Contents lists available at GrowingScience

International Journal of Data and Network Science

homepage: www.GrowingScience.com/ijds

Antecedents of social media influencers on customer purchase intention: Empirical study in Jordan

Nida AL-Sousa, Dmaithan Almajalia* and Abdullah Alsokkara

^aApplied science private university, Jordan

CHRONICLE

ABSTRACT

Article history:
Received: May 18, 2022
Received in revised format: September 26, 2022
Accepted: November 23, 2022
Available online: November 23
2022

Keywords: Social Media Instagram Social Media Influencers Intention to Purchase Information quality Trustworthiness The present study examined the impact of social media influencers (SMIs) on consumers' purchasing decisions, by examining the factors affecting purchase intentions of consumers. Online questionnaire was used to gather data from Facebook users as the study respondents. SMIs are currently a promising marketing technique in influencing purchase intention of customers, but in Jordan, studies on this matter are still lacking. This study therefore presented several key factors associated with SMIs in influencing the purchase intention of customers, in Jordanian context. Accordingly, the key factors affecting customer purchase intention through SMIs were examined. A model was proposed and empirically tested and validated using structural equation model (SEM), with data obtained from 390 Jordanian Facebook users. From the results, significant impact of Information Quality (IQ) and Trustworthiness (TRU) on attitude toward a brand, and consequently on purchase intentions of customers, was affirmed.

© 2023 by the authors; licensee Growing Science, Canada.

1. Introduction

Social media comprise web-based or mobile application platforms on which internet users from different locations and backgrounds interact with each other (Kaplan & Haenlein, 2010). In addition to forming social connections with other users (Muller & Peres, 2019; almajali.,2022), interactions on such platforms allow users to also create and moderate content. In addition, users could create dynamic online feeds (Peters et al., 2013; Al Sokkar.,2013), aside from partaking in various interactive internet activities. Aral and Walker (2014) additionally stated that the exchange and dispersal of data by way of social media make business decision making and customer connection development and management much simpler.

The use of social media facilitates the dissemination of knowledge concerning an organization and its brand (Nofal et al., 2020; AL-Sous et al., 2022). In addition, Nisar and Whitehead (2016) found that social media helps improve brand awareness and value, while Zhang et al. (2017) indicated that it generates trust and loyalty of customers. Social media also increases customer's purchase intentions, aside from boosting sales and long-term relationships with customers (Trawnih et al., 2021). Relevant to these past findings, Tan (2017) proposed the use of social media influencers (SMIs) in increasing purchase intention of customers.

IResearch had reported that through influencers, the message of the company is circulated to the target audience, and at the same time, the influencers were able to generate content about the brand on social media. Through social media also, influencers could respond to the questions submitted by the audience, and in doing so, the influencers establish a relationship of trust that is important in developing or increasing the intent of the audience to purchase the brand (Sokolova & Kefi, 2020).

* Corresponding author.

E-mail address: d_almajali@asu.edu.jo (D. Almajali)

ISSN 2561-8156 (Online) - ISSN 2561-8148 (Print) © 2023 by the authors; licensee Growing Science, Canada. doi: 10.5267/j.ijdns.2022.11.010

In their study, Blackwell et al. (2001) reported that the customers' intentions to buy signify the products they contemplate on purchasing so that both their wants and needs could be met.

For businesses, Fortsythe and Shi (2003) stressed the need to increase customer intentions to purchase their brand, by offering products that meet the wants and needs of customers. In this regard, the optimal utilization of SMIs would motivate customers to purchase the brand. Attitudes, opinions, and habits of customers about a particular brand were found to be positively affected by influencers that are perceived as reliable in terms of their information and recommendations, leading to increase in purchase intention towards the brand (Uzunoglu & Klip, 2014). In fact, the perception of buyers of a given product is affected by SMIs (Solomon, 2017) and the perception of customers affects their intention to make the purchase (Sumarwan, 2015).

Based on the discussion, this paper attempted to examine the impact of SMIs on the intention of consumers to make purchases, and in doing so, this study attempted to find answer to the following research question: What are the aspects that link to the influence of social media influencers in Jordan in terms of influencing consumers' purchasing intentions?

