

The Mediation Effect Of Perceived Risk In The Relationship Between Perceived Ease Of Use, Perceived Cost, Social Influence And Perceived Trust And Attitude Towards Online Grocery Shopping

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ABSTRACT

Purpose: This article examines the mediation of perceived risk between perceived ease of use, perceived cost, social influence and perceived trust on consumer attitudes towards online grocery shopping adoption in the South African Gauteng Province. **Methodology:** Using an extended Technology Acceptance Model (TAM), the study adopted a quantitative cross-sectional survey approach, with data collected from 507 respondents aged between 18 and 60 years. **Findings:** Results suggest complex patterns of mediation that counter assumptions surrounding the universal role of perceived risk in technology acceptance. Findings suggest that perceived risk partially mediates the links between perceived ease of use and attitude, and between perceived cost and attitude, with the cost-attitude link showing 36% direct effect due to risk perceptions. However, in contrast to our expectations, perceived risk did not mediate the effects of social influence and perceived trust on attitude. Social influence had a significant direct effect on attitudes and only 3% of the variance was explained by risk perceptions but not perceive trust which appeared that it played mainly through its indirect effects. **Implications:** These findings suggest that the mediating function of perceived risk is selective and context-dependent in emerging markets. This study contributes to the extant literature on technology acceptance by emphasizing the contextualized nature of mediation effects and offers implications for practitioners in online grocery retailing aiming to increase adoption rates in emerging markets. **Originality:** By empirically validating the contextual dependency of risk mediation within the extended Technology Acceptance Model, the study advances theoretical discourse and provides actionable insights for online retailers in developing economies.

Keywords: *Online grocery shopping, perceived risk, Technology Acceptance Model, perceived ease of use, perceived cost, social influence, perceived trust, consumer attitudes.*

INTRODUCTION

The Technology Acceptance Model (TAM) and its extensions are widely used frameworks to explain consumer adoption of online services. However, the traditional TAM, which primarily focuses on perceived ease of use (PEOU) and perceived usefulness, has limitations when applied to complex e-commerce contexts such as online grocery shopping (OGS). To better capture the dynamics shaping consumer behaviour in OGS, additional constructs including perceived risk, perceived cost, social influence, and perceived trust are critical (Rahimi & Oh, 2024; Ghimire, 2022). Perceived risk represents the uncertainty and possible negative consequences consumers associate with e-commerce, with potential ramifications associated with financial loss, privacy infringement, false product presentation, or delivery failure (Tannady & Dewi, 2024). Online shopping presents consumers with an insurmountable inability to interact directly with products before purchase, which exacerbates consumer perceived risk concerning product

quality and performance (Billore & Anisimova, 2021). OGS is particularly concerned with perceived risk due to the perishable and quality-sensitive nature of food products, which presents a greater perceived risk than durable goods (Bruwer, *et al.*, 2023).

Although perceived risk has been treated by many prior studies as a direct barrier to adoption, new research identifies its function as mediator linking antecedent such factors as trust, social norms and use- attitudes towards consumer acceptance of OGS (Habib & Hamadneh, 2021). This mediating effect is particularly valuable in emerging markets such as South Africa where risk perceptions may differ from those of developed countries. Thus, it is important to consider the mediation of perceived risk on the relationships between perceived ease of use and perceived cost, social influence/ trust perception and consumer attitude toward online grocery shopping adoption. This study seeks to examine these mediating effects in a South African context, thus offering key contributions into the psychological obstacles and facilitators of technology adoption within an emerging market. Insights into these relationships could help strategies aimed at increasing adoption by mitigating perceived risks through improving usability, giving price transparency, building trust or social influence.

2. LITERATURE REVIEW

The Technology Acceptance Model (TAM) and its extensions have been widely used to explain consumers' adoption of online services. However, scholars have noted that the traditional TAM, which focuses mainly on perceived ease of use (PEOU) and perceived usefulness, is limited when applied to complex e-commerce contexts such as online grocery shopping (OGS). Additional constructs perceived risk (PR), perceived cost (PC), social influence (SI), and perceived trust (PT) are required to capture the dynamics shaping consumer behaviour (Rahimi & Oh, 2024; Ghimire, 2022). This section reviews literature on how perceived risk mediates the relationships between PEOU, PC, SI, and PT and consumer attitudes toward OGS adoption.

