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The Impact of Green Auditing on Organizational Performance in Jordan: the Moderating Effect of the Auditor's Opinion

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Abstract: The Underlying study is highly significant for the management of organisations and government to understand the importance of green auditing in controlling the carbon footprint in their country.The primary data collection method has been employed in the underlying research because the information has been accumulated directly from the relevant participants and questionnaire surveys have been conducted with the 300 auditors in the energy sector of the Jordan.The overall findings of the study mainly suggest that there is significant impact of green auditing on organisation performance in Jordan with the moderating effect of auditor's opinion.Therefore, it is recommended to the Jordanian energy sector to carry out green audit on the annual and semi-annual basis for the purpose of maintaining records and take auditor's opinion on the ground on which the audit has to be conducted.

Keywords: Green Auditing, Organisational Performance, Auditor's Opinion, Jordan

1 Introduction

In recent years, rapidly increasing civilisation and industrialisation have created a significant impact on the environmental sustainability of the earth [1,2,3,4]. The rise in human revolution and technological developments that were intended to make the lives of people more comfortable has indirectly contributed to environmental degradation, creating an adverse effect on human health [5,6,7,8,9]. The excessive exploitation of natural resources has drawn the concern of people regarding environmental issues at both national and international levels [10,11,12]. In this regard, there is a crucial need for an assessment of the causes and reasons that are causing the environmental threats and to deploy the measures to counterattack the issues associated with environmental pollution [13,14,15,16]. Therefore, in this study, researchers aim to assess the impact of green auditing on organizational performance considering the moderating influence of auditors' opinion. Green auditing in an organization is defined as the method or technique of inspecting the type and amount of carbon footprint emitted by a specific industry or organization, its environmental impact, and strategies for controlling it [17].

Green auditing can be regarded as an attempt to examine the organizational activities to analyse the extent to which the organization is aligned with the environmental sustainability measure that helps in evaluating the organizational performance in terms of profitability, consumer demand, and growth [18]. When a particular organisation focuses on environmental sustainability measures and defines the control to manage the carbon footprint, it helps in developing a positive perception among customers and other stakeholders, resulting in enhanced organisational performance [19]. However, the biased, qualified, and unqualified opinions of the auditors regarding the sustainability measures currently used by the organization and strategies that they should use in the future can influence the association between green auditing and organizational performance [20]. In this study, green auditing practices undertaken by organizations in

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Jordan have been analysed. Jordan is one of the developing countries in the Middle-East, having textiles, mining, and clothing manufacturing as the major economic sectors [21]. The manufacturing industry of Jordan contributed 1461 JOD million to the GDP of the country in the year 2019 [22]. However, the country has started to utilise solar panels to control the carbon emissions from the manufacturing sector. According to Knoema (2020), the power and energy sectors of Jordan emit the maximum amount of carbon emissions as compared to other sectors of the country [23]. The below highlight graph demonstrates that 42.7% of CO2 is emitted by the power industry in Jordan.

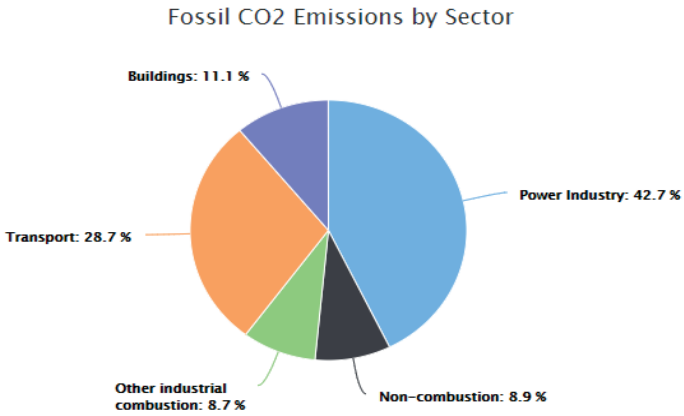

Fig. 1: Carbon emission in Jordan by sector

Furthermore, carbon emissions in Jordan have increased to 26 million metric tons in 2018 from 22 million metric tons in 2016 [24]. According to the study contemplated by Alrabai et al. (2017), industry's increasing demand for electricity supplies and growing industries in Jordan have contributed significantly to increasing the carbon footprint from the energy sector of the country [25]. Therefore, to resolve this issue, researchers aim to analyse the impact of green auditing on the performance of organisations in the energy sector of Jordan. The underlying study is highly significant for the management of organizations and governments to understand the importance of green auditing in controlling the carbon footprint in their country.

