



International Journal of Human Capital in Urban Management

Volume 7, Number 3, Summer 2022



Urban Sustainability is Based on Human Capital

Circulation: 200

pISSN 2476-4698

eISSN 2476-4701

Aims and Scope

International Journal of Human Capital in Urban Management (IJHCUM) aims to offer an outlook on the utilization of human capital in urban management based on existing urban and metropolitan problems. The journal expects to eventually turn into a convergence point as a reference available to professionals, managers and researchers in the field of urban management. Topics of interest include but are not limited to the following disciplines: Human Capital in Urban Management; Urban architecture, design, development and planning; Urban communications and services; Urban civil engineering and related management issues; Urban economics, administrative and financial management; Urban transportation systems and traffic management; Urban social and cultural welfare; Urban ecology and related; environmental concerns; Urban Health, Safety and Environment; Sustainable urban infrastructure.

Vision and Mission

International Journal of Human Capital in Urban Management (IJHCUM) is an open access, peer-reviewed journal affiliated with Municipality of Tehran focusing on employment and allocation of human capital for urban management, including urban multidisciplinary themes. IJHCUM is an integral partner with the scientific and technical communities, delivering superior Information products and services that foster communication, build insights and enables individual and collective advancement in urban management. Providing human capital information to the general public administration with description of contemporary advances in urban issues to be used in improving protection and management.



International Journal of Human Capital in Urban Management (IJHCUM)

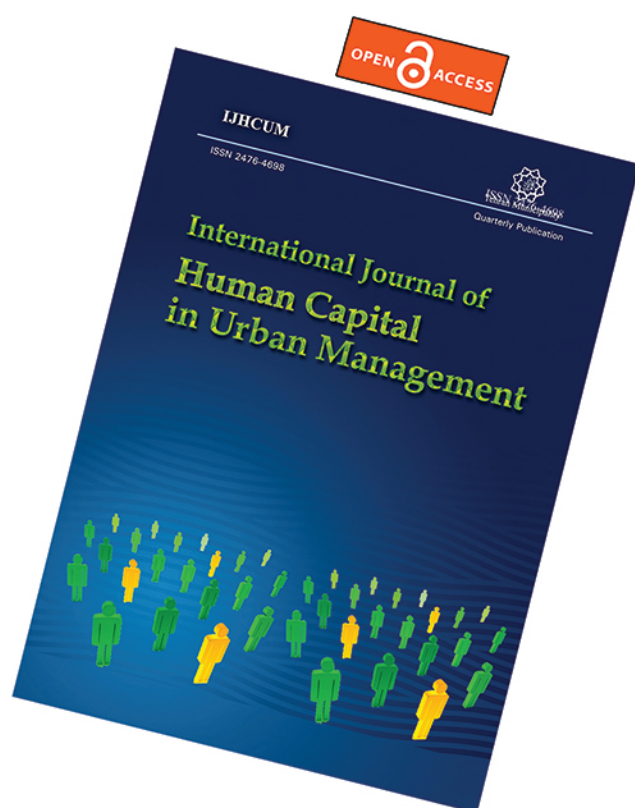
Editor-in-Chief
E. Sheikh, Ph.D.

pISSN 2476-4698

eISSN 2476-4701

QUARTERLY FULL OPEN ACCESS PEER REVIEWED PUBLICATION

Journal Abbreviation: Int. J. Hum. Cap. Urban Manage.



CALL FOR PAPERS

Publication benefits in
International Journal of
Human Capital in Urban Management

- *Quarterly Publication journal*
- *Online submission and reviewing*
- *Online status inquiry*
- *Double blind peer reviewing*
- *Rapid evaluation and publication*
- *Immediate publication on the net*
- *Open access to all PDF full text of published articles*
- *No pay charge for publication*

Municipality of Tehran
Tehran Urban Research & Planning Center

www.ijhcum.net

editor@ijhcum.net

ijhcum@gmail.com

Tel.: +9821 6403 8606

Fax: +9821 9609 0402

CONTENTS

Volume 7, Number 3, Summer 2022

(Serial # 27)

1. Adsorption studies of Iodine removal by low-cost Bioinspired Mushuma and Mupane bark derived adsorbents for urban and rural wastewater reuse 297
O. Gotore; V. Mushayi; R. Rameshprabu; L. Gochayi; T. Itayama (JAPAN- ZIMBABWE- THAILAND- NETHERLANDS)
2. Conceptual model of the role of urban pause space in promoting social interactions 309
Z. Yaghoubpour F. Habib Z.S.S. Zarabadi (IRAN)
3. Leadership style and company performance in the manufacturing industry management 327
L. Wei; HL. Vasudevan (MALAYSIA)
4. Application of Data Envelopment Analysis to assess the efficiency using income aspect in the local government 341
A. Jafari Shahrestani; E. Sangi; H. Mazaherian; S. Movaghar Hoor (IRAN)
5. Toward behavior-based placemaking: the evolution of place concept in urban design knowledge 357
A.R. Sadeghi; F. Shahvaran; A.R. Gholami; T. Feyzabi (IRAN- CANADA)
6. Designing organizational trauma models in the sport organizations 373
A.A. Bayati; A. Khodayari; N. Khalife (IRAN)
7. Is there a connection between tariffs and economic growth? A computable general equilibrium analysis based on the Global Trade Analysis Project model 383
S.Sh. Hossain; H. Delin; M. Mingying (CHINA)
8. Designing and explaining the model of factors influencing the formation of a career path with a postmodern approach 393
M. Saveh; D. Gholamzadeh; H Safarzadeh (IRAN)
9. An investigation into vandalism and its effects on urban beauty 405
S. Motahari; A. Taftiyan; M. Moeinadin (IRAN)
10. Direct and indirect analysis of contamination levels in lakes of two adjacent areas 417
J. Figueroa Jiménez1; N. Guerrero Del Castillo; J. C. Musa Wasil; K. Malave-Llamas; C. Morales Agrinzoni (PUERTO RICO)

COVERING LETTER

Subject: **Submission of manuscript**

Dear Editor,

I would like to submit the following manuscript for possible evaluation

Manuscript Title:

Running Title (Short title):

Main Subjects:

Name and address of corresponding author:

Telephone #

Fax #

Email:

I affirm that the manuscript has been prepared in accordance with International Journal of Human Capital in Urban Management guide for authors.

I have read the manuscript and I hereby affirm that the content of this manuscript or a major portion thereof has not been published in a refereed journal, and it is not being submitted fully or partially for publication elsewhere. The manuscript has been read and approved by all listed authors.

The source(s) of financial support of study (if any):

Type of Manuscript (check one):

- ☐ Original research paper
- ☐ Case report
- ☐ Research note
- ☐ Short communication
- ☐ Review paper

Name:

Corresponding Author Signature:

Date:

ORIGINAL RESEARCH PAPER

Adsorption studies of Iodine removal by low-cost Bioinspired Mushuma and Mupane bark derived adsorbents for urban and rural wastewater reuse

O. Gotore ^{1,2*}, V. Mushayi ², R. Rameshprabu ³, L. Gochayi ⁴, T. Itayama ¹

¹ Department of Water and Environmental Engineering, Graduate School of Advanced Engineering, Nagasaki University, Nagasaki, Japan

² Department of Civil Engineering, Harare Polytechnic College, Harare, Zimbabwe

³ Department of Renewable Energy Engineering, School of Renewable Energy, Maejo University, Chiang Mai, Thailand

⁴ Department of Water Management and Governance, Institute for Water Education, IHE Delft, Netherlands

ARTICLE INFO

Article History:

Received 22 February 2022

Revised 19 April 2022

Accepted 18 May 2022

Keywords:

Bayesian analysis

Frequentist analysis

Iodine

Kinetic adsorption

Mupani biochar

Mushuma biochar

Water reuse

ABSTRACT

BACKGROUND AND OBJECTIVES: Water pollution and scarcity are becoming a serious challenge worldwide and methods of treating or recycling the wastewater are becoming expensive, especially in rural areas of least developed countries. An affordable wastewater recycling approach is imminent and should be cost-effective, using local materials to alleviate the water shortage and pollution challenges. The use of adsorbents from different biomass has been on the highway and tree barks are no exception for that matter. This research, therefore, intends to test the use of novel material's capacity to remove iodine from an aqueous solution under set conditions and use Bayesian statistics to validate the results as compared to the Frequentist approach.

METHODS: This study is qualitative and developmental research where Bayesian and Conventional statistics were applied to complementarily validate the results. Kinetic models, Field Emission Scanning Electron Microscopy, and Energy Dispersive X-ray Spectroscopy were used to characterize the novel adsorbent to check for its potential and capability in removing iodine from water. Akaike Information Criterion (AICc) was then used to select the best model.

FINDINGS: The findings demonstrated that the Bayesian approach was simultaneously applied with classical methods to compare their parameter estimation. Mupane biochar performed better than Mushuma, Pseudo-Second-Order model described both materials better with lower AICc values of 37.76 and 38.03 than other kinetic models respectively, indicating a chemisorption mechanism. Bayesian approach remarkably revealed slightly higher qt estimations of 40.712 and 41.639 mmol/g than conventional statistics with 40.01 and 40.29 mmol/g for Mushuma and Mupane biochar. Elovich model subsequently fit the data, henceforth demonstrating a heterogeneous surface property with chemisorption phenomena. Field Emission Scanning Electron Microscopy and Energy Dispersive X-ray Spectroscopy exhibited C (81.93 mol% and 86.91 mol %) and O (16.12 mol% and 11.49 mol%) for Mushuma and Mupane respectively.

CONCLUSION: Material performances were insignificant however, Mupane marginally outperformed Mushuma bark. However, further examination is required in determining the surface area, adsorption isotherms, and functional groups available. This African tree-bark biochar promised to be good adsorbents of wastewater contaminants and their kinetic mechanisms can be a benchmark to suggest their applications as potential candidates for environmental-ecosystem-protection and water re-use strategy, especially in rural and urban areas.