Perceived risk refers to the uncertainty and potential negative outcomes consumers associate with online transactions, including financial loss, privacy breaches, product misrepresentation, and delivery failure (Tannady & Dewi, 2024). Unlike traditional shopping, online environments deny consumers the ability to physically inspect goods, amplifying perceptions of product and performance risk (Billore & Anisimova, 2021). In the OGS context, the perishability and quality sensitivity of food products heighten risk perceptions compared to durable goods (Madinga *et al.*, 2023). While many studies treat perceived risk as a direct barrier to adoption (Yen, 2024), emerging scholarship explores its mediating role, linking antecedent factors such as usability, trust, and social norms to consumer attitudes (Habib & Hamadneh, 2021).

Perceived ease of use

PEOU is the extent to which an individual believes that utilising a specific technology or information system requires minimal effort, as outlined by Davis in 1989. The effort mentioned pertains to the finite resources allocated to activities, with the individual being accountable (Driediger & Bhatiasevi 2019). Research shows that perceived risk acts as a mediating variable explaining how technology acceptance factors like ease-of-use influence consumers' purchase intentions in online grocery settings (Habib & Hamadneh 2021). Ease of use can reduce perceived risk indirectly by increasing user confidence, which positively impacts attitudes towards online shopping (Makhitha & Duffett 2024). Furthermore, perceived risk influences attitudes and intentions by moderating or mediating the technology acceptance model constructs, including PEOU and behavioral intention (Mutahar *et al.* 2021; Thomas-Francois & Somogyi 2022). The mediating role of perceived risk is particularly relevant in online grocery shopping, where consumers' risk perceptions vary between emerging and developed markets, emphasizing the need to explore these dynamics in specific contexts like South Africa. Therefore, the following hypothesis was formulated

H₁ There is significant mediation effect of perceived risk in the relationship between perceived ease of use and attitude towards online grocery shopping

Perceived trust

According to Human *et al.*, (2020), the term 'perceived trust' (PT) is characterised as a sense of safety and reliability towards others. Despite multiple interpretations, trust is commonly acknowledged as crucial in the online context because of the diverse risks individuals may confront while engaging in the purchasing process (Pauzi *et al.*, 2017). According to Lee and Levy (2014), trust has a vital role in the online purchasing decision and in determining the intention of an online purchase. Trust is known to mediate the effect of perceived risk on purchase intention, but studies also show a reciprocal relationship where higher trust reduces perceived risk, and elevated perceived risk erodes trust (Siu & Ismail, 2022). This interplay suggests that perceived risk plays a mediating role in how trust influences attitudes toward online grocery shopping. While the direct mediation effect of risk between trust and attitudes is less commonly studied, these findings imply it exists and is important, especially for inexperienced consumers where risk factors strongly inhibit online shopping intentions (Duffett & Charles, 2024). Additionally, the specific context of emerging markets, including South Africa, shows that risk factors and trust experiences differ from developed markets, underlining the necessity to investigate perceived risk's mediation effects further in online grocery shopping settings. This provides empirical grounding and theoretical rationale for H2:

H₂ There is significant mediation effect of perceived risk in the relationship between perceived trust and attitude towards online grocery shopping.

Social influence

Social influence (SI) is described as the degree to which individuals perceive the expectations of others, such as family and friends, regarding their use of a specific technology (Kian, Loong & Fong 2018). Social influence can affect perceived risk by shaping consumers' perceptions of uncertainty and safety in online shopping, especially in emerging markets like South Africa where risk factors differ from developed countries. The mediating role of perceived risk explains how social context and peer influence can elevate or mitigate concerns about online grocery shopping, thus shaping attitude indirectly through risk perception. This mediation effect emphasizes the need to include social influence and perceived risk together in exploring consumer attitudes toward virtual food shopping (Makhitha & Duffett, 2024). Studies have found that social influence moderates consumers' risk perceptions, which in turn impact their attitudes and intentions to shop online, especially in emerging markets like South Africa where risk concerns vary from developed countries (Habib & Hamadneh 2021; Thomas-Francois & Somogyi 2022; Makhitha & Duffett 2024). Therefore, the following hypothesis was developed:

H₃ Relationship between Social Influence and Attitude is mediated by Perceived risk.

Perceived cost

Online grocery shopping can offer convenience but requires paying delivery fees and tips which can make it more expensive than shopping in-store (Ghai & Tripathi 2019). Perceived cost is often viewed as part of the trade-off consumers assess when evaluating risks and benefits of online shopping. Higher perceived costs can enhance the perception of financial risk, which negatively affects consumer attitudes unless mitigated by other factors. Studies reveal that perceived financial risk, convenience risk, and security risk significantly influence consumer attitudes towards online shopping, with attitude mediating the effect of these risks on purchase intention (Makhitha & Ngobeni, 2021). Costs perceived by consumers often translate into financial risk perceptions, which then affect their attitudes toward shopping online. Studies show perceived financial risk significantly influences attitudes and fully mediates the impact of perceived cost on purchase intention, with attitude playing a key mediating role in this pathway. This means that higher perceived costs increase perceived risk, which results in less favourable attitudes toward online grocery shopping unless other mitigating factors intervene.