2 Literature Review and Hypotheses Development

According to the research carried by Yang (2012) specified that Green auditing is the emerging concept that has been gaining the attention of researchers and analysts gradually concerning control of the negative environmental effects [26]. The Green auditing is considered as the inspection carried out to examine the greenhouse gas emissions by a particular organisation, strategies used and measure to control the future [27]. The activities have undertaken the Green auditing includes the development of the audit plan, acquiring the background information and making a sudden visit [28]. The green auditing can be referred to as the attempt to examine whether a particular organisation complies with legal environmental laws and regulations of the country [29]. The research carried out by Al Jabouri (2019) specified that green auditing activities do not only aim to create positive change in the environment of the country but also focus on increasing the organization's performance by employing rigorous techniques. However, auditors' opinions play a critical role in influencing the relationship between green auditing and organizational performance because auditors tend to provide strategies for future implementation based on their opinions and judge existing measures ineffective to control carbon footprint accordingly [30]. The auditors can present adverse, qualified, non-qualified or disclaimer opinions during the green auditing process, effecting the organization's performance eventually [31]. In this regard, the hypothesis has been formulated as:

H1: The Auditors opinion moderates the relationship between green auditing and organisation performance.

H2: The Auditors opinion do not moderate the relationship between green auditing and organisation performance.

The study conducted by Huang and Li (2013) specified that the carbon emission (CO2) is one of the prominent factor considered in the Green auditing that has maximum impact on organisation performance [32]. Organisation emitting a high level of air pollution tend to have negative brand image among consumers, employees and shareholders that would directly

influence the organisational performance in terms of profitability, productivity and revenue generation [33]. Furthermore, the opinions of auditors regarding the way the organisation is controlling the carbon emission and air pollution will significantly affect the organisation performance [28]. In this regard, the hypothesis has been formulated as:

H3:The Auditors opinion moderates the relationship between air pollution audit and organisation performance.

H4:The Auditors opinion do not moderate the relationship between air pollution audit and organisation performance.

Waste generation is another critical factor of green auditing that reflects the extent to which an organization controls its production waste by recycling it or dumping it in the appropriate manner [34]. The disposal of different kinds of waste, such as plastic, raw materials, dirty water, and solid resources, adversely affects the environment and fuels the negative attitude of people towards the organization. The green audition over the waste management and waste production levels of the organization defines the level to which the organization is responsible for environmental sustainability [16]. In this regard, the hypothesis has been formulated as:

H5:The Auditors opinion moderates the relationship between audit of waste management and organisation performance.

H6:The Auditors opinion do not moderate the relationship between audit of waste management and organisation performance.

The study conducted by Saar (2012) inferred that with the increase in urbanisation and civilisation the water has become one of the sacred resources [18]. The excessive usage in industrial for the production purpose has led to a shortage of water. Furthermore, dumping the wastage into the water is affecting the quality of drinking water as well as marine life. The study contemplated by Alrabai et al (2017) stated that it is essential to conduct the audit of water consumption and resources over the way organisation is utilising the water and number of litres going in wastage [25]. The organisation wasting water excessively and dumping dirty water in the sea can legally be held by the official authorities of the state that can affect the organisational performance in a negative way [27].

H7:The Auditors opinion moderates the relationship between audit of water consumption and resources and organisation performance.

H8:The Auditors opinion do not moderate the relationship between audit of water consumption and resources and organisation performance.

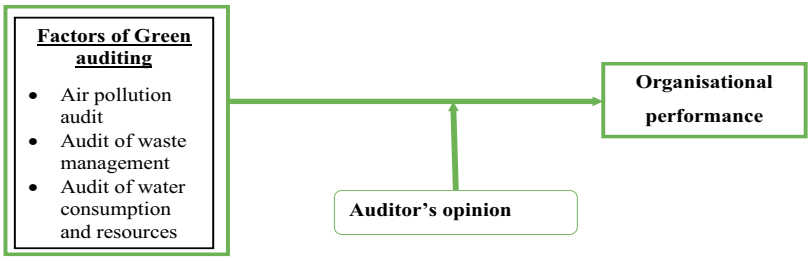

Fig. 2: Research model

3 Research Methodology

The research methodology reflects the systematic way of conducting the study and assembling the information. The authors of the underlying research used a quantitative research paradigm to analyze the impact of green auditing on organizational performance, taking into account the moderating effect of the auditor's opinion based on statistically derived data rather than qualitative information that may vary over time. The quantitative design was chosen over the qualitative because it permits estimates of the extent to which green auditing influences organizational performance.