DOI: [10.22034/IJHCUM.2022.03.01](https://doi.org/10.22034/IJHCUM.2022.03.01)



NUMBER OF REFERENCES

34



NUMBER OF FIGURES

5



NUMBER OF TABLES

3

*Corresponding Author:

Email: gotoreobey@gmail.com

Phone: +817044862303

ORCID: [0000-0001-8556-0151](https://orcid.org/0000-0001-8556-0151)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

In most remote rural areas of developing countries, tree barks are dominant bioresources that become available post forestry commission operations, seasonal shifts, and some industrial activities. Harkin *et al.* (1971) reiterated that tree bark institutes between 9 and 15 % of stem volume. Mushuma tree, an African native species, is dominant in the Midlands province of Zimbabwe. The Shuma fruits (Jackle-berry, *Diospyros mespiliformis*) (Ajayi and Mafongoya, 2017) are syruplike juice, and smooth with soft-transparent- jelly inside. The tree has a medium to huge tree stem with the outer bark peeling off naturally as the tree grows as well as the season changes. Additionally, the Mupane tree (*Colophospermum mopane*) (Ajayi and Mafongoya, 2017) is a legume family vegetation abundantly found in the Midlands of Zimbabwe under hot, dry low-lying areas between the altitude of 200m and 1150 meters. They are also found in the Northwestern part of South Africa. Tree barks of Mushuma and Mupane are usually used to start fires because of their common availability in the province as well as their affinity to fires. It is very quick to start fires and the tree wood itself takes a long time without extinguishing. Generally, these trees' bark is either left in the forest after the tree ages or the outer barks peeled off or used as fuel by the local communities. However due to high rural to urban movements, the availability of tree barks is increasing, and the rest is getting decomposed in the bush with no value to the community. Moreover, environmental concerns regarding soil quality would be at stake when considering the effect of the natural decomposition of tree bark. Sometimes, they block waterways, and river trash screens, and fill in the shallow water wells which can become a danger to humans at night as well as wild and domestic animals. However, the use of tree barks had been recently researched in looking for better material for use in the adsorption field of study when they can be used as an adsorption substrate for the elimination of water pollutants including dyes (Ajaelu *et al.*, 2017; Cong *et al.*, 2017; Tan *et al.*, 2021) heavy metals (Agarwal *et al.*, 2020; Cumberland *et al.*, 2018; Afroze *et al.*, 2016; Cutillas-Barreiro *et al.*, 2014) and pharmaceutical compounds (Afroze *et al.*, 2016). Zazycki *et al.*, (2018) also added that numerous approaches can be employed to eradicate water toxins but among them, adsorption has been

found to account for added advantages owing to its simple production process, renewing capacity, high proficiency, and cost-effective. In the adsorption process, activated carbon is widely used owing to its large specific surface area, developed pore structure, high adsorption efficiency, and good chemical stability (Liu *et al.*, 2019). Prajapati and Mondal (2020) restated that adsorption normally takes place within mesopores which are conduits for adsorbate particles, and capillary condensation occurs to adsorb these macromolecules. The adsorption process has been proven one of the best wastewater treatment technologies around the world and activated carbon is undoubtedly considered a universal adsorbent for the removal of diverse types of pollutants from water (Dim 2013). However, given the high cost and associated preparations and chemicals required for activated carbon, there is a constant search for alternate low-cost adsorbents. From that end, Liang *et al.*, (2021) elucidated that plant barks that are rich in tannin-rich produce the most effective adsorbent materials as compared to other agro-based biomaterials. Plant barks are among the most widely utilized adsorbents in the study of pollutant removal from aqueous media and numerous studies have been conducted in this regard (Obey *et al.*, 2021). Plant species investigated include eucalyptus, (Afroze *et al.*, 2016, Cumberland *et al.*, 2018). African border (Zazycki *et al.*, 2018), flamboyant pods (Aremu *et al.*, 2018), sycamore (Cong *et al.*, 2017), pine (Cutillas-Barreiro *et al.*, 2014), and many others. Besides their comparatively low or no cost, there are several recompenses proliferate in using plant barks as precursors (adsorbents) for water treatment, including being eco-friendly, renewable in nature, and requiring less time to process (Eletta *et al.*, 2020; Tan *et al.*, 2021). In this research, data analysis was conducted with the help of well-known conventional statistics and the application of Bayesian statistics as an emerging powerful approach. Bayesian statistics has the potential to replace the use of classical statistics, addressing most of the latter's inherent inadequacies, and supporting comprehensive and demanding statistical analysis of extensive diversity of pragmatic data (Furia *et al.*, 2019, Gelman *et al.*, 2004). Bayesian analyses provide unswerving probabilistic evaluations between groups/treatments and are suited to material science studies as they provide more defense against over-confidence in

small sample sizes (Borg *et al.*, 2018; Mengersen *et al.*; 2016; Ntzoufras 2011; First *et al.*, 2016) as compared to traditional techniques. In this context, The R2JAGS (Just another Gibbs sampler) package provides an interface to the R programming language, which uses the Hamiltonian Markov Chain Monte Carlo (MCMC) method to generate MCMC chains used to characterize the posterior distribution (Ntzoufras 2011; Firat *et al.*, 2016). Therefore, Bayesian techniques do not suffer from several restrictions as frequentist statistics do and can sustain rich, vigorous analyses in numerous circumstances (Furia *et al.*, 2019; Swinton *et al.*, 2018), concomitantly, illustrating how conventional techniques analysis works and the deficiency they hold (Furia *et al.*, 2019; Gelman *et al.*, 2004). This novel study aims to investigate and understand the physicochemical properties of Mushuma and Mupani barks and their characterization to evaluate the kinetic mechanism of adsorption from different models and statistical methods for the determination of equilibrium analysis. Additionally, the novel study will bring about an investigation of the fundamental use of biochar in rural areas to treat wastewater and remove environmental pollutants. Thus, it is the first research to be conducted on these two materials from literature and the results will be used in further studies. Additionally, the implementation of Bayesian statistics in this study will help validate the data and unlock and authenticate their application in material science studies. A comparison between classical and Bayesian posterior distribution will be made and evaluated for a sound and robust decision. The assessment of model parameter magnitudes will be significant as the equilibrium concentrations will be availed from three models attested in this study. The current study has been carried out in Nagasaki, Japan in 2022.

MATERIALS AND METHODS

Materials and chemicals

The already fallen and dried Mushuma and Mupani barks were obtained in Gokwe, a rural area in the Midlands province of Zimbabwe. After collection from the bush, the materials were transferred to the laboratory, chopped down, washed twice with Ultra-pure water to remove any adsorbed impurities, and allowed to dry in the sun for two weeks. The dried barks were pyrolyzed at 600 °C for 2 hours in a muffle furnace and later cooled down in a desiccator. The

produced bark biochar from Mushuma (MSHBC) and Mupani (MPNBC) was then sieved after ground into small particle sizes 0.25-1.0mm. they were then washed with tap water to adjust the pH to 7.0. The temperature was monitored by a thermocouple sensor (K-87 type, HTK0251, HAAKO, Japan) with a digital controller thermometer (E5CB, 88 Omron, Japan). Later vacuumed to eliminate air as much as possible with a stirrer for an overnight period. Only the settled biochar was assumed to be well vacuumed and was preserved in 100 ml with Ultra-pure (from the laboratory) water before being used in the experiment. To conduct the adsorption experiment, Iodine solution and Sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3$) were bought from Nacalai Tesque, INC, Tokyo, Japan, and soluble starch was purchased from Wako pure chemical industries Ltd, Osaka, Japan. All chemicals used in this study were analytical grades.

Kinetic adsorption experiment

Iodine solution (0.1 mol/L) was measured for the adsorbate and diluted with Ultra-pure water to get this concentration, 1.02g wt.% of both MSHBC and MPNBC was weighed and then placed in 300 ml conical flasks with 200 ml iodine solution (0.1 mol/L). This mixture was agitated for 48 hours at 20 ± 1 °C with sample collection from 1, 2, 4, 6, 8, 10, 12, and 24 hours post vigorous shaking by EYELA multi-shaker at 152 rpm. A sample of 5 ml was collected each time for kinetic measurement, filtered, and titrated with 0.1 mol/L $\text{Na}_2\text{S}_2\text{O}_3$ using starch for ultimate endpoint equivalence. After the experiment, the changes in qt with time were fitted into the pseudo-first (Eq. 1) and pseudo-second (Eq. 2) order kinetic models to investigate the adsorption kinetics of iodine on MSHBC and MPNBC:

$$q_t = q_e (1 - \exp(-k_1 t)) \quad (1)$$

$$q_t = \frac{q_e^2 k_2 t}{1 + q_e k_2 t} \quad (2)$$

In these equations, qt (mmol/g) represents the amount of iodine absorbed by biochar at time t. K_1 (1/min) and K_2 (g. mmol/min) represent rate constants of the adsorption. To further investigate the underlying adsorption mechanism of iodine by MSHBC and MPNBC, the Elovich (Eq. 3) and Intra-particle diffusion (Eq. 4) models were used to describe the kinetic data.

$$q_t = \left(\frac{1}{\beta} \right) \ln(\alpha\beta) + \left(\frac{1}{\beta} \right) \ln(t) \quad (3)$$

$$q_t = k_p t^{\frac{1}{2}} + C \quad (4)$$

Where α is the initial adsorption rate (mmol/g./min); β (g/mmol) is a constant related to surface coverage and activation energy, and t (min) is the contact time; k_p is the Intra-Particle Diffusion (IPD) model rate constant (mmol/g/min), t is time in mins and C is the intercept reflecting the boundary layer thickness.

Statistics and data analysis

The R software version 4.1.3 was used for data analysis and simulations conducted in this study, which is a well-reputed and open-source statistical programming language. The fitting of the nonlinear curves was completed by using the Nonlinear Least Squares (NLS) command and the prediction function from the R package. Additionally, Bayesian statistics were applied to attest to the applicability of such a powerful method in adsorption studies in parameter estimation. Therefore, R2JAGS (ver. 0.7-1) and the Bayes-plot packages were used to establish the kinetic model parameters and graphically represent this information respectively in the R. Bayes-plot package extracts the Markov chain Monte Carlo (MCMC) results of the posterior distribution and analyses the data graphically from the 10 000 iterations, 1000 burning and 3 MCMC chains used. The prior and likelihood distributions were set (gamma distribution) before the simulations were conducted, and the posterior was presented and evaluated against the conventional statistics. Additionally, the Akaike Information Criterion (AICc), a second-order estimator of prediction error and was used to check the relative quality of statistical models for the adsorption kinetics data. Given that three models were tested in this study, AICc estimates the quality of each model, relative to each model, and the best model will be chosen concerning the lowest criterion generated by the AICcmodavg package in R. The model with the lowest value will be the conventionally selected.

RESULTS AND DISCUSSION

Elemental composition

The EDX elemental composition for MSH and MPN biochar were 74.76 % and 80.92 %, 19.6 % and 14.25

% for C and O respectively. Other inorganic elements are shown in Fig. 1 and Table 1 as confirmed by the EDX analysis. This shows that both barks have enough rich C content with MPHBC having a higher content of carbon. The oxygen content is very high for MSHBC bark than MPNBC, however, both compositions are as expected after pyrolysis. After dehydration and decarboxylation reactions, the O/C ratio diminished to 0.263 % and 0.176 % for MSHBC and MPNBC respectively, and this can be anticipated for the H/C ratio as well. Even though diminished, it is high enough to suggest the existence of polar functional groups on the biochar surface which is connected to the carbonization process.

This reduction could reflect the loss of simply degradable compounds of carbon such as the volatile matter hence this H/C molar ratio as well indicated the formation of aromatic compounds in the biochar. In addition to that, Wu *et al.*, (2012) and Dong *et al.*, (2013) also reiterated that lower ratios might indicate a unique structural arrangement of aromatic rings (Vishnu *et al.*, 2021), which forms from stables graphitic like structures. The O/C molar ratio decreased during carbonization, and that could have induced dehydration responses which abridged the hydrophilicity capacity of the biochar surface (Dang *et al.*, 2021; Doumer *et al.*, 2015; Al-Wabel *et al.*, 2013). Higher temperatures of 600 °C as used in this study might lead to an increased amount of volatile matter which in turn enhanced the content of these aromatic structures, especially when the temperature exceeded 400 °C as narrated by Soars *et al.*, (2022), Fang *et al.*, (2015) and Al-Wabel *et al.*, (2013).