H₄ Perceived risk mediates the relationship between perceived cost and attitudes toward online grocery shopping.

The literature underscores the pivotal role of perceived risk as a psychological barrier in OGS adoption. While traditional TAM variables like PEOU and PT remain influential, their effects on attitudes are often indirect, channelled through risk perceptions. Similarly, PC and SI exert influence partly by altering the degree of uncertainty consumers associate with online transactions. Although evidence of mediation varies across contexts, especially between developed and emerging markets, the consensus is that risk perceptions

fundamentally shape consumer decision-making in OGS. Addressing PR through usability improvements, cost transparency, trust-building measures, and leveraging social influence is essential to fostering positive consumer attitudes and encouraging wider adoption.

METHODOLOGY

Quantitative research method, cross-sectional survey design was used in this study. The research was conducted within Gauteng Province, South Africa. The study successfully obtained 507 usable responses following rigorous quality screening procedures that eliminated incomplete surveys, suspicious response patterns. The target population encompassed grocery shoppers aged 18 to 60 years, representing the primary consumer segment most likely to engage with digital shopping platforms while possessing the technological familiarity necessary for online grocery adoption. The sampling methodology employed non-probability convenience sampling. The mediation testing incorporated the Sobel test, Delta method, and Monte Carlo simulations to assess the statistical significance of indirect effects, while also applying the foundational Baron and Kenny framework for establishing mediation conditions. Additionally, the more contemporary Zhao, Lynch, and Chen logic was employed to provide nuanced interpretation of mediation effects, allowing for identification of complementary and competitive mediation patterns that go beyond traditional full and partial mediation categories.

FINDINGS AND DISCUSSION

This section presents the results of the study, starting with the profile of the respondents.

Demographic profile

According to the study's demographic profile, 78.3% of respondents were women and 21.5% of respondents identified as men. Nearly half (48.1%) of all respondents were in the 31–40 age range, indicating a concentration in the economically active years in the respondents' age distribution. Young individuals between the ages of 18 and 30 make up 27.4% of respondents, followed by those between the ages of 41 and 50 (20.3%). The respondents' educational backgrounds include a Grade 12 certificate for 26.6%, a bachelor's degree or BTech for 22.5%, and a National Diploma for 14.4%. Only 5.1% of people had less schooling than Grade 12, while 9.5% of people held postgraduate degrees (Master's and Doctoral degrees, respectively). Part-time employees make up 16.2% of the sample, while full-time employees make up 52.3%, for a total employed rate of 68.5%. 40.6% of the respondents, the largest group, make less than R10,000 per month. Collectively, respondents in the middle-income range of R11 000 to R30 000 make up 42.1%.

Validity and reliability

Reliability was established using Cronbach's alpha. The alpha coefficient was computed for each item, and the lowest number that was deemed appropriate for the items' dependability was 0.7. Cronbach's alpha exceeded 0.80 for all 4 constructs (ATT, PEOU, PU, PT, SI).

Results for the mediation role of perceived risk

Mediation analysis basically looks at whether the independent variable has a direct effect on the dependent variable or if it works in a sequential manner through the mediator variable or variables. Mediation analysis has been applied in this study to determine whether the relationship between factors that influence consumer to adopt OGS and attitude is mediated by perceived risk perceptions in the subsequent mediation model.

Table 1: Mediation results

Mediation Relationship	Baron & Kenny)	Baron & Kenny	Sobel Test	Delta Method	Monte Carlo	RIT	RID	Mediation Result
PT → PR → ATT	$\beta = -0.151$, p = 0.102 (not significant)	$\beta = 0.021$, p = 0.453 (not significant)	Index = -0.003 p = 0.495	Index = -0.003 p = 0.498	Index = -0.003, p = 0.595	1.6%	1.5 times	Not Supported
SI → PR → ATT	$\beta = 0.229$, p = 0.057 (not significant)	$\beta = 0.021$, p = 0.453 (not significant)	Index = 0.005 p = 0.485	Index = 0.005 p = 0.481	Index = 0.005, p = 0.541	3%	0.026 times	Not Supported
PC → PR → ATT	$\beta = 0.562$, p = 0.001 (significant)	$\beta = 0.029$, p = 0.358 (not significant)	Index = 0.016 p = 0.363	Index = 0.016 p = 0.364	Index = 0.012 p = 0.391	36%	0.3 times	Supported
PEOU → PR → ATT	$\beta = 0.422$, p = 0.001 (significant)	$\beta = 0.029$, p = 0.358 (not significant)	Index = 0.012 p = 0.368	Index = 0.012 p = 0.370	Index = 0.012 p = 0.368	13%	0.15 times	Supported