The primary data collection method has been employed in the underlying research because the information has been accumulated directly from the relevant participants to address the objectives of study effectively and obtain updated information regarding the green auditing practices. For this purpose, questionnaire surveys have been conducted with the 300 auditors in the energy sector of the Jordan to gather their perspective about the way green auditing affects the organisation performance and influence of their opinion on it. The questionnaire survey has been designed on the 5-point Likert scale to make them easily comprehensible by participants.

Convenience sampling helps the researcher reach the participant based on ease and reseach ability rather than relying on specific characteristics. Hair et al (2014) have indicated that structural equation modelling (SEM) has become a popular statistical and multivariate approach which provides a means for assessing the theories that are conceptually testing the significance of variables [35]. The Smart PLS software includes an SEM package with the maximum likelihood of the estimation, which is used for measurement of the models.

The SmartPLS has been used to examine the gathered data systematically obtained from the survey. Moreover, the SEM technique has been used to evaluate the impact of green auditing on organisation performance with the moderating role of auditor's opinion. Besides, the tests which were taken into consideration include composite reliability, discriminant validity, and average variance extracted values for the structural model. Moreover, goodness-of-fit indices have also been used for the structural equation modelling on Smart PLS.

4 Results

4.1 Confirmatory Factor Analysis (CFA)

In the current section, the researcher has demonstrated the CFA analysis results used to determine the reliability and validity of the measurement model. Firstly, the reliability of the research constructs has been estimated relying on the study of Avkiran and Ringle (2018) who recommended the minimum appropriate value for both Cronbach alpha and composite reliability indicators is 0.6 [36]. In consideration of this, the results listed in table 1 mainly depict that all research constructs are reliable and have the most negligible value for composite reliability as 0.869. However, in the context of Cronbach Alpha, the least value is estimated at 0.776. In addition to the above statement, the AVE is the mostly used metrics which has a threshold value for 0.5. Considering this, the variable possesses convergent validity as the AVE is calculated at 0.691. Such aspects can be depicted in table 1 as the model mainly comprises reflective constructs.

Table 1: Reliability and Convergent Validity

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
AOP*APA	1.000	1.000	1.000
AOP*AWM	1.000	1.000	1.000
AOP*AWR	1.000	1.000	1.000
Air Pollution Audit	0.835	0.901	0.751
Audit of Waste Management	0.904	0.94	0.838
Audit of Water Consumption and Resources	0.881	0.927	0.808
Auditor's Opinion	0.776	0.869	0.691
Organisational Performance	0.894	0.934	0.825

In furtherance to the discussion on the convergent validity and reliability, it is also necessary to explain the distinctiveness of the variables of the study. Considering this statement, the HTMT ratio is mainly utilised for determining the distinctiveness of the variables and the maximum value accepted is 0.85 as the conservative criterion [37,38,39,40]. Therefore, the scores listed into Table 2 give an explanation for that not one of the values of the constructs are violating the criterion for the HTMT ratio and subsequently it infers that the variables may be used for the path evaluation due to the fact that most computed cost is expected at 0.916.

Table 2: Discriminant Validity using HTMT Ratio

	AOP*APA	AOP*AWM	AOP*AWR	Air Pollution Audit	Audit of Waste Management	Audit of Water Consumption and Resources	Auditor's Opinion	OP
AOP*APA	1							
AOP*AWM	0.615	1						
AOP*AWR	0.458	0.527	1					
Air Pollution Audit	-0.297	-0.194	-0.137	0.867				
Audit of Waste Management	-0.217	-0.357	-0.16	0.469	0.916			
Audit of Water Consumption and Resources	-0.177	-0.185	-0.437	0.293	0.443	0.899		
Auditor's Opinion	-0.408	-0.338	-0.267	0.486	0.49	0.424	0.831	
Organisational Performance	-0.209	-0.181	-0.435	0.252	0.424	0.486	0.539	0.908