Spectrometric surface morphological analysis

From the FESEM images in Fig. 1, morphology analysis of two bark biochar products revealed that surface texture can be influenced by biomass type even under identical pyrolysis conditions. Biochar produced from Mushuma bark has large surface pores (10-15 μm in diameter), uniformly distributed and separated by a thick carbon wall (2-3 μm) than Mupami bark, while the Mupane has smaller and heterogeneously distributed pores (3-5 μm in diameter). This corresponds to the kinetic results from Iodine adsorption where MPNBC seem to have higher q_t values than MSHBC. Larger pores tend to correlate to the limited surface area than small pores, so the adsorption will be higher on smaller pores. Additionally, small pores exhibited on the biochar are

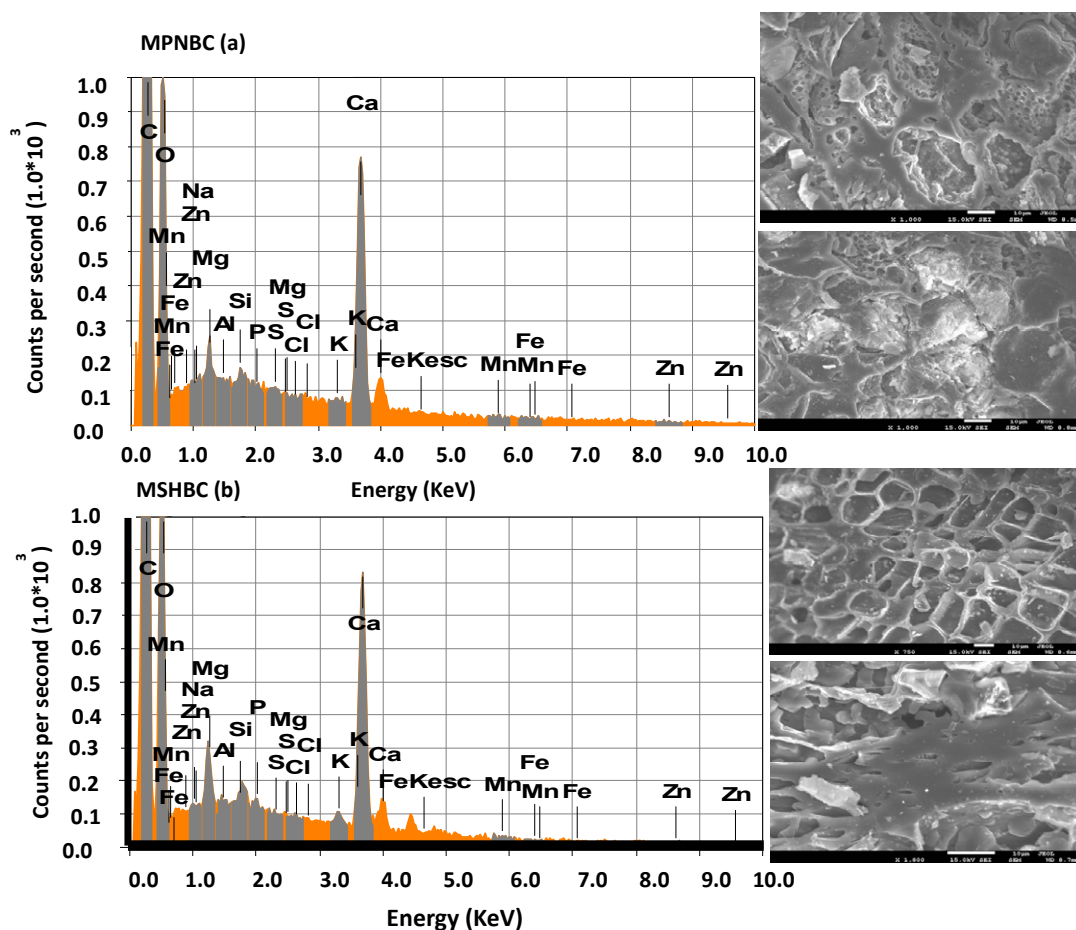


Fig. 1: Presentation of EDX graphical output and FESEM images for elemental composition and surface morphological analysis respectively, of Mupane (a) and Mushuma (b) Tree barks biochar pyrolyzed at 600 °C for 2 hr

Table 1: The chemical composition extracted from the EDX analysis for Mupane and Mushuma barks biochar modified at 600 °C for 2 hrs. in mass and moles units.

Chemical formula	Mushuma biochar		Mopane biochar	
	ms%	mol%	ms%	mol%
C*	74.76	81.93	80.92	86.91
O*	19.6	16.12	14.25	11.49
Na	nd*	nd*	nd*	nd*
Mg*	0.45	0.24	0.25	0.13
Al*	0.03	0.02	nd*	nd*
Si	nd*	nd*	0.04	0.02
P*	0.11	0.05	0.02	0.01
S*	0.03	0.01	0.07	0.03
Cl*	0.06	0.02	nd	nd
K*	0.23	0.08	0.07	0.02
Ca*	4.51	1.48	4.18	1.34
Mn*	0.07	0.02	0.04	0.01
Zn*	0.15	0.03	0.16	0.03
Total	100	100	100	100

nd*-not detected

clearly associated with high porosity and void volume which corresponds to more capacity for adsorption.

Adsorption kinetics mechanism

MPNBC showed more significant adsorption for Iodine than MSHBC as exhibited in Fig. 2 (a) and (b) correspondingly. Consequently, the Iodine kinetic adsorption process on MPNBC and MSHBC could be divided into three stages: rapid adsorption stage, slow adsorption stage, and adsorption equilibrium stage as elucidated by Zarzycki et al., 2018 as well. The first 12 hours were observed to be a rapid Iodine adsorption stage on both biochars. The graph for MPNBC seems to be steeper than MSHBC. The adsorption capacity of the prepared Mupane and Mushuma barks were estimated to be 40.38 and 39.78 mg/g respectively, from the experimental data. From conventional statistical analysis of Pseudo-second order.

model, Mushuma and Mupani biochar exhibited adsorption capacity of 40.01 and 40.29 mmol/g (Table 2) which were slightly lower than the Bayesian outcome of 40.712 and 41.639 mmol/g (Table 3) correspondingly. This reveals the strength of Bayesian analysis against classical statistics as different quantile ranges revealed different estimations and the 50% (median) was so close to the actual mean for each parameter. The adsorption rate constants of the two biochar also exhibited the above phenomenon where the conventional method indicated a homogeneous reaction rate (0.014/min) as in Table 2, so as the Bayesian statistics as shown in Table 3. Moreover, the Elovich model revealed that the initial adsorption was 110.701 and 117.88 mmol/g/ min, 112.847 and 120.214 mmol/g/ min for Mupane and Mushuma biochar from Conventional and Bayesian methods respectively. Different adsorption mechanisms could

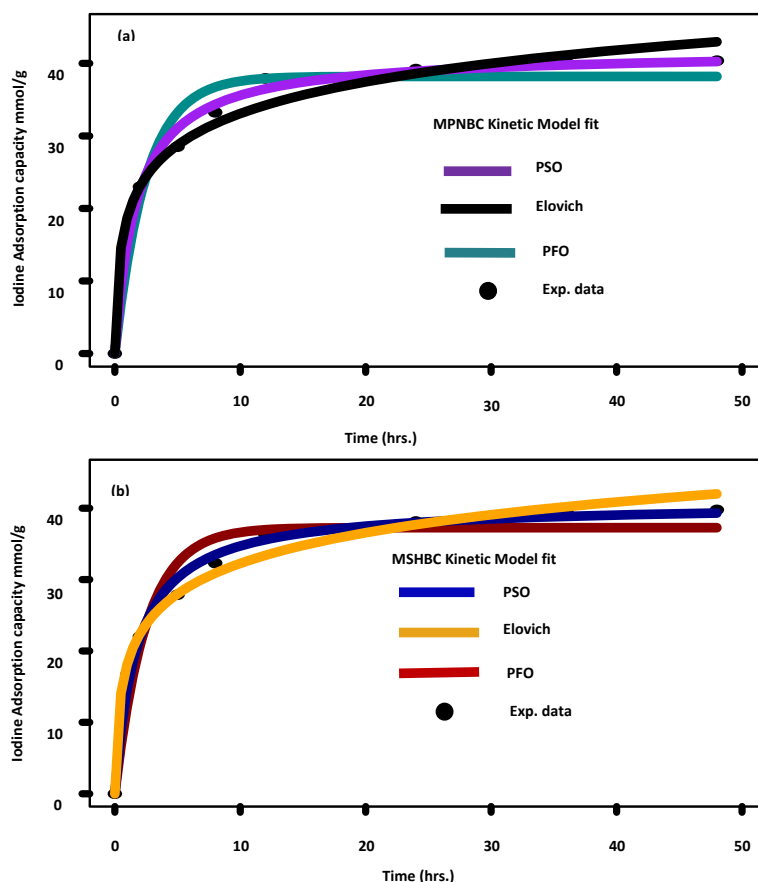


Fig. 2: The effect of contact time on the adsorption of Iodine solution onto the bark biochar, (a) Mushuma, (b) Mupani, fitting three Models (Pseudo first order, second-order, and Elovich) after 48 hr. of agitation

Table 2: The kinetic adsorption model of iodine onto Mushuma and Mupane bark derived Biochar showing the fitting parameters from the conventional statistical analysis of Pseudo first order, second order, and Elovich Models

Chemical formula	Mushuma biochar		Mopane biochar	
	ms%	mol%	ms%	mol%
C*	74.76	81.93	80.92	86.91
O*	19.6	16.12	14.25	11.49
Na	nd*	nd*	nd*	nd*
Mg*	0.45	0.24	0.25	0.13
Al*	0.03	0.02	nd*	nd*
Si	nd*	nd*	0.04	0.02
P*	0.11	0.05	0.02	0.01
S*	0.03	0.01	0.07	0.03
Cl*	0.06	0.02	nd	nd
K*	0.23	0.08	0.07	0.02
Ca*	4.51	1.48	4.18	1.34
Mn*	0.07	0.02	0.04	0.01
Zn*	0.15	0.03	0.16	0.03
Total	100	100	100	100

nd*-not detected

Table 3: Bayesian estimation of posterior distribution parameters (Mean \pm SD) from three kinetic adsorption Models generated by the Just another Gibbs sampler (R2JAGS) package from R software

Chemical formula	Mushuma biochar		Mopane biochar	
	ms%	mol%	ms%	mol%
C*	74.76	81.93	80.92	86.91
O*	19.6	16.12	14.25	11.49
Na	nd*	nd*	nd*	nd*
Mg*	0.45	0.24	0.25	0.13
Al*	0.03	0.02	nd*	nd*
Si	nd*	nd*	0.04	0.02
P*	0.11	0.05	0.02	0.01
S*	0.03	0.01	0.07	0.03
Cl*	0.06	0.02	nd	nd
K*	0.23	0.08	0.07	0.02
Ca*	4.51	1.48	4.18	1.34
Mn*	0.07	0.02	0.04	0.01
Zn*	0.15	0.03	0.16	0.03
Total	100	100	100	100

nd*-not detected

have been encountered during the 48-hour contact time, but the adsorption rate gradually decreased until the adsorption reaches the equilibrium state as [Ajayi and Mafongoya \(2017\)](#) elaborated.