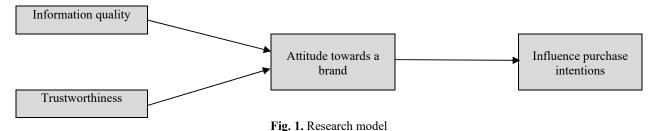
2. Significance of the Study

SMIs have a potential as a marketing strategy, and so, the present paper attempted to examine the main aspects associated with the role of SMIs in influencing purchase intentions of customers. This paper is particularly of value to businesses that employ SMIs as a marketing strategy to form long-lasting relationships with their customers (Raji et al., 2020).

The use of SMIs as a marketing strategy is rather innovative, distinct from the conventional methods. However, the use of SMIs as a marketing strategy can be justified. First and foremost, intention to purchase encompasses the inclination of the customer to buy a certain product or service, while purchase intentions are regarded as one of important marketing metrics. These marketing metrics are often measured and factored by marketing managers when deciding new and current goods and services. Nonetheless, the subject of SMIs as marketing strategy of business is very much a new subject of exploration among scholars and so, studies on this matter are still too few. Hence, the present paper attempted to understand the manner in which SMIs impact perceptions, attitudes, and intentions of consumers towards making purchases (Trivedi & Sama, 2020).

3. Literature review

From past findings, this paper created a research model as can be viewed in the following Figure 1. As shown in the model, two factors affect the attitude of customers towards a brand (ATU) namely information quality (IQ) and trustworthiness (TRU). As proposed by the model, ATU affects customer's INT (purchase intentions).



3.1 Information Quality (IQ)

Information quality concerns the quantity of information furnished to customers by businesses, and customers are more likely to buy the product when the provided information is complete. In other words, the presence of full information and descriptions will increase the interest of consumers to buy the goods in question. As proposed by information richness theory, inperson thorough information remains a strong marketing tool, despite the ability of modern electronic media (e.g., e-payments) in promoting and propelling e-commerce (Chesney et al., 2017).

Information with high inclusiveness will increase consumers' confidence, and consequently their possibility of purchasing the goods or services. Chen and Chang (2018) relevantly stated that being furnished with high-quality information from a vendor, customers will have their satisfaction level increased significantly, leading to greater motivation to make the purchase. In a related study, Cheung and Thadani (2012) mentioned that people would turn to social media platforms to seek information of various types, and that the quality of the discovered information appeared to have direct linkage with what they perceive concerning the reliability of the sought-after information. Lou and Yuan (2019) indicated that the information quality posted by an influencer will determine the amount of trust that readers have in it, brand awareness of the reader, and readers' intentions to make a purchase. The following hypothesis was hence proposed:

H₁: The quality of information provided by social media influencers with regard to a brand, positively affects consumers' brand attitudes.

3.2 Trustworthiness (TRU)

Trustworthiness relates to the reliability and honesty level of an endorser (Shimp, 1997), and for marketing experts, Erdogan (1999) mentioned the need to choose celebrity endorsers with reliability and honesty. In their study, Wang and Scheinbaum (2018) affirmed a solid link between future purchase intentions and source's dependability. In another study, Xiao et al. (2018) analyzed the videos uploaded on YouTube, and found the impact of trust on how much customers believe the information they come across, and how they decide on what they would like to purchase (Hu et al., 2003). Nonetheless, some scholars reported contradictory findings in their study, which might be factored by cultural differences or the different techniques of advertising used in campaigns. In their study, De Veirman and Hudders (2019) found that SMIs cannot be compared to celebrities in terms of their status and profile (celebrities are said to have higher status and profile), and so, endorsements by SMIs may be less reliable. Additionally, Statista (2018) reported that social media advertising use was uncommon until the last decade, after which, the use has been growing. This study therefore proposed the hypothesis below:

H2: The level of trust in social media influencers with regard to a brand, positively affects consumers' brand attitude.

3.3 Attitude toward a Brand and Purchase Intention

Buying intention is the intention of an individual towards acquiring a given brand (Spears & Singh, 2004). Based on planned behavior theory by Ajzen (1991), the possibility of an individual to perform certain behaviour can be predicted by the attitude of the individual towards that behavior, the individual's subjective norms, and presumptive behavioral control. Actual behavior can be justified through behavioral control aims and viewpoints, considering that behavioral intentions and attitudes are directly linked. Eagly and Chaiken (1993) stated a difference between purchasing behavior or a person's own thought about a brand, and brand attitude, and all these affect the person's brand assessment and his/her intent to actually purchase the brand.