4.2 Path Assessment

In order to present the assessment for the measurement model, it has helped with the dedication of the factors touching on the reliability and validity of the latent constructs together with the significance of the hypothesised paths which might be tested through the SEM approach. Further to the above announcement, the significance and impact have also been evaluated with the assessment of bootstrapping wherein the scores were supplied within the table 3and figure below. In keeping with Hair et al., (2016), bootstrapping is referred as an operation via which sub-sampling and re-sampling are used for identifying the significance of the research variables [41]. In the context of the results presented below, it can be observed that the effect of green marketing on the performance in Jordan has significant influence on each other. In the case of the combined effect of AOP and APA with the organisational performance, it can be stated that there is no significant influence on each other as p-value is estimated at 0.568 which is greater than the threshold significance value of 0.05.

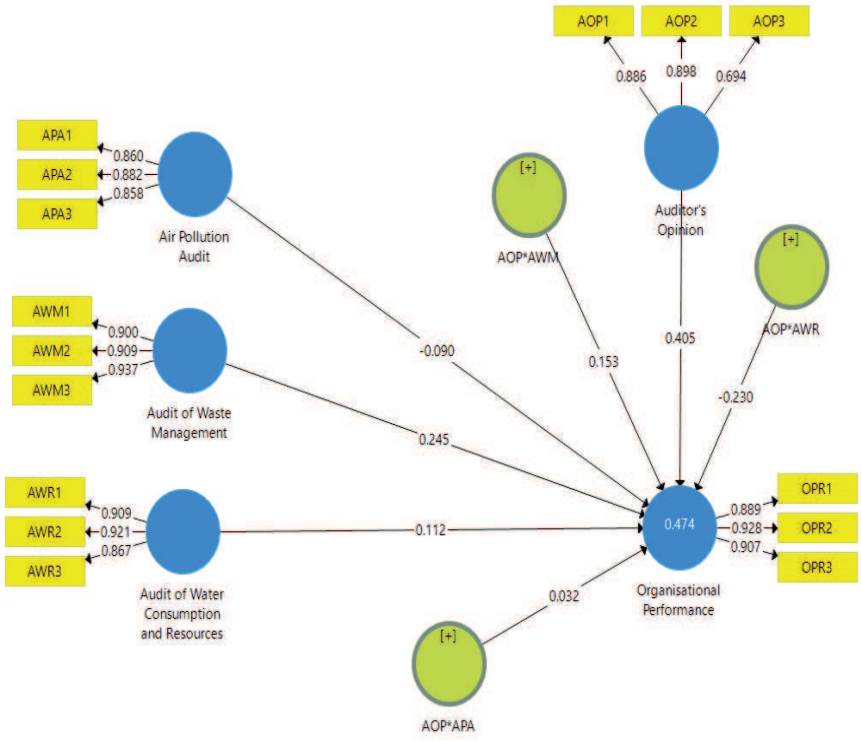

Fig. 3: Measurement Model

Hence, there is no significant influence with respect to these variables. In addition to the above statement, the case of the combined effect of AOP and AEM with the organisational performance, it can be stated that there is significant influence on each other as p-value is estimated at 0.015 which is greater than the threshold significance value of 0.05. Furthermore, in the case of the combined effect of AOP and AWR with the organisational performance, it can be stated that there is a significant influence on each other as p-value is estimated at 0.000 which is less than the threshold significance value of 0.05. Furthermore, the audit of waste management has a significant impact on the organisation performance because of the positive co-efficient and p-value (B=-0.245, P-value: 0.000<0.05). Moreover, the audit of water consumption and resources has an insignificant impact on the organisational performance in case of Jordan as the p-value is estimated at 0.085 which is greater than the threshold value of 0.05. The overall findings of the study mainly suggest that there is significant impact of green auditing on organisation performance in Jordan with the moderating effect of auditor's opinion.