Moreover, [Table 2](#) also presents the adsorption kinetic results from conventional statistics which shows that the pseudo-second-order kinetic equation better describes the adsorption behaviors of the tree bark biochar for Iodine adsorption ([Dang et al., 2021](#); [Doumer et al., 2015](#)). The model selection AICc scores for MPNBC and MSHBC were 38.03 and 37.76 respectively, away below other models used. AICc is a strong tool for model selection than

using the correlation coefficient on non-linear model functions. This can be theoretically supported by the equilibrium adsorption capacity values from both statistical methods were also close to the experimental equilibrium adsorption capacity, signifying that the pseudo-second-order kinetic model could better describe the Iodine adsorption ([Doumer et al., 2015](#); [Al-Wabel et al., 2013](#)). The estimation from Bayesian simulation is higher than conventional estimations. However, the surface coverage estimations were almost the same from both methods. From this point of view, it can be inferred that both conventional and Bayesian approaches to estimations are well

established and seem hard to justify if one of the two is preferred over the other (Furia *et al.*, 2019; Gelman *et al.*, 2004).

Nevertheless, the Bayesian framework is deemed to be applicable with no restriction to the kinetic adsorption in this study due to a wide and more relevant supporting outcome than the other (Cutillas-Barreiro *et al.*, 2014). Most importantly, the use of priors makes the Bayesian method more sensitive to different prior guess estimates which may also lead to different posterior estimations of the parameters. In support of the Bayesian distribution outcome, the posterior distribution of the best two kinetic model parameter estimates was presented

by the density and trace plots for the two biochar materials. Figs. 3 and 4 show the density and trace plots for the posterior estimates of Pseudo second order and Elovich model parameters. The trace plot visibly exhibited the convergence of each q_t and k_2 for α and β kinetic parameters for Pseudo second order and Elovich models respectively (Dang *et al.*, 2021; Doumer *et al.*, 2015; Al-Wabel *et al.*, 2013).

These kinetic results explain that Iodine adsorption on the two-bark biochar was proximity to chemisorption than physisorption, meaning that new chemicals could have been formed on the biochar surfaces probably during pyrolysis or otherwise during the agitation.

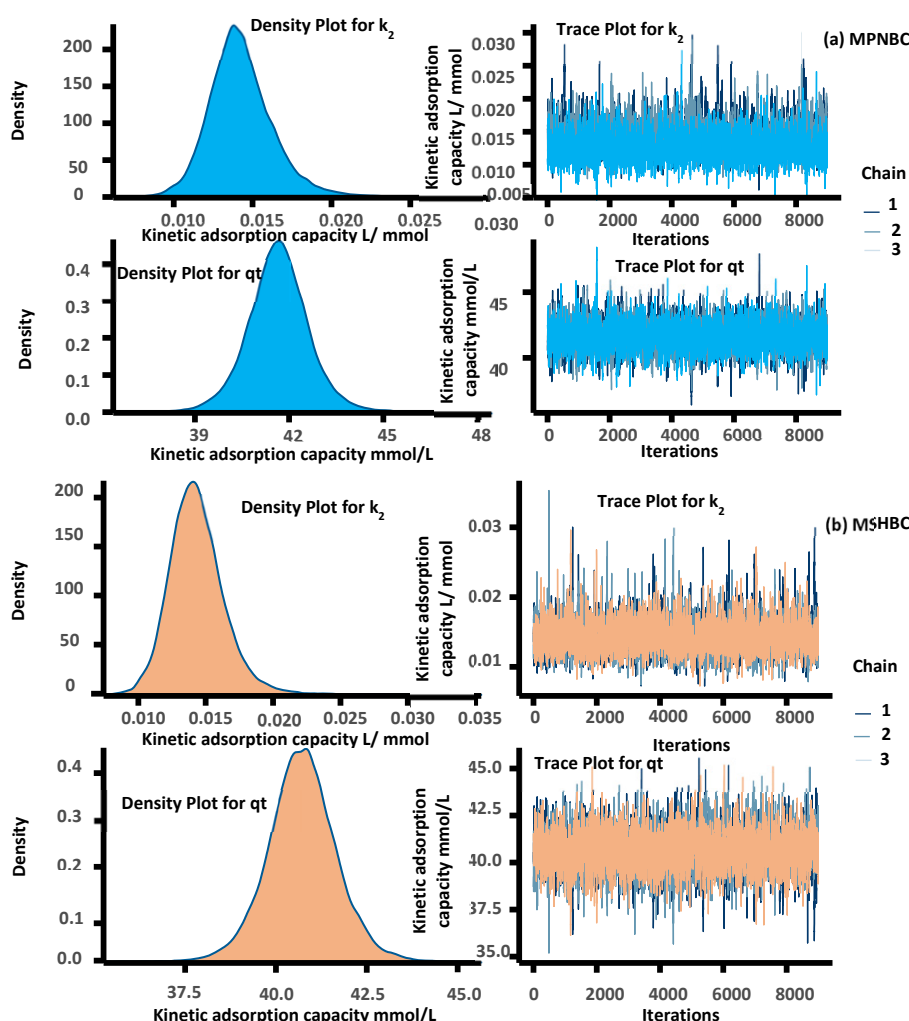


Fig. 3: Density and trace plot parameter presentations of Pseudo second-order model from the Markov chain Monte Carlo chain simulations for the effective use of Bayesian statistics

Fig. 5 shows a fit for the Intra particle diffusion which shows that the linear graph did not pass through the origin and tells us that Intra particle diffusion was not a rate-limiting factor, but other mechanisms are involved (Cutillas-Barreiro *et al.*, 2014). The adsorption kinetic results are shown in Fig. 2 and Table 2 revealed that the kinetic model fits follows the order pseudo-second-order > Elovich > pseudo-first-order > Intra particle diffusion.

Besides pseudo-second-order fitting the experiment, the Elovich Model subsequently delineated the data well as a secondary model. The Elovich model assumes that the surface of the biochar

adsorbent is heterogeneous, meaning that there are parts of the surface that have more affinity for iodine adsorption than others (Amaku *et al.*, 2021). The fit for iodine adsorption using the Elovich model suggests that it is strongly associated with the biochar, and McMillan (2018) suggested with such scenarios, the adsorbed iodine could be immobilized. Additionally, the Bayesian statistics should be used to fit adsorption empirical models to validate the estimated parameters through posterior distributions as it offers a powerful simulation and estimations alongside density and trace plots for clear parameter position through convergence. The

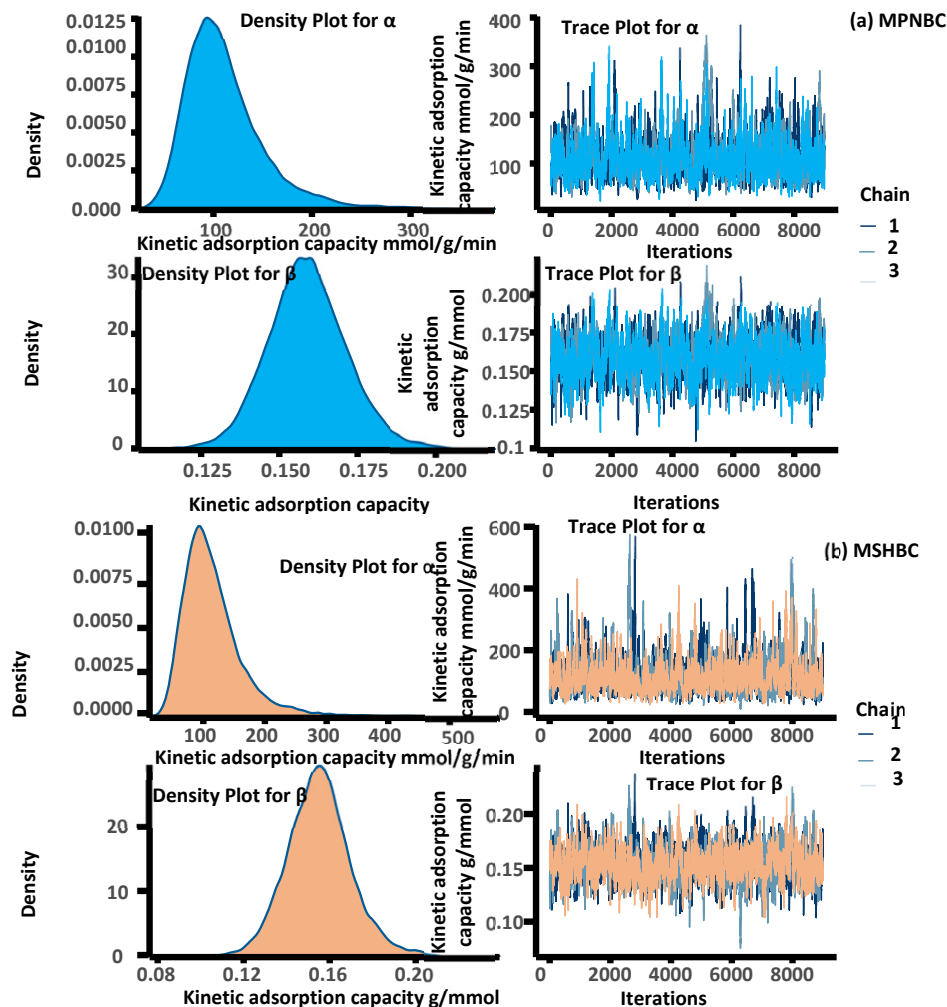


Fig. 4: The density and trace plots of Elovich kinetic model from the Markov chain Monte Carlo chain simulations for adsorption parameters convergence and peaks, demonstrating the application of Bayesian analysis of data

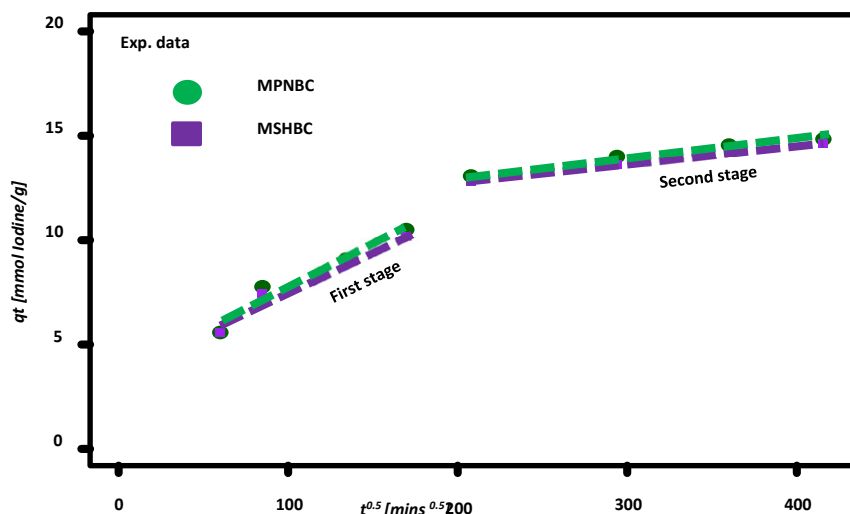


Fig. 5: Illustration of the Intraparticle diffusion model for kinetic adsorption of Iodine onto the Mupane and Mushuma Tree barks biochar measure after 48 hr. of agitation

novel bark biochar investigated in this research for wastewater treatment and reuse carries with it the merits exhibited by the results. It is suggested that the contribution of these two materials from tree bark in combating climate change through carbon sequestration should be investigated concerning the revealed capabilities in contaminant removal.