Attitudes are underpinned by ideas within a person's memory, and these ideas, in addition to the contextual factors, affect the behavior of consumers (Ajzen & Fishbein, 2000). Attitude precedes people's intention, and attitude is also affected by the past evaluation of people of their potential behavior, in this study's context, within retail settings (Ajzen, 1991). The attitudes of people towards a brand entails a complete evaluation that is also affected by their responses to stimuli or beliefs towards a given brand. Furthermore, attitudes significantly affect relationship exchanges, by manifesting as cognitive, affective, and behavioral intentions. Equally, attitudes are the leading determinants of how consumers will act, and attitudes are fairly established and permanent within people. This study hence proposed the hypothesis below:

H₃: Consumer brand attitude positively affects consumers' purchase intentions.

4. Methodology

Data were obtained using a questionnaire which was distributed online to 1000 active Facebook users aged between 18 and 29 – a link was sent to these users who were selected based on a convenient sampling method. As reported by Napoleoncat (2020), there were about 2 million Facebook users, and most were in the age group of 18-29. Hence, choosing these people as study respondents was appropriate. The questionnaire was completed by 400 respondents, which means that this study achieved 40% response rate. For data analysis, it involved 390 completed questionnaires because 10 of these completed questionnaires had to be excluded because they were incomplete. The questionnaire items were adapted from past studies including Rebelo (2017), Roy (2018), Ki et al. (2019), Taillon et al. (2020), Saima and Khan (2020) and Chia et al. (2021). The construct items were all measured using a five-point Likert scale (from 1 to denote "Strongly Agree" to 5 to denote "Strongly Disagree".

5.1 Data analysis

Data were analyzed using a structural equation model (SEM). Bollen and Noble (2011) indicated that SEM is able to evaluate complex models comprising a number of dependent and independent variables. SEM is also appropriate when researchers want to compute highly complex models and verify the predictive ability of the model. The use of SEM for data analysis involved two stages as proposed by Ringle et al. (2015), whereby, during the first stage, the measurement was evaluated, and during the second stage, the structural model was evaluated. Similar procedures were also performed by Anderson and Gerbing (1988).

5.2 Constructs' reliability

The measurement model was evaluated to ascertain its reliability. Based on Hair et al. (2019), Cronbach's alpha was computed in determining the model's internal consistency. The results showed that all construct items scored values smaller than or equal to 0.70.

5.3. SEM Analysis

This study tested the proposed hypotheses using SEM. The details are as discussed below:

5.3.1 Measurement Model

This study employed Confirmatory factor analysis (CFA) in examining the properties of the instrument items. As described by past researchers (e.g., Bagozzi & Yi, 1988; Hair et al., 2006; Newkirk & Lederer, 2006; Kline, 2010), the measurement model shows the evaluation of latent variables or hypothetical constructs with respect to the observed variables, particularly with respect to the validity and reliability of the responses of observed variables for the latent variables. Factor loadings, Cronbach's alpha, composite reliability, and Average Variance Extracted (AVE) of the variables can be viewed in Table 1. As shown, factor loadings for all construct items were larger than 0.50, and based on Bagozzi and Yi (1988) and Creswell (2009), convergent validity could be affirmed. Another proof of convergent validity was the AVE value exceeding 0.50 for all variables as suggested by Bagozzi and Yi (1988) and Hair et al. (2010). In addition, composite reliability values for all items were larger than 0.60, which means that the latent variables had high-level internal consistency.