Table 3: Path Analysis

	Co-efficient	T Statistics	P Values
AOP*APA ->Organizational Performance	0.032	0.572	0.568
AOP*AWM ->Organizational Performance	0.153	2.438	0.015
AOP*AWR ->Organizational Performance	-0.23	4.341	0.000
Air Pollution Audit ->Organizational Performance	-0.09	1.854	0.064
Audit of Waste Management ->Organizational Performance	0.245	4.441	0.000
Audit of Water Consumption and Resources ->Organizational Performance	0.112	1.721	0.085
Auditor's Opinion ->Organizational Performance	0.405	6.092	0.000

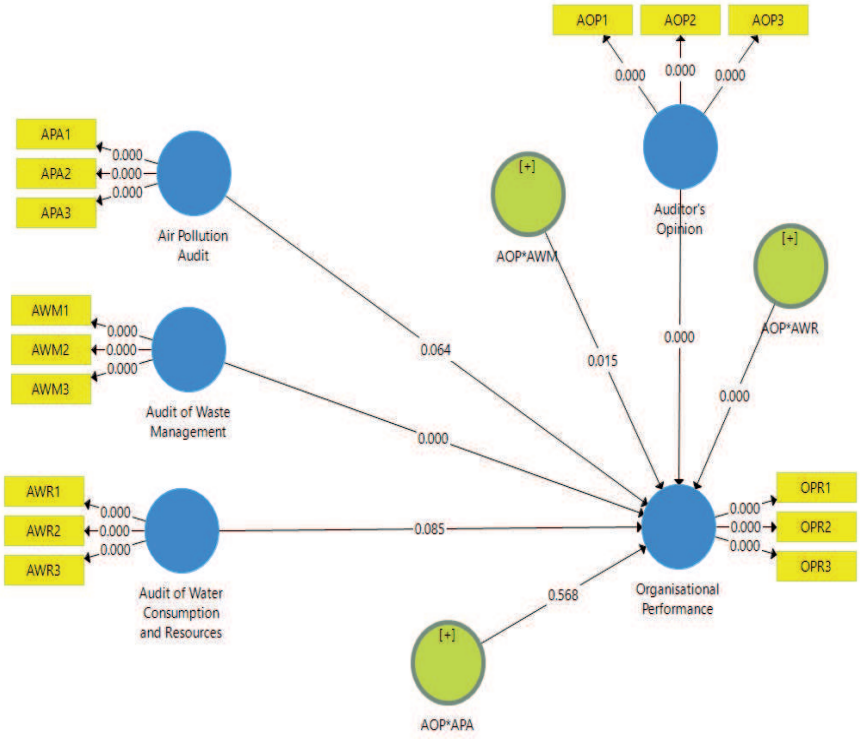

Fig. 4: Bootstrapping with p-values

4.3 Quality Criterion

After carrying out assessment on the measurement model, it is essential to assess the quality criterion with the help of R-square and adjusted R-square that makes a speciality of the assessment of the first-rate. In terms of quality table, it can be assessed that the organisational performance is explaining 46% variance with respect to the variables of Auditor's opinion and green auditing. The model of the study possesses predictive relevance.

Table 4: Quality Assessment of the Model

	R Square	R Square Adjusted
Organisational Performance	0.474	0.462

5 Conclusion

The present study is highly significant for the management of organisations and government to understand the importance of green auditing in controlling the carbon footprint in their country.The findings are relevantly new because limited research has been carried out in this manner and it reveals that green auditing has a significant impact on the organisational performance with the mediating role of auditor's opinion. Therefore, it is recommended to the Jordanian energy sector to carry out green audit on the annual and semi-annual basis for the purpose of maintaining records and take auditor's opinion on the ground on which the audit has to be conducted. Moreover, for the future researchers, it is recommended that they can opt for qualitative parameters in this research because this is entirely based on quantitative research design.