CONCLUSION

The two tree barks, native to the Southern African region, were successfully converted to a novel non-customized biochar with relevant adsorption kinetic mechanisms examined. These agro-biomass materials used in this study were the first to be investigated for their potential use as water re-use and low-cost adsorbents in rural areas of Zimbabwe. The materials are easy to obtain from the abundant deadwood in the forest and the production can be established easily with locally available and inexpensive materials. The pseudo-second-order model well described the kinetics of Iodine adsorption onto MSHBC and MPNBC, accompanied by the Elovich model. The Intra particle diffusion model did not pass through the origin, so it was clear that other mechanisms could have been contributed to the adsorption of Iodine onto the bark biochar. This confirms a heterogeneous surface characteristic with significant chemisorption mechanisms developed during pyrolysis of the agro-biobased biochar. Bayesian analysis was imple-

mented to provide a correlation and support of these material's data to validate the application and significance of conventional methods. The analysis from Bayesian exhibited more merits than classical methods as the outputs are clear and robust. It was possible to gain adequate information about the adsorption of iodine over time from a small sample, providing supplementary sustenance for the importance of using alternative statistical approaches in this study. The results from both classical and Bayesian analysis were insignificantly different from each other, but it was the former had its shortcomings including a lack of flexibility hence the latter provides tangible benefits that are simultaneously robust and nuanced. The C and O elements were observed to be the main composition in the two biochar as exhibited by the EDX analysis. However, further examination is required in determining the surface area, adsorption isotherms, and functional groups available. However, Mushuma and Mupani tree barks are promising adsorbents for environmental pollution control and wastewater re-use in urban environments and remote areas of developing countries. The obtained results revealed the capability of the locally available tree bark to be used for water recycling strategy for the local people. These materials are affordable and their production process is easy. This is a first step toward studying these new materials and further study will give proper answers for its applications

towards the goal with more information brought out through research.

AUTHOR CONTRIBUTIONS

The authors confirm the study's conception and design: data collection was conducted by V. Mushayi and L. Gochayi: O. Gotore performed the analysis and interpretation of the results. The draft manuscript preparation was finalized by O. Gotore and R. Rameshprabu. The results were evaluated by all authors, and the final version of the manuscript was approved.

ACKNOWLEDGEMENTS

The authors appreciate the referees, editors, and reviewers for their effort in their correction and suggestions to improve the quality and content of this paper. Most acknowledgment is given to the JICA (D-17-04963) and HONJO Foundation (FS20-0801) for the provision of these Scholarships to be in Japan for the study period.

CONFLICTS OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

ABBREVIATIONS

<i>AICc</i>	Akaike Information Criterion
<i>EDX</i>	Energy Dispersive X-Ray Analysis
<i>IPD</i>	Intra-Particle Diffusion model
<i>MCMC</i>	Markov chain Monte Carlo
<i>MSHBC</i>	Mushuma Biochar
<i>MPNBC</i>	Mupane Biochar
<i>Eq.</i>	Equation

REFERENCES

- Afroze, S.; Sen, T.K.; Ang, H.M., (2016). Adsorption performance of continuous fixed-bed column for the removal of methylene blue (MB) dye using *Eucalyptusheathiana* bark biomass. *Res. Chem. Intermed.*, 42(3): 2343-2364 (22 pages).
- Agarwal, A.; Upadhyay, U.; Sreedhar, I.; Singh, S.A.; Patel, C.M., (2020). A review on valorization of biomass in heavy metal removal from wastewater. *J. Water Process. Eng.*, 38: 101602.
- Ajalu, C.J.; Nwosu, V.; Ibrinke, L.; Adeleye, A., (2017). Adsorptive removal of cationic dye from aqueous solution using chemically modified African Border Tree (*Newbouldia laevis*) bark. *J. Appl. Sci. Environ. Manage.*, 21(7): 1323-1329 (7 pages).
- Ajayi, O.C.; Mafongoya, P.L., (2017). Indigenous knowledge systems and climate change management in Africa. *CTA*. 139.
- Al-Wabel, M.I.; Al-Omran, A.; El-Naggar, A.H.; Nadeem, M.; Usman, A.R., (2013). Pyrolysis temperature induced changes in characteristics and chemical composition of biochar produced from *conocarpus* wastes. *Bioresour. Technol.*, 131: 374-379 (6 pages).
- Amaku, J.F.; Nnaji, J.C.; Ogundare, S.A.; Akpomie, K.G.; Ngwu, C.M.; Chukwuemeka-Okorie, H.O.; Zubairu, S.M.; Ugwu, B.I.; Odoemelam, S.A.; Conradie, J., (2021). *Chrysophyllum albidum* stem bark extract coated tillite adsorbent for the uptake of Cr (VI): thermodynamic, kinetic, isotherm, and reusability. *Biomass Convers. Biorefin.*, 1-13 (13 pages).
- Aremu, M.O.; Alade, A.O.; Bello, A.A.; Salam, K.K., (2018). Kinetics and thermodynamics of 2, 4, 6-Trichlorophenol adsorption onto activated carbon derived from flamboyant pod bark. *Int. J. Environ. Sci.*, 13(3): 158-166 (9 pages).
- Borg, D.N.; Minett, G.M.; Stewart, I.B.; Drovandi, C.C., (2018). Bayesian methods might solve the problems with magnitude-based inference. *Med. Sci. Sports Exerc.* 50: 2609-2610 (2 pages).
- Cong, L.; Feng, L.; Wei, X.; Jin, J.; Wu, K., (2017). Study on the adsorption characteristics of Congo red by sycamore bark activated carbon. In *environment. Technologies. Resources. Proceedings of the Int. Sci.-Pract. Conf. Probl.* 1: 64-69 (6 pages).
- Cumberland, S.A.; Wilson, S.A.; Etschmann, B.; Kappen, P.; Howard, D.; Paterson, D.; Brugger, J., (2018). Rapid immobilisation of U (VI) by *Eucalyptus* bark: Adsorption without reduction. *Appl.*

- Geochem., 96: 1-10 (10 pages).
- Cutillas-Barreiro, L.; Ansias-Manso, L.; Fernández-Calviño, D.; Arias-Estévez, M.; Nóvoa-Muñoz, J.C.; Fernández-Sanjurjo, M.J.; Fernández-Sanjurjo, Álvarez-Rodríguez, E.; Núñez-Delgado, A., (2014). Pine bark as bio-adsorbent for Cd, Cu, Ni, Pb and Zn: batch-type and stirred flow chamber experiments. *J. Environ. Manage.*, 144: 258-264 (7 pages).
- Dang, B.T.; Gotore, O.; Ramaraj, R.; Unpaprom, Y.; Whangchai, N.; Bui, X.T.; Maseda H.; Itayama, T., (2021). Sustainability and application of corn-cob-derived biochar for removal of fluoroquinolones. *Biomass Convers. Biorefin.*, 1-11 (11 pages).
- Dim, P.E., (2013). Adsorption of methyl red and methyl orange using different tree bark powder. *Adsorption*, 4(1): 330-338 (9 pages).
- Dong, X.; Ma, L. Q.; Zhu, Y.; Li, Y.; Gu, B., (2013). Mechanistic investigation of mercury sorption by Brazilian pepper biochars of different pyrolytic temperatures based on X-ray photoelectron spectroscopy and flow calorimetry. *Environ. Sci. Technol.*, 47(21): 12156-12164 (9 pages).
- Doumer, M. E.; Arizaga, G.G.C.; da Silva, D.A.; Yamamoto, C.I.; Novotny, E.H.; Santos, J.M., Wisniewski A. Jr.; de Andrade J.B.; Mangrich, A.S., (2015). Slow pyrolysis of different Brazilian waste biomasses as sources of soil conditioners and energy, and for environmental protection. *J. Anal. Appl. Pyrolysis*, 113: 434-443 (10 pages).
- Eletta, O.A.; Adeniyi, A. G.; Ighalo, J.O.; Onifade, D.V.; Ayandele, F.O., (2020). Valorisation of Cocoa (*Theobroma cacao*) pod husk as precursors for the production of adsorbents for water treatment. *Environ. Technol. Rev.*, 9(1): 20-36 (17 pages).
- Fang, Q.; Chen, B.; Lin, Y.; Guan, Y. (2014). Aromatic and hydrophobic surfaces of wood-derived biochar enhance perchlorate adsorption via hydrogen bonding to oxygen-containing organic groups. *Environ. Sci. Technol.*, 48(1): 279-288 (10 pages).
- Firat, M.Z.; Karaman, E.; Başar, E.K.; Narinc, D., (2016). Bayesian analysis for the comparison of nonlinear regression model parameters: an application to the growth of Japanese quail. *Braz. J. Poult. Sci.*, 18(SPE): 19-26 (7 pages).
- Furia, C.A.; Feldt, R.; Torkar, R. (2019). Bayesian data analysis in empirical software engineering research. *IEEE Trans. Software Eng.*, 47(9): 1786-1810 (24 pages).
- Gelman, A.; Carlin, J.B.; Stern, H.S.; Rubin, D.B., (2004). *Texts in statistical science: Bayesian data analysis*.
- Liang, L.; Xi, F.; Tan, W.; Meng, X.; Hu, B.; Wang, X. (2021). Review of organic and inorganic pollutants removal by biochar and biochar-based composites. *Biochar*, 3(3): 255-281 (27 pages).
- Liu, X.; Tian, J.; Li, Y.; Sun, N.; Mi, S.; Xie, Y.; Chen, Z., (2019). Enhanced dyes adsorption from wastewater via Fe₃O₄ nanoparticles functionalized activated carbon. *J. Hazard. Mater.*, 373: 397-407 (11 pages).
- McMillan, O., (2018). *Characteristics and mechanisms of atrazine sorption to biochar for land remediation* (Doctoral dissertation, University of Cambridge) (289 pages).
- Mengersen, K. L.; Drovandi, C.C.; Robert, C.P.; Pyne, D.B.; Gore, C.J., (2016). Bayesian estimation of small effects in exercise and sports science. *PLoS ONE* 11: e0147311.
- Ntzoufras, I., (2011). *Bayesian modeling using WinBUGS* (698): John Wiley & Sons.
- Obey, G.; Adelaide, M.; Ramaraj, R. (2021). Biochar Derived from Non-customized Matamba Fruit Shell as an Adsorbent for Wastewater Treatment. *J. Bioresour. Bioprod.*
- Prajapati, A. K.; Mondal, M. K., (2020). Comprehensive kinetic and mass transfer modeling for methylene blue dye adsorption onto CuO nanoparticles loaded on nanoporous activated carbon prepared from waste coconut shell. *J. Mol. Liq.*, 307: 112949.
- Soares, M.B.; Dos Santos, F.H.; Alleoni, L.R.F., (2022). Temporal changes in arsenic and lead pools in a contaminated sediment amended with biochar pyrolyzed at different temperatures. *Chemosphere*, 287: 132102.
- Swinton, P.A.; Hemingway, B. S.; Saunders, B.; Gualano, B.; Dolan, E., (2018). A statistical framework to interpret individual response to intervention: paving the way for personalized nutrition and exercise prescription. *Front. Nutr.*, 5: 41.
- Tan, Y.; Wang, K.; Yan, Q.; Zhang, S.; Li, J.; Ji, Y., (2019). Synthesis of amino-functionalized waste wood flour adsorbent for high-capacity Pb (II) adsorption. *ACS omega*, 4(6): 10475-10484 (10 pages).
- Vishnu, D.; Dhandapani, B.; Kannappan Panchamoorthy, G.; Vo, D.V.N.; Ramakrishnan, S.R., (2021). Comparison of surface-engineered superparamagnetic nanosorbents with low-cost adsorbents of cellulose, zeolites and biochar for the removal of organic and inorganic pollutants: A review. *Environ. Chem. Lett.*, 19(4): 3181-3208 (28 pages).
- Wu, W.; Yang, M.; Feng, Q.; McGrouther, K.; Wang, H.; Lu, H.; Chen, Y., (2012). Chemical characterization of rice straw-derived biochar for soil amendment. *Biomass and bioenergy*, 47: 268-276 (9 pages).
- Zazycki, M.A.; Godinho, M.; Perondi, D.; Foletto, E.L.; Collazzo, G. C.; Dotto, G.L. (2018). New biochar from pecan nutshells as an alternative adsorbent for removing reactive red 141 from aqueous solutions. *J. Cleaner Prod.*, 171: 57-65 (9 pages).

