the size choice and style choice)
Q17 Follow up question: why are you willing to follow the advice/why do you feel uncomfortable to follow the advice?

Category: **Behavioral Intention - Intention to Purchase**

Q19 After viewing the recommendation Zalando provides, would you say there's a higher possibility for you to make a purchase compared to before you view it?

Category: **Perceived Authenticity**

Q20 I will show you a photo which contains three different types of recommendations Zalando gives (For female participants (see Figure. 6) / For male participants (see Figure.7): How do you feel about the three sections compared to each other?
Q21 If Zalando adds a recommendation section of real customers' photos and reviews, how would you feel about that - in terms of impacting your decision on following the recommendation, making purchases and sharing your information?

Category: **Perceived Site Quality**

Q22 In a few words, describe Zalando's e-commerce site, in terms of its site quality.
Q23 What does the site quality mean to you?

Category: **Structural Assurance**

Q24 Have you seen any information about Zalando's safeguards on its website (such as guarantees, regulations, promises, legal resources)?
Q25 **If Yes:** Do the safeguards make you feel comfortable using the site, and why?

Category: **Trusting Beliefs**

a integrity
b benevolence
c competence
d predictability

Q26 Would you say Zalando is honest and genuine with providing information regarding using your data for the recommender system? (a)
Q27 Would you say Zalando uses the recommender system for your well-being, not just for their benefit? Why? (b)
Q28 If you are looking for a product for a specific occasion, would you say you would rely on Zalando's recommendations in terms of styling and sizing? What makes you think this way? (c)
Q29 Would you say Zalando can provide good service & products in a consistent time frame? What makes you think this way? (d)
Q30 Would you say Zalando can give reliable recommendations in a consistent time frame? What makes you think this way? (d)

Category: **Intention to Share Interaction Data**

Q31 What do you think of the fact that Zalando gathers information from your internet use in order to give recommendations?
Q31 If Zalando is able to give better suited recommendations for you to find more personalised products, would you like to give them your browsing information? IF YES/NO Why or why not?

Category: **Open Question**

Q33 Are there any other factors you think will impact your trust on Zalando's recommendation?