References

[1] S. Al-Nawafah, H. Al-Shorman, F. Aityassine, F. Khrisat, M. Hunitie, A. Mohammad and S. Al-Hawary. The effect of supply chain management through social media on competitiveness of the private hospitals in Jordan. *Uncertain Supply Chain Management*,**10**, 737-746 (2022).
[2] F. Aityassine, B. Aldiabat, S. Al-rjoub, F. Aldaihani, F., H. Al-Shorman and S. Al-Hawary. The mediating effect of just in time on the relationship between green supply chain management practices and performance in the manufacturing companies. *Uncertain Supply Chain Management*,**9**, 1081-1090 (2021).
[3] A. Mohammad. Customers' electronic loyalty of banks working in Jordan: The effect of electronic customer relationship management. *International Journal of Scientific and Technology Research*,**8**, 3809-3815 (2019).
[4] L. Harrison. *Environmental, health, and safety auditing handbook*.McGraw-Hill, New York US (2018).
[5] R. Alshawabkeh, H. AL-Awamleh, M. Alkhawaldeh, R. Kanaan, S. Al-Hawary, A. Mohammad and R. Alkhawalda. The mediating role of supply chain management on the relationship between big data and supply chain performance using SCOR model. *Uncertain Supply Chain Management*,**10**, 729-736 (2022).
[6] I. AlTaweel and S. Al-Hawary. The Mediating Role of Innovation Capability on the Relationship between Strategic Agility and Organizational Performance. *Sustainability*,**13**, 7564 (2021).
[7] M. Eldahamsheh, H. Almomani, A. Bani-Khaled, Z. Al-Quran, S. Al-Hawary and A. Mohammad. Factors Affecting Digital Marketing Success in Jordan. *International Journal of Entrepreneurship*,**25**, 1-12 (2021).
[8] E. Tariq, M. Alshurideh, I. Akour and S. Al-Hawary. The effect of digital marketing capabilities on organizational ambidexterity of the information technology sector. *International Journal of Data and Network Science*,**6**, 401-408 (2022).
[9] H. Barton and N. Bruder. *A guide to local environmental auditing*. Routledge, United Kingdom (2014).
[10] H. Al-Awamleh, M. Alhalalmeh, Z. Alatyat, S. Saraireh, I. Akour, S. Alneimat and S. Al-Hawary. The effect of green supply chain on sustainability: Evidence from the pharmaceutical industry. *Uncertain Supply Chain Management*,**10**, 1261-1270 (2022).
[11] F. Aityassine, M. Soumadi, B. Aldiabat, H. Al-Shorman, I. Akour, M. Alshurideh and S. Al-Hawary. The effect of supply chain resilience on supply chain performance of chemical industrial companies. *Uncertain Supply Chain Management*,**10**, 1271-1278 (2022).
[12] R. Patriarca, G. Di Gravio, F. Costantino and M. Tronci. The Functional Resonance Analysis Method for a systemic risk based environmental auditing in a sinter plant: A semi-quantitative approach. *Environmental Impact Assessment Review*,**63**,72-86 (2017).
[13] M. Alolayyan, M. Al-Qudah, M. Hunitie, I. Akour, S. Alneimat, S. Al-Hawary and M. Alshurideh. Validating the operational flexibility dimensions in the medical service sectors. *Uncertain Supply Chain Management*,**10**, 1397-1404 (2022).
[14] A. AL-Zyadat, J. Alsaraireh, D. Al-Husban, H. Al-Shorman, A. Mohammad, F. Alathamneh and S. Al-Hawary. The effect of industry 4.0 on sustainability of industrial organizations in Jordan. *International Journal of Data and Network Science*,**6**, 1437-1446 (2022).
[15] M. Khalayleh and S. Al-Hawary. The impact of digital content of marketing mix on marketing performance: An experimental study at five-star hotels in Jordan. *International Journal of Data and Network Science*,**6**, 1023-1032 (2022).
[16] W. Cook, S. van Bommel and E. Turnhout. Inside environmental auditing: effectiveness, objectivity, and transparency. *Current Opinion in Environmental Sustainability*,**18**,33-39 (2016).
[17] H. Rongbing. Environmental auditing: an informationized regulatory tool of carbon emission reduction. *Energy Procedia*,**5**,6-14 (2011).
[18] T. Saar. Environmental Auditing in INTOSAI: 20 Years Later. *International Journal of Government Auditing*,**39**,1 (2012).
[19] C. Owusu and S. Frimpong. Corporate social and environmental auditing: Perceived responsibility or regulatory requirement. *Research Journal of Finance and Accounting*,**3**,47-57 (2012).
[20] T. Khan. The initiation of environmental auditing in the United States. *Managerial Auditing Journal*,**32**, 810-826 2017.
[21] R. Shihab, T. Soufan and S. Abdul-Khaliq. The causal relationship between exports and economic growth in Jordan. *International Journal of Business and Social Science*,**5**, 302-308 (2014).
[22] Trading economics. *Jordan GDP From Manufacturing 2003-2020 Data, 2021-2022 Forecast Historical*. (2020) Available at: https://tradingeconomics.com/jordan/gdp-from-manufacturing (Accessed: 16 September 2020).
[23] Knoema. *Jordan CO2 emissions, 1970-2019*. (2020). Available at: https://knoema.com/atlas/Jordan/CO2-emissions. (Accessed: 16 September 2020).