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Gotore, O.; Mushayi, V.; Rameshprabu, R.; Gochayi, L.; Itayama, T., (2022). Adsorption studies of Iodine removal by low-cost Bioinspired Mushuma and Mupane bark derived adsorbents for urban and rural wastewater reuse. *Int. J. Hum. Capital Urban Manage.*, 7(3): 297-308.

DOI: 10.22034/IJHCUM.2022.03.01

url: http://www.ijhcum.net/article_252222.html



International Journal of Human Capital in Urban Management
(IJHCUM)

Homepage: <http://www.ijhcum.net/>

ORIGINAL RESEARCH PAPER

Conceptual model of the role of urban pause space in promoting social interactions

Z. Yaghoubpour, F. Habib*, Z.S.S. Zarabadi

Department of Urban Planning, Faculty of Art and Architecture, Islamic Azad University, Science and Research Branch, Tehran, Iran

ARTICLE INFO

Article History:

Received 18 December 2021

Revised 22 February 2022

Accepted 18 April 2022

Keywords:

Cultural and social values

Social interactions

Sustainable urban development

Urban pause space

ABSTRACT

BACKGROUND AND OBJECTIVES: Urban pause refers to those places where social interactions, human communication and the presence of people, which is the identity and meaning of the environment, are formed and are a place for citizens to gather. In fact it is a pedestrian area or a public place for urban open space. In modern applications, the social interactions of citizens in today's cities, including Tehran, have been severely damaged. The purpose of this study is to achieve a conceptual model including principles and criteria to increase social interactions of citizens in 15 Khordad Square in Tehran, Iran to determine how to realize the appropriate urban pause space, increase social interactions of residents and passers-by in this area.

METHODS: The present study has been done in a descriptive-analytical manner and based on a survey strategy with an exploratory and mixed approach, various aspects of urban space, urban pause space and citizens' social interactions are examined. The statistical population included researchers and academic elites with knowledge relating to the research topic, as well as urban planning experts, senior managers and social science experts working in Municipality of Tehran. Using a snowball sampling method, a researcher made questionnaire were distributed to 100 people. Cronbach's alpha test was performed in order to achieve reliability and validation of criteria and sub-criteria of field measurement tools. Spss software were used to analyze the obtained data.

FINDINGS: The results showed that based on the standard deviation calculations, the average score of all propositions (sub-criteria and criteria) was higher than 4 (based on 5 and average 3) accepted by experts and specialists. The standard deviation of the propositions below 1 showed that 3 functional, physical and semantic dimensions and a total of 18 components and 54 indicators in the formation of the final research model were accepted and approved by experts and specialists.

CONCLUSION: Social interactions in parts of the city not only lead to the identity of the neighborhood and the region, but also lead to human communication and the presence of people and personality and give meaning to specific places with historical and nostalgic background in the city. Biological, spiritual and psychological needs and the most important aspect of the principles of urban management. Such a city can be the main link between dynamic urban spaces and tourists.

DOI: [10.22034/IJHCUM.2022.03.02](https://doi.org/10.22034/IJHCUM.2022.03.02)



NUMBER OF REFERENCES

36



NUMBER OF FIGURES

3



NUMBER OF TABLES

8

*Corresponding Author:

Email: f.habib@srbiau.ac.ir

Phone: +989122159142

ORCID: [0000-0001-8052-6229](https://orcid.org/0000-0001-8052-6229)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

Growth and development of cities, centralization of facilities and welfare services in downtown have made aggregation problems for urban life, such as crowds and traffic problems. Powerful countries in the world have taken measures to get rid of urban traffic problems that one of them is creating an urban pause space. Urban pause space for optimal use of urban space with a focus on sustainable urban development is done with using underground spaces in cities (Gehl, 2013). Urban pause space can have positive social cultural economic and political effects of it which is created in suitable space, such as:

- The place of formation of social interactions and citizenship relations;
- Increasing the amount of social wealth in urban structure;
- The place of social integrity formation and expansion of national solidarity;
- Creating opportunities to strengthen political functions and local associations;
- The arena of displaying and cultivating cultural and social values
- Use of urban subsurface spaces;
- Preventing the waste of energy resources and increasing air and environmental pollution on the surface of the planet;
- Reduces the density of earth's surface and makes life (Steuteville, 2004).

In the United States, spaces are created for low income neighborhoods in the form of urban pause space, also with this activity, develop the economy and pedestrian mobility and provide safety for pedestrians for famous urban pause space. Rose Square in Egypt is the universal experience in the field of urban pause space and its influences on different dimensions such as reduction of traffic, tourism development, increasing walking and human centered city instead of car centered (Forman, 2014) and makes the obsessed researcher study the urban pause space in cities of the country to make a research in the field of influences of urban pause space on promoting social interactions. Naghshe Jahan square in Isfahan, Azadi square, urban pause space in Hemmat square, urban pause space in vanak square, urban pause space in Vallieasr square and recently Imamhossein square and natural bridge

in Tehran and Sheikh Safi street in Ardabil are the attractive and noticeable places of urban pause spaces in Iran (Soltani, 2020). The study of the history of Iranian architecture shows that space creation and urban planning of ancient Iran were in a way that in addition to supply daily requirements of people, It has actually been a place for aggregation and trade and it makes the importance of urban pause space in ancient Iran a noticeable topic. By spending time and due to the deprivation of new cities from this point in the development of modern cities in the new decade, it can be seen that this issue has been considered in theory and to a much lesser extent in practice. Due to the role of important urban elements and attention to architecture and culture of Iran and insufficient attention to them in development of modern cities and creating strict problems for the wealth of citizens, provide motivation to create and develop important urban elements (Soltani and Khodaparast, 2010). Panzdahkhordad Street, is one of the most important street remaining from old Tehran. This street is part of Arg Naseri and now is one of the most crowded streets in Tehran and has become a sidewalk over the years. Important historical constructions such as Khakhgolestan, Tehran radio building, historical building of national bank, historical building of Justice, Rezza bazar, Gold bazar, sabzeh square, Nasserkhosro street, Zargarha bazar entrance, Oudlajan bazar, Pamenar, King mosque, Timcheh hajabdollah, Nayeab, Moslim and Shamshiri and many other important places are located in its neighborhood areas. Fortunately due to the importance of the mentioned streets and constructions, extensive and great rebuilding's by the Municipality of Tehran and with the help of people and tradesmen are done in this street which is extremely appreciated. The area around Panzdahkhordad due to its location in the historical context and also due to the existence of Tehran Bazar has huge potential to become an urban pause space. The studied area with locating in the center core of Tehran is one of the most crowded and busy area of Tehran and is one of its remarkable commercial-cultural areas. This region has a rich history in terms of architecture and urban planning, and due to its physical nature, which is a collection of various official cultural and commercial activities, it is a place of travel for all groups of society. Also, one of the important and strategic features of this region is the location of Tehran Grand Bazaar in this

region. With its potential and the great use of the people of Tehran (businessmen and local people), this region needs more special facilities for the use of citizens, stopping in urban areas and increasing their social interactions. (Hamidi *et al*, 1997; Daneshpour and Charkhchian, 2007). Considering the significant shortcomings in the field of urban pause in social interactions in the area of June 6, Tehran, this study seeks to identify and determine the principles and criteria that, if applied, will lead to social interactions of citizens who use this space. The present study was conducted in 2011 in Tehran.

METHODS AND MATERIALS

This research is developmental in terms of depth of study and descriptive in terms of research purpose because it's done with the purpose of explaining the various aspects of urban space and social interactions. It uses the mixed approach that is a combination of qualitative and quantitative methods in a way that firstly explain the different aspects of urban space, urban pause space and citizen's social interactions in a qualitative way and with a case study strategy which is one of qualitative research strategies. In addition to the case study, the scrolling method has been used for gathering and data analyzing a quantitative method. The research approach is exploratory. The research approach as the name implies, seeks to explore the things that happen and the question is about them. The method is useful when there is insufficient knowledge about a phenomenon which does not exist, therefore the exploratory method can be used to decide whether the subject matter is worth researching or not. The exploratory method can be done by searching the literature, talking to experts in relevant field and conducting focused interviews with individuals or groups, reading various texts and writings, consulting with professors, etc. exploratory research is non-experimental and observational; in other words the researcher observes only the variables without changing them. In such studies the discovery of relationships with municipality variables are studied. The main goal in research exploration is the recognition of a situation about which necessary information is not available. In other words the researcher seeks accessing the information that can realize the research topic with them. Although it is necessary to mention any research requires a series of exploratory studies with the meaning that exploratory

research is a field of doing more important and more extensive researches. After studying the principles and history, a suitable questionnaire was designed in order to access the validity of the conceptual model of urban pause space in promoting social interactions. Due to the specialization of the subject, the first statistical population includes a number of researchers and academic experts in addition to have research experiences about urban space, urban pause space and social interactions will be selecting for questioning. Scholars, urban planning experts, senior municipal managers and social science experts are chosen through snowball sampling which is a non-random method. Researchers are used to identify potential individuals in studies or the topic that are difficult to find or limited to a very small group. 100 people were chosen in this way. According to recent study the exact statistical population of elites and academic experts on the subject of urban pause space and social interactions are not available, therefore the snowball method will be trusted about elites and experts. The research system or research core describes the role of urban pause space in promoting social interactions and is dawn as Fig. 1.