Source: statistical results

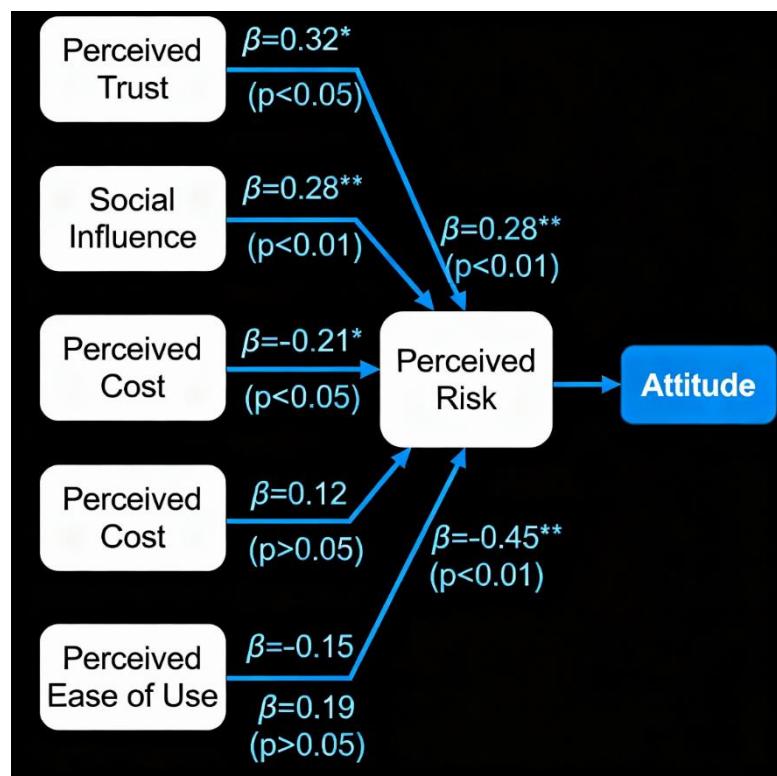


Figure 1: Mediation results

Source: Authors construction

DISCUSSION

The finding of this study show that perceived risk (PR) partially mediated the relationship between perceived ease of use (PEOU) and attitude towards online grocery shopping. The Sobel, Delta and Monte Carlo tests produced consistent mediation indices of 0.012 with p-values greater than 0.05, indicating that the indirect effect was not statistically significant. Additionally, according to the Baron and Kenny approach, it was significant ($\beta = 0.422$, $p < 0.00$). Similarly, Zhao, Lynch and Chen's approach found that the direct effect of PEOU on ATT of $\beta = 0.080$, $p = 0.130$ was not statistically significant. The results are like Nguyen et al. (2024) who reported that perceived risk is significantly lower when OGS platforms display simplicity and affordance and it is only then that the user's adoption attitudes is improved. Thomas-Francois and Somogyi (2022) also found partial mediation, suggesting that PEOU is not consistently the strongest direct effect on attitude but that its effects are relayed through reduced perceived risk.

Considering the Baron and Kenny method, perceived cost had a significantly positive effect on perceived risk ($B = 0.562$, $p < 0.001$). Nonetheless, the effect of perceived risk on attitude towards online grocery shopping was not significant ($B = 0.029$, $p = 0.358$). Likewise, the direct effect of perceived cost on attitude was not significant ($\beta = -0.061$, $p < 0.134$). The percent indirect relative to the total effect was 36%, showing that more than a third of the total effect was operating through the mediator path. Hypothesis H2 was supported, indicating that perceived risk mediated the relationship between perceived cost and attitudes towards online grocery shopping. In some studies, high perceived costs amplified risk concerns, leading to weaker adoption attitudes (Habib & Hamadneh, 2021). Consumers worried about financial loss when prices, delivery fees, or hidden charges were perceived as excessive. Conversely, transparent pricing and discounts reduced perceived financial risks, which then improved adoption attitudes. However, some African-based studies found that the mediation was weak, suggesting that cost directly influences adoption without always passing through risk (Musikavanhu & Musakuro, 2023).