[24] Worldometer. *Jordan CO2 Emissions*. (2020) Available at: https://www.worldometers.info/co2-emissions/jordan-co2-emissions/ (Accessed: 16 September 2020).
[25] L. Alrabai, A. Al-Ghandoor, M. Obaidat and S. Zawaydah. *Decomposition analysis of co2 emissions of electricity generation in Jordan: toward zero emissions*. In 2017 2017 World Energy Engineering Congress, Atlanta, Georgia (2017).
[26] C. Yang. The effect of environmental management on environmental performance and firm performance in Taiwanese maritime firms. *International Journal of Shipping and Transport Logistics*,**4**, 393-407 (2012).
[27] T. Hsiao, C. Chuang, N. Kuo and S. Yu. Establishing attributes of an environmental management system for green hotel evaluation. *International Journal of Hospitality Management*,**36**, 197-208 (2014).
[28] R. Jain. *Environmental impact of mining and mineral processing: management, monitoring, and auditing strategies*. Butterworth-Heinemann, UK (2015).
[29] R. Burritt. Environmental performance accountability: planet, people, profits. *Accounting, Auditing & Accountability Journal*,**25**, 370-405 (2012).
[30] R. Dixon, G. Mousa and A. Woodhead. *The necessary characteristics of environmental auditors: a review of the contribution of the financial auditing profession*. In Accounting Forum (Vol. 28, No. 2, pp. 119-138).Taylor & Francis (2004).
[31] Z. Liang-Hua and S. Huang. Ten Years Of Review Of Environmental Auditing Research In China: Track, Problems And Prospect. *China Population, Resources And Environment*,**3**, (2011).
[32] R. Huang and Y. Li. Undesirable input–output two-phase DEA model in an environmental performance audit. *Mathematical and Computer Modelling*,**58**, 971-979 (2013).
[33] C. Viegas, A. Bond, J. Ribeiro and P. Selig. A review of environmental monitoring and auditing in the context of risk: unveiling the extent of a confused relationship. *Journal of Cleaner production*,**47**, 165-173 (2013).
[34] N. Rika and K. Jacobs. Reputational risk and environmental performance auditing: A study in the Australian commonwealth public sector. *Financial Accountability & Management*,**35**, 182-198 (2019).
[35] J. Hair, M. Gabriel and V. Patel. AMOS covariance-based structural equation modeling (CB-SEM): Guidelines on its application as a marketing research tool. *Brazilian Journal of Marketing*,**13**, 44-55 (2014).
[36] M. Sarstedt, C. Ringle and J. Hair. Partial least squares structural equation modeling. *In Handbook of market research* (pp. 587-632). Cham: Springer International Publishing (2021).
[37] A. Mohammad, R. Aldmour, and S. Al-Hawary. Drivers of online food delivery orientation. *International Journal of Data and Network Science*,**6**, 1619-1624 (2022).
[38] L. Al-Abbadi, D. Bader, A. Mohammad, A. Al-Quran, F. Aldaihani, S. Al-Hawary and F. Alathamneh. The effect of online consumer reviews on purchasing intention through product mental image. *International Journal of Data and Network Science*,**6**, 1519-1530 (2022).
[39] L. AL-Qudah, K. Aburisheh, A. ALshanti, D. Massadeh, E. Hyasat and S. Al-Hawary. Corporate social responsibilities and financial reporting quality: Evidence from Jordanian manufacturing firms. *Uncertain Supply Chain Management*,**10**, 1493-1500 (2022).
[40] S. Kergroach. Industry 4.0: New challenges and opportunities for the labour market. *National Research University Higher School of Economics*,**11**, 6-8 (2017).
[41] J. Hair, G. Hult, C. Ringle and M. Sarstedt. *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications, US (2016).