Humanistic urban planning

What is referred to as the human-centered city in urban discourse literature, may be due to the lexical limitation of returning the Latin word "people-oriented city" or "people centered city" or "human oriented city" and it is better than the word; people-oriented city or humanistic city to be used for that. Designing the topic Human oriented city versus or car-oriented city has specialized application in urban planning. The human oriented city in no way opposed to theism. It is not intended to create a duality in the form of originality to human against the absolute sovereignty of God. The translation of these specialized terms in to human centered city creates this mentality that such a view is merely rooted in the school of humanism is centered or humanism proposed by (Badri *et al*, 2018). Petrarch revealed his intellectual framework against teaching of Catholic Church and believed that every individual social movement should be measured by human standards and be judged (Asadi, 2018). The continuation of these currents of thought led to atheism and the grounding of affairs and relations and with industrial progress and replacement of mechanical relationships instead

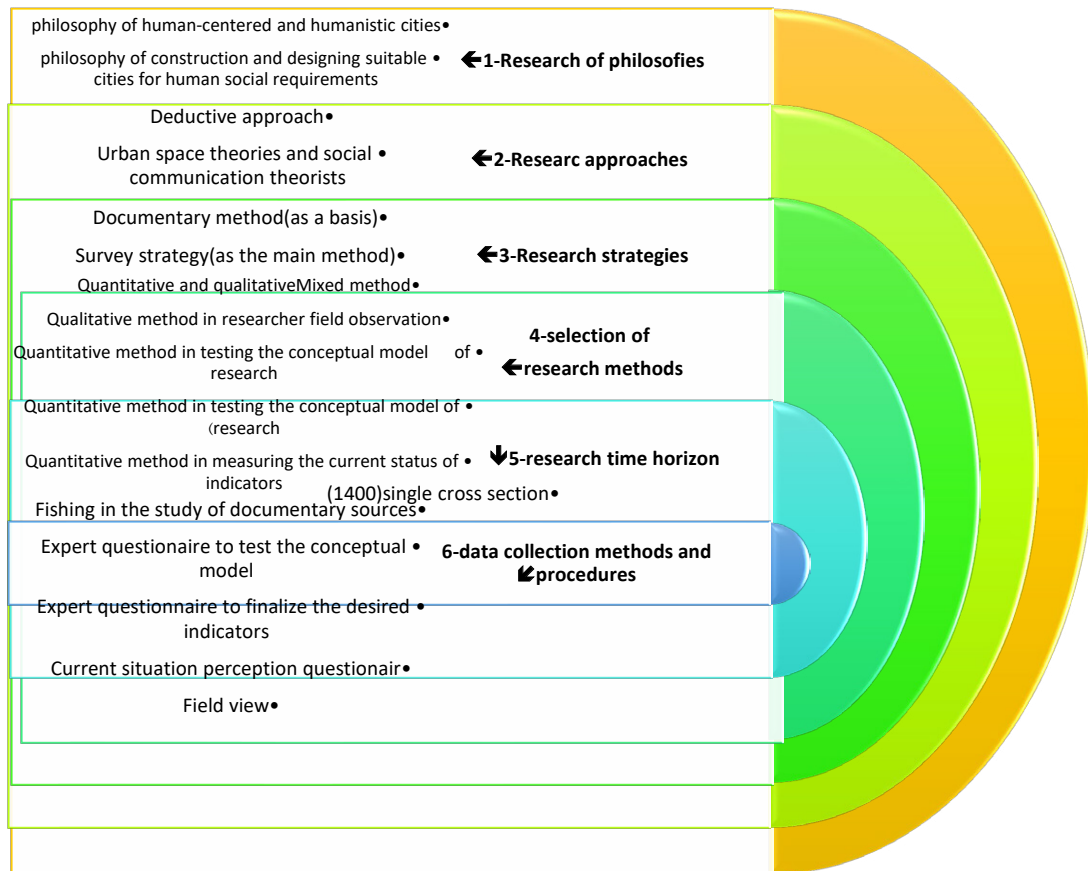


Fig. 1: Layers of research system or research onion explain the role of urban pause space in promoting interactions

of human emotions we reach the area of mechanism domination in which human is transformed in an automated life and the age of Fordism is over. As in the school of Fordism manufacturing firms with hierarchical structure operate in such way that mass production and consumerism are maximized simultaneously. One of its consequences is to achieve standards like every person is a house and every person is a car, which indicates the peak of consumerism and use of resource without paying attention to their subsequent consequences. Postmodernist movements don't have response to the instrumental use of mind and were an emphasis on the fact that humanism was necessarily opposed to traditions and values of past such as religious teachings (Sullivan, 2010; Heidari, 2015). A human oriented city is a city constructed with human scale and has special attention in physiological and spiritual needs of

human beings, the difference between human beings in proportion to the environment and the context of the city for acceptance and response to human needs. Human who can choose his destination and path of life based on his worldwide and beliefs. Of course in a Muslim society human will be oriented towards God, not the originality of the human essence. Infact being anthropocentric humanism is defined as subset of being theocentric, not in parallel or in opposition. In humanistic urban planning (Porahmad et al, 2015). The needs of fellow human beings and citizens are considered from human perspective and the orientation of urban management to the side of responding to the requirements of citizens which in fact is deemed to be the same example of serving the people and another aspect of following the divine commands (Steiner, 2012). In humanistic urbanism the rotation of powering space is such that

all individuals, groups and social classes have the right to participate in space and benefit from urban facilities and services (Haffner, 2013). The task of humanistic urban management is also to prevent monopolization of urban facilities, so that a suitable place can be seen for all citizens (Mao and Long, 2014). The theoretical model of the humanistic city is in the middle of two different views, one is the view of maximum government intervention and the other is the competitive view based on mechanism and the free market. Paying attention to the philosophy of human creation and utilizing the power and capacity of human for development and architecture so that the environment will be prepared for responding to human needs and in line with the same worldwide (Kellert et al., 2011), same as the holy Quran that commands; one of human's duty is development on earth (Pasalar, 2003).

Humanistic urban components

Citizens are the main and essential components of cities which are constantly dynamic by the nature of non-human static factor and quantitative changes (number), their distribution and quality of life in accordance with the levels of modern technology (qualitative), it is necessary that urban development and urban planning characteristics are always considered to meet the same requires and conditions, as Shahbazi (2017) also deals with this issue. After the widespread and uncontrolled entry of cars in modern cities of the world, have the various effect and consequences including the deed line of special cities in the control boundaries. In addition, the logic based on the zoning of inner-city users, causes the city to break as much as possible. In the scientific urban planning community of the world in the 1980s and 1990s one change of attitude is gradually seen that leads a process which is now called humanistic urbanism. In this urban planning as also Pakzad (2011) points out, concept and components such as comfort, citizens, their security, more efficiency of urban spaces and vitality of cities are noticeable components. In this opinion in the past construction techniques not only included construction but also spaces, and this issue requires to be revived and to achieve this target, the cooperation of all professions relevant to environment is essential. From great importance in humanistic urban planning as principals, include the following: safety, security, and welfare of citizens.

Now if it is stipulated that in the subset of the same principals, some more detailed cases be dealt with specifically, the safely of pedestrian which in the humanistic urban planning approach can be pointed to, which includes the following:

- Wide sites for movement on foot;
- A network of side walk with easy access for neighboring areas and units;
- Out skirts located around the city and away from centers of traditional units;
- Pedestrian encouragement and bicycle movement, dispersing and traffic distribution along it;
- Minimizing housing units to accommodate more people establishment of urban centers, retail stores, restaurants and residential units in about 5 minutes' walk;
- Design of streets with the possibility of controlling movement and speed;
- Encouragement of various users to encourage residential integration and retailment and business activities (Alitajer et al, 2016).

It is important to mention that interference with citizen's private spaces such as a home or a commercial personal property out of control and will power of urban planners except in a series of principle such as localizing occupation or in the view of properties. But public spaces are the arena in which the most urban planning intervention can take place. The most important urban public space are urban streets so it would be imaginable to discuss humanistic urban planning. A significant amount of writings will lead to design of urban streets. In other words, among the urban spaces, the street in the most important public area which urban planners have the most remarkable role in their design and construction because it's not owned by a person in which a person has a taste and dominates. This urban space can be very attractive in quality. Accordingly, it contributes to the quality of citizen's life where they live or just pass by. From the point of view of urban planners and designers the street must be responsible for the various activities of citizens in public spaces as an urban space. These activities can be mandatory and get the minimal influence from the physical space; either it is an activity that the person choses voluntarily or an activity influenced

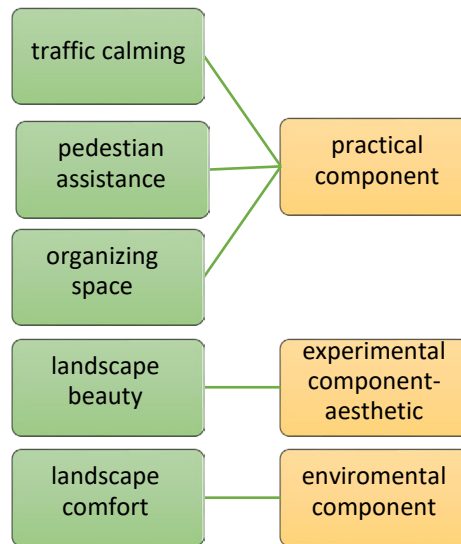


Fig. 2: Components and indicators of urban streets for a humanistic approach
(Soltani and Khodaparast, 2010)

by presence of others in public places. Soltani and Khodaparast (2010), examined the issue of streets with humanistic criteria in a research. According to studies in theoretical literature and practical experiences in creating humanistic streets they choose various indicators to measure the humanism of streets. These quality measure indicators of urban street as a consequence of three factors of functional quality, experimental quality, aesthetic quality and environmental quality were considered.

Public territory and urban pause space

The most noticeable differences between personal pause and territory are that; firstly personal space is transformed while the territory is almost stable and secondly human usually demarcates his territory and significantly makes others realize it, in the other words, it places itself in the form of a demarcated territory, which is totally significant for others. in public places pause spaces are defined as local territory. The facilities which enables the pedestrian to do some secondary activities in space are also factor of creating pause. If it is possible for the person to sit, the possibility of pause in space will be increased. Existence of visual, functional or absorbing activities. Spontaneously summon the pedestrian the pedestrian to pause in space definitely utilizes the facilities of space and stop there for a while, and realize

that itself is a response to create a sense of stillness in a space whose territory is provided as maximum tolerance of the audience, therefore enclosed safe spaces with suitable facility for comfort of people such as platforms and benches should be considered (Efroymsen et al, 2009). It is also possible to install distinct spaces from the moment routes for the comfort of people. These spaces can be separated by height difference, flooring, and lighting of movement routes. The people feel still in the space when they find their required calmness in it. Calmness is in terms, of factors affecting a person's physical aspects, such as ease of movement, security, comfort, and also peace of mind. When the space is predictable, the peace of mind will be created. Predictability of space must be possible both physically and from various events in space, it means the person should have the ability to monitor the space. To make it possible to monitor the space, any corners should be low traffic, low light, and the other words eliminate obscure corners in space. In summary, pause space must have all the characteristics of a local territory to meet the requirements of individuals. In public spaces.