The Baron and Kenny technique indicated non-significant relationships between SI and PR ($\beta = 0.229$, $p = 0.057$) and PR and attitude ($\beta = 0.021$, $p = 0.453$) which did not meet the requirements for mediation. Furthermore, all three test statistics (Sobel, Delta and Monte Carlo) had p-values that were significantly higher than the usual cut-off ($p=0.485$, 0.481 and 0.541 respectively). The mediating effect of perceived risk in the relationship between social influence and attitude was small, with a value of 3% out of the total mean value (RIT=3%), as the direct effect of social influence on attitude was still significant ($\beta = 0.186$, $p<0.001$). The small value of the indirect to total effect ratio (RID = 0.026) also corroborated the weak role of perceived risk as a mediating influence. Thus, H3 was supported, such that social influence had a direct effect on attitude towards online grocery shopping, rather than an indirect effect through the mediator perceived risk. Several studies confirm that social influence (SI) reduces perceived risk by providing reassurance through peer recommendations, online reviews, or social media endorsements. Chen *et al.*, (2021) showed that risk perceptions mediated the relationship between SI and attitude, such that positive social cues lessened uncertainty, indirectly improving consumer attitudes. In collectivist and emerging market contexts, this mediation was found to be stronger, as consumers rely heavily on community norms to mitigate perceived risk (Alshannag *et al.*, 2022).

All three mediation tests Sobel, Delta and Monte Carlo shown in Table 2 returned $p > 0.05$ (0.495, 0.498 and 0.595 respectively) and are considered non-significant. Though the direct effect from perceived trust to attitude towards online grocery shopping was significant ($\beta = 0.211$, $p < 0.001$), mediation Hypothesis 2 was not supported due to the non-significant indirect pathway through perceived risk. Thus, these results suggest that perceived trust had a direct influence on consumers' attitudes towards online grocery shopping without any meaningful mediation through perceived risk. Trust is one of the strongest antecedents to reduced risk. Bhatti *et al.*, (2020) and Oghazi *et al.*, (2021) found that perceived trust (PT) strongly lowered PR, which then improved attitudes toward OGS. In these cases, PR partially mediated the relationship, meaning that while trust directly fostered positive attitudes, a portion of its effect worked through reducing risk perceptions. Interestingly, some studies argue that the mediation effect is context-dependent: in developed markets with strong consumer protection, mediation is weaker because trust directly drives adoption; in emerging markets with fragile trust environments, risk perceptions are more central (Makhitha & Ngobeni, 2024).

CONCLUSION

This research explored perceived risk's role as a mediator of perceived ease of use, perceived cost, social influence, perceived trust on consumers' attitudes toward online grocery shopping in Gauteng Province, South Africa. Using an adapted Technology Acceptance Model framework, the research analysed data from 507 participants to examine the role perceived risk plays in the acceptance of digital grocery platforms in an emerging market context. The study's results revealed more complicated mediation patterns that go against the assumption that perceived risk assumes the same or universal role across the different study variables. Perceived risk mediated the relationship between perceived ease of use and attitude toward online grocery shopping and the relationship between perceived cost and attitude toward online grocery shopping, though these indirect relationships did not reach statistical significance across the measurement methods employed in the study. The mediation of perceived risk was more significantly supported in the link between perceived cost and consumers' attitudes toward online grocery shopping through the identification of risk perceptions which represented 36% of the total effect between perceived cost and attitude toward online grocery shopping, and financial risk served as a determinant of perceived risk in general when shopping groceries online. The ease of use and intuitive navigation of an online grocery shopping platform also reduced perceived risk, which indirectly led to a more favourable attitude despite only partial support for this pathway. Contrary to assumptions, perceived risk was not a significant mediator in either social influence and attitude or perceived trust and attitude. Rather, social influence had a strong direct association with consumer attitudes, with only 3% of the effect of social influence being mediated through risk perceptions.

There are theoretical and practical implications of the findings in this paper. From a theoretical standpoint, the research further advances knowledge about technology acceptance models by showing that perceived risk's mediation effect is not invariant and unsupportive for all antecedent variables. The contextual specifications of these effects point to the necessity of exposing mediation patterns in different market contexts as market trends established in the developed world may not apply to emerging economies, such as South Africa, where antecedent variables (infrastructure challenges, commercial constraints, trust challenges) differ with considerable generalization. In conclusion, while perceived risk is a contributory modulator in consumers' attitudes towards grocery shopping online, mediation functions are conditional or selective to context. Knowing about these specifications, both scholars and practitioners could create even more nuanced models and developed strategies to foster digital retail uptake in emerging economies, contributing to wider digital transformation in consumer behaviour in developing economies.

Author Contribution

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The authors worked together to conceptualize and design the study and to carry out the study. All authors reviewed and approved the final version of the manuscript for submission.

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Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper

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