Table 1

The final measuring model's characteristics

Constructs and Indicators	Factor Loadings	Std. Error	Square Multiple Correlation	Error Variance	Cronbach Alpha	Composite Reliability*	AVE**
Information quality(IQ)					0.90	0.87	0.91
IQ1	0.666	0.011	0.831	0.322			
IQ2	0.721	0.021	0.881	0.378			
IQ3	0.722	0.028	0.745	0.522			
IQ4	0.651	0.040	0.618	0.508			
Trustworthiness					0.81	0.67	0.83
TRU1	0.651	0.033	0.655	0.322			
TRU2	0.551	0.417	0.661	0.506			
TRU3	0.653	0.031	0.611	0.588			
Attitude toward a brand (ATU)					0.87	0.82	0.61
ATU1	0.662	0.037	0.522	0.490			
ATU2	0.511	0.021	0.475	0.377			
ATU3	0.654	0.029	0.510	0.411			
Influence purchase intention					0.96	0.83	0.95
INT1	0.729	0.0101	0.601	0.502			
INT2	0.548	0.031	0.711	0.478			
INT3	0.805	0.041	0.844	0.321			
INT4	0.811	0.031	0.710	0.592			

Additionally, Table 2 shows that none of the correlations between construct pairs were greater than the square root of the AVE estimations for the two components, demonstrating discriminant validity (Hair et al., 2006). As a result, the measurement findings showed that the study's convergent and discriminant validity were satisfactory.

Table 2Correlations of constructs

COLLEGE OF COMPARED				
Constructs	IQ	TRU	ATU	INT
IQ	0.91			
TRU	0.773	0.94		
ATU	0.662	0.751	0.75	
INT	0.554	0.811	0.622	0.92

5.3.2 Structural Model

The study's ideas were tested using structural equation modeling on the Amos 20 platform. All hypotheses, including those involving direct and indirect effects, can be tested concurrently using SEM. The direct effects' outcomes demonstrate that Information quality, trustworthiness and attitude toward a brand positively and significantly impacted Influence purchase intention; therefore, H1 and H2 were accepted; whereas attitude toward a brand influences purchase intention. The tested hypotheses are summarized in Table 3 below.

Table 3

Summary of the theoretical model's proposed findings

Research Proposed Paths	Coefficient Value	t-value	p-value	Empirical Evidence
H1: $IQ \rightarrow ATU$	0.513	24.91	0.000	Supported
$H2: TRU \rightarrow ATU$	0.016	1.221	0.014	Supported
H3: ATU \rightarrow INT	0.055	2.044	0.002	Supported

6. Discussion and Implications

The present study examined the impact of SMIs on the behavior of customers toward certain brands and their likelihood in making purchases on the brands. Results demonstrated the potential of SMIs in encouraging customers to be aware of a given brand and consequently make the purchase, and so, businesses should consider utilizing SMIs as their marketing strategy in getting their brand known to customers, via paid posting of SMIs of their brand through social media. SMIs with positive

brand experience are of value to businesses as they are more potent in influencing the customers in purchasing the firm's product. Also, this study finds social media platforms integral improving the interaction between the influencers and the customers. Also, aside from offering special discounts or offers, client loyalty could be increased through acknowledging their purchase engagement through SMIs.

7. Conclusion and future work

Essentially, this study investigated the factors influencing the intent of customers to make purchases by way of SMIs. The results showed positive and direct impact of Information Quality (IQ) and Trustworthiness (TRU) on attitude towards a brand (ATU) and consequently purchase intentions (INT). The key factors connected to the perceptions of customers towards a brand were identified in this study and could be of value to both companies and SMIs in their efforts to improve customer engagement. Clearly, SMIs play a prominent role in affecting customers' purchase intention. Results showed that simple, interesting and high-quality content could draw customer attention, and consequently purchase intention. In addition, trust towards the brand also could encourage customers to make the purchase. Hence, as SMIs, it is important that they improve their content and trust of customers towards the brand that they represent or endorse to increase purchase intention. Additionally, some study limitations have been identified to guide future research. The first limitation of this study was its small number of participants, and so, future studies should utilize larger samples to increase generalizability. Another limitation is the model itself, as it comprises only a few dimensions. Hence, future studies should add more dimensions (e.g., individual characteristics and industry type) to enrich the model. Lastly, the use of quantitative methods in this study means that the findings may not be as comprehensive. Hence, future studies should consider utilizing a mixed method so that the factors influencing consumers' purchase intentions through SMIs could be understood more in-depth.

References

- Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211.
- Ajzen, I., & Fishbein, M. (2000). Attitudes and the Attitude-Behavior Relation: Reasoned and Automatic Processes. *European Review of Social Psychology*, 11(1), 1–33. https://doi.org/10.1
- Al Sokkar, A., & Law, E. (2013, June). Validating an episodic UX model on online shopping decision making: A survey study with B2C e-commerce. *In Proceedings of the 5th ACM SIGCHI symposium on Engineering interactive computing systems* (pp. 297-306).
- AL-Sous, N., Alsokkar, A., Majali, T., Mansour, A., Alsherideh, A., Masadeh, R., & Dahali, Z. (2022). Antecedents of ecommerce on intention to use the international trade center: An Exploratory Study in Jordan. *International Journal of Data and Network Science*, 6(4), 1531-1542.
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, 103(3), 411.
- Almajali, D. A. (2022). Determinants of Online Behavior Among Jordanian Consumers: An Empirical Study of Open-Sooq. *Interdisciplinary Journal of Information, Knowledge, and Management, 17,* 339-359.
- Aral, S., & Walker, D. (2013). Tie Strength, Embeddedness & Social Influence: Evidence from a Large Scale Networked Experiment. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2197972
- Bollen, K. A., & Noble, M. D. (2011). Structural equation models and the quantification of behavior. *Proceedings of the National Academy of Sciences*, 108(supplement_3), 15639-15646.
- Bagozzi, R., & Yi, Y. (1988). On the evaluation of structural evaluation models. *Journal of the Academy of Marketing Science*, 16(1), 74-94.
- Chesney, T., Chuah, S. H., Dobele, A. R., & Hoffmann, R. (2017). Information richness and trust in v-commerce: implications for services marketing. *Journal of Services Marketing*, 31(3), 295–307.
- Chen, C. C., & Chang, Y. C. (2018). What drives purchase intention on Airbnb? Perspectives of consumer reviews, information quality, and media richness. *Telematics and Informatics*, 35(5), 1512-1523.
- Cheung, C. M., & Thadani, D. R. (2012). The impact of electronic word-of-mouth communication: A literature analysis and integrative model. *Decision support systems*, 54(1), 461-470.
- De Veirman, M., & Hudders, L. (2019). Disclosing sponsored Instagram posts: the role of material connection with the brand and message-sidedness when disclosing covert advertising. *International Journal of Advertising*, 39(1), 94–130.
- Eagly, A.H., & Chaiken, S. (1993). The psychology of attitudes. Harcourt brace Jovanovich college publishers.
- Erdogan, B. Z. (1999). Celebrity Endorsement: A Literature Review. Journal of Marketing Management, 15(4), 291-314.
- Forsythe, S. M., & Shi, B. (2003). Consumer patronage and risk perceptions in Internet shopping. *Journal of Business Research*, 56(11), 867–875.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, 31(1), 2-24.
- Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate Data Analysis*. 6th ed., New Jersey: Prentice-Hall
- Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2010). *Multivariate Data Analysis*. 7th ed., New Jersey: Prentice-Hall
- Hu, X., Lin, Z., & Zhang, H., (2003). Trust Promoting Seals in Electronic Markets. *Journal of Promotion Management*, 9(1–2), 163–180.

- Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, 53(1), 59–68.
- Ki, C. C., & Kim, Y. (2019). The mechanism by which social media influencers persuade consumers: The role of consumers' desire to mimic. *Psychology & Marketing*, 36(10), 905–922.
- Kline, R. (2010). Principles and Practice of Structural Equation Modeling. The Guilford Press.
- Lou, C., & Yuan, S. (2019). Influencer Marketing: How Message Value and Credibility Affect Consumer Trust of Branded Content on Social Media. *Journal of Interactive Advertising*, 19(1), 58–73.
- Muller, E., & Peres, R. (2019). The effect of social networks structure on innovation performance: A review and directions for research. *International Journal of Research in Marketing*, 36(1), 3–19.
- Nofal, M. I., Al-Adwan, A. S., Yaseen, H., & Alsheikh, G. A. A. (2020). Factors influencing social media adoption among smes during COVID-19 crisis. *Periodicals of Engineering and Natural Sciences*, 8(4), 2471–2483.
- Napoleoncat. (2020). Instagram users in Jordan. Accessed (2 Dec 2021) https://napoleoncat.com/stats/instagram-users-in-jordan/2020/03/
- Nisar, T. M., & Whitehead, C. (2016). Brand interactions and social media: Enhancing user loyalty through social networking sites. *Computers in Human Behavior*, 62, 743–753.
- Peters, K., Chen, Y., Kaplan, A. M., Ognibeni, B., & Pauwels, K. (2013). Social Media Metrics A Framework and Guidelines for Managing Social Media. *Journal of Interactive Marketing*, 27(4), 281–298.
- Raji, R. A., Mohd Rashid, S., Mohd Ishak, S., & Mohamad, B. (2019). Do Firm-Created Contents on Social Media Enhance Brand Equity and Consumer Response Among Consumers of Automotive Brands? *Journal of Promotion Management*, 26(1), 19–49.
- Rebelo, M. F. (2017). How Influencers' Credibility on Instagram is perceived by consumers and its impact on purchase intention (Doctoral dissertation)
- Ringle, C., Da Silva, D., & Bido, D. (2015). Structural equation modeling with the SmartPLS. Bido, D., da Silva, D., & Ringle, C. (2014). Structural Equation Modeling with the Smartpls. *Brazilian Journal Of Marketing*, 13(2).
- Roy, S. (2018). Meaning transfer in celebrity endorsements: an explanation using metaphors. *Journal of Marketing Communications*, 24(8), 843–862.
- Spears, N., & Singh, S. N. (2004). Measuring Attitude toward the Brand and Purchase Intentions. *Journal of Current Issues & Research in Advertising*, 26(2), 53–66.
- Sokolova, K., & Kefi, H. (2020). Instagram and YouTube bloggers promote it, why should I buy? How credibility and parasocial interaction influence purchase intentions. *Journal of Retailing and Consumer Services*, 53, 101742. https://doi.org/10.1016/j.jretconser.2019.01.011
- Sumarwan U. (2015). Perilaku Konsumen: Teori dan Penerapannya dalam Pemasaran. Bogor, Indonesia: IPB Press.
- Saima, & Khan, M. A. (2020). Effect of Social Media Influencer Marketing on Consumers' Purchase Intention and the Mediating Role of Credibility. *Journal of Promotion Management*, 27(4), 503–523.
- Solomon, M. R. (2018). Consumer Behavior Buying, Having, and Being, 12edition.
- Statista. (2018). Social Media Advertising (Worldwide). Available at: https://www.statista.com/outlook/220/100/social-media-advertising/worldwide.
- Tan, D. (2017). The Commercial Appropriation of Fame: A Cultural Analysis of the Right of Publicity and Passing Off. Cambridge: Cambridge University Press.
- Trivedi, J., & Sama, R. (2020). The Effect of Influencer Marketing on Consumers' Brand Admiration and Online Purchase Intentions: An Emerging Market Perspective. *Journal of Internet Commerce*, 19(1), 103–124.
- Taillon, B. J., Mueller, S. M., Kowalczyk, C. M., & Jones, D. N. (2020). Understanding the relationships between social media influencers and their followers: the moderating role of closeness. *Journal of Product & Brand Management*, 29(6), 767–782.
- Trawnih, A., Yaseen, H., Al-Adwan, A. S., Alsoud, A. R., & Abdel Jaber, O. (2021). Factors influencing social media adoption among smes during COVID-19 crisis. *Journal of Management Information and Decision Sciences*, 24(6), 1–18.
- Wang, S. W., & Scheinbaum, A. C. (2018). Enhancing Brand Credibility Via Celebrity Endorsement. *Journal of Advertising Research*, 58(1), 16–32.
- Uzunoğlu, E., & Misci Kip, S. (2014). Brand communication through digital influencers: Leveraging blogger engagement. *International Journal of Information Management*, 34(5), 592–602.
- Zhang, M., Guo, L., Hu, M., & Liu, W. (2017). Influence of customer engagement with company social networks on stickiness: Mediating effect of customer value creation. *International Journal of Information Management*, 37(3), 229–240.
- Xiao, C., Li, B., Zhu, J. Y., He, W., Liu, M., & Song, D. (2018). Generating adversarial examples with adversarial networks. arXiv preprint arXiv:1801.02610.



© 2023 by the authors; licensee Growing Science, Canada. This is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY). license (http://creativecommons.org/licenses/by/4.0/).