Social interaction

Social interaction is defined as relationship between two people or more, which causes a relation between them and this reaction is realized for both

Table 1: Types of spatial territory

Experienced example	The amount of ownership	Time of capture	Types of territory
Room of the house	Complete	Always	First territory
Sight space	Complete	Always	Around the person
Clothes and personal accessories	Complete	Always	Proprietary territory
Haunt!	Relative and high	Limited period	Secondary territory
Parking and integrated corridor	Relative and common	Long period	Defendable territory
Parties	Relative and low	Short period	Interactive territory
Street and park	Lack of ownership	Temporary	Public territory
Chair in the restaurants	Lack of ownership	Temporary	Public area
Turn in the queue	Lack of ownership	Temporary	Temporary area

(Shahcheraghi, 2015)

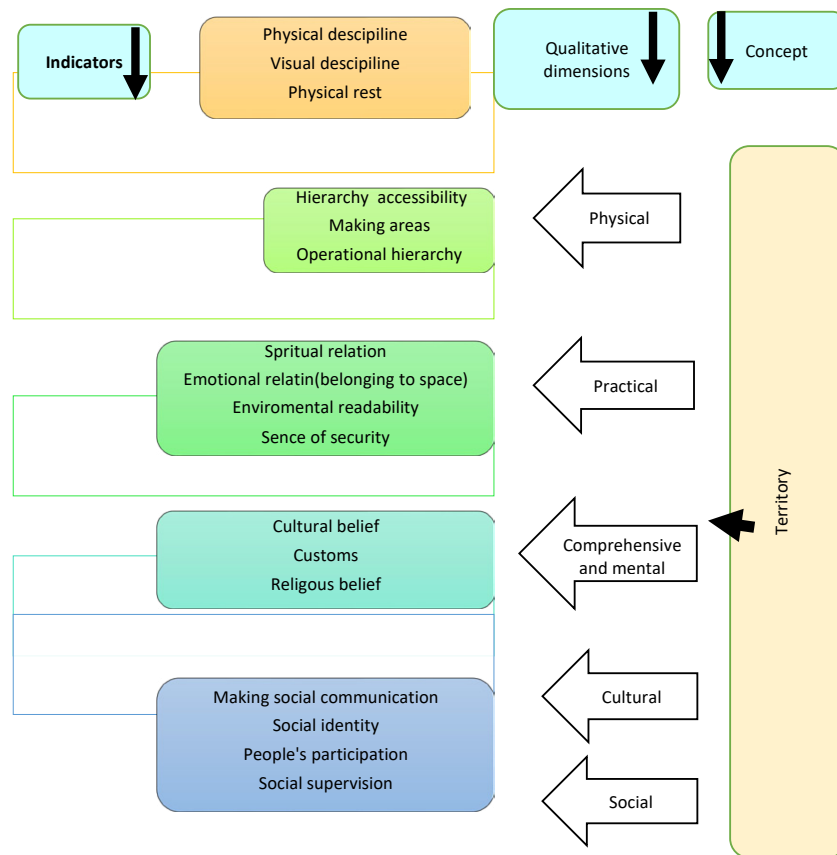


Fig 3: Qualitative indicators of spatial territory formation
(Bahreini and Tajbakhsh, 1998)

sides; therefore meaningless relationships are not in this mentioned group. Of course there are some other definitions for social interactions, As an example, social interaction and making communication can be a physical subject, one look, one discussion or communication between people which requires events definition, appropriate activities and as a result

role playing of people in space and their membership in groups and social network. Entertainment is one of basic human requirements which includes; rest and socializing. These different requirements can be met by interaction in space, therefore social interaction is one of human's demand. Social interactions depends on a sociable space to meet this demand. Two

general types of known social interactions in public spaces are defined; random social interaction such as street conversation opportunities and organized social interactions for example a party in a park (Daneshpour and Charkhchian, 2009). One of valuable aspects of public spaces is opportunity for stochastic interaction. Stochastic social interaction is divided into two types; daily (normal) interaction and sudden interaction factors creating social interaction in social spaces: proximity or neighborhood, durability, familiarity, freedom for procrastination, facilities, physical features of equipment, facilities and services, access, movement, outdoor activities. In order to have meaningful social relationships, people must be in moods of sitting, standing or walking; therefore the matter of paying attention to pedestrian movement for having meaningful experiences and making communication and receiving information can be understood.

Factors affecting social interaction

People make their social relationships based on their benefits and do it based on their expectations, norms and their specific roles, therefore the presence of individual in the places with others, is remarkable factor for the person to stay in it. Hence people may look for places where have people with similar characteristics in terms of class, ethnicity, religion, economic group, life pattern, education, salary. Way of growing up the children, similar race but despite being homogenous people, meeting encouragement and interactions increase with physical and social places this dependence promotion to that place, heterogeneous social spaces are also an opportunity for people to experience aggregation and perfect social and free interaction (Tibalds, 2008).

Cumulative elements have important influence on social interactions and among them the following can be mentioned:

- Sidewalks (narrow passages), pedestrian urban spaces, places for citizen's presence and their participation in life which consider their qualities maximize their vitality.
- Urban signs: symbols located in towns, distinguish the different parts and due to their index, have attraction and accumulate residents and ultimately establish interaction among residents. Minarets, mosques, the existence of an index

tree, urban elements, etc are examples of these urban signs.

- Spatial identity: people need identical space units to feel dependency to them. Sense of attachment is hidden inside the meaning of identity (Moghtadar et al., 2016).

Social interaction is one of the most important manifestation of successful urban spaces. Aggregated spaces have particular importance in making social relationships. Cause of the role of life and initial relationships of people's socialization as one of essential human requirement is possible when spaces are designed in a way to respond to social interaction appropriately. The use of the word sociable, indicates the quality of spaces which bring people together or make them separated (Efroymson et al., 2009). The sociability of public spaces promotes a spirit of solidarity and individual growth for all citizens, regardless of gender, ethnicity, race, age or social and economic status. If a collective space has desirable characteristic, it would be capable to attract people. Parks as one of collective spaces have potential role in socializing and creating social interactions. Various aspects are involved in creating social interaction in collective spaces, researches, based on research factors, affecting socialization are in two general categories of factors. "Physical" and "activity". Factors that emphasize on physical dimension, like privacy provision, territory, legibility, comfort and security are factors such as environmental experiences, presence and social interactions refer to the activity dimension of space (Shafteoe, 2012).

Physical components affecting socialization

Physical space in any environment performs as a space system and the characteristics of this space system affect social interactions of users. The physical environment provides facilities and spatial organization special systems and patterns consolidate actually in space and diminish other activities; in other words physical environment facilitate the formation of group relationships and provides a pleasant level of privacy in activity space. It includes dimensions, space geometry and space relationships in activity spaces. Provide essential indicators for constancy and peoples comforts in the environment and at last man made environment generates and guarantees and esthetic feelings, experiences and

symbolic perceptions as qualities, affect the users in the environment and offices. Eagerness for group activities in life environment in different levels of family and groups, is relevant to organization of physical space and its quality is extremely efficient in biologist of residents. Physical factors can cause entry or stop inside the space for individuals. Also factors such as availability, visual attractions and natural factors for creating space can play an effective role in creating a sense of security and lead to increased interaction between space users (Giddens, 1994).

Activity components

Activity components of public spaces are related to activities and surrounding users. The behavioral nature of a space form through different activities. When people are active and present in a space to watch and listen, they make the environment of space, alive and dynamic and transform it with inactive participation. Dependency to a place is enhanced not only by physical aspects but also by the quality of behaviors and social interaction in space (Dines and Cattell, 2006). There are enough spaces for sitting and special events occurring in space such as street performances, public arts and similar events that connect the people, increase the attraction of spaces. William White believes; there are perfect opportunities for making communication between people and eagerness for talking to each other, in the process of such events collective spaces such as parks have appropriate physical and activity features, will be considered as safe place and will be capable to attract different groups of society. This issue finally increase social interaction in proposed user (Kogani, and Pirmohammadi, 2015).

The role of urban space in developing social relations

According to the Maslow pyramid, human requires to establish social relationships (Hopper, 2020). Maslow believes that this requirement is because of physical requirement, trust and safety requirement and requirements of social relationships and respectfulness and dignity and approval and encouragement requirements. Urban space makes the possibility of social scope expansion and face to face encounters, which is due to high potential of such space in a variety of good exchanges, rumors, information and news (Andishmand, 2018). Also social relationships improvement causes the trustiness' and

increase the dignity and social position, although urban space has a huge potential to reinforce group behaviors and social reactions (Roy *et al.*, 2014), it is talented in collective behaviors more than any other places as a prone classifier of social life. Therefore Mumford believes main performance of urban space is shaping the city collectively and the basic function of the city is to give the city a collective shape which Martin (2016) rightly call it "the relationship between me and you". Operation which has provided the possibility of many gathering, numerous meetings and many competitions between different individuals and groups in a way that the exhibition of social life can come on stage there, actors and spectators change their role. Instead the social function of open urban spaces enables the gathering of individuals. The existence of groups and the movement of people in the urban space is the key of success for urban space, and this is the image which "Jane Jacobs", presents of urban space and considers it as the main factor in the nature of urban space Jacobs and Jacobs, (1996). The feature like being dynamic and alive of a city depends on complex, dense and crowded urban centers; density and congestion and proximity and the activity of people are ideal images because such features attracts more city residents to the urban centers and it leads to economy promotion in such urban environments and give them on new, active and vibrant face Suzuki *et al.*, (2013), and these features spread to the whole city, on the other hand the more present of people cause to different reactions and provide the social emotional requirements of human being (Ghalambardzfuli and Naghizadeh, 2014).

The influence of framework on social interaction

If the urban framework is considered to be the same set of intertwined buildings and places that the people of the city are its residents and life continues in the pores and empty spaces, It can be concluded that the framework and biosocial which take place within cannot be separated (Rebernik *et al.*, 2017). People are naturally sociable and love guttering with others but to create a memorable space where you can gather and mingle, a place, focus or support are demanded. Those gathering places may be around fountains, artwork, and platforms or around memorable constructions. Those constructions usually have a place to sit, a lip to lean on, a place to shelter from the sun and rain and have a quiet place

to chat even those who don't know each other well, find justification for presence of each other in these places. What makes these spaces social and active, refers to framework factors which cause entry and then stop for people inside the space factors such as; access, visual attractions and natural factors (Mehta, 2014).

Effect of function on social interactions

The activity dimension of public spaces is related to the surrounding activities and users. Jane Jacobs in "life and death of huge American cities, reveals that one of the most important of urban life promotion is combination of urbanization with commercial and residential practices on a neighborhood scale. Studies show public spaces where people are able to work in the environment by looking at others, sitting, eating, retail activities, sport activities or in White's words events or Woody interpretation of active and inactive entertainment, are more attractive for people. These activities and many other activity and physicality features give identity to public spaces and influence the comfort and give people the possibility to enjoy for being in space (Shahbazi et al., 2017).

Designing urban space to increase social interactions

Designing urban space to increase social interactions, Ghalambardzfuli and Naghizadeh (2014), the target of studying the relation between specs and social interaction, is an attraction of people to space in which encouragement for communications

and social interaction is considered between people. If the space be able to supply the general and special expectations, the presence of people in that space will be possible. It means firstly the space should include basic criteria's such as security. The secondary purpose is that, in addition to the presence in space, the person should be encouraged to communicate and interact in space. It means that this space in addition to initial criteria's, require other criteria's which support pause in space, for example if you demand furniture's as well as urban space, this furniture should be in a way to support face to face contact. In this case the placement of benches moving and facing each other are preferred to the fixed and row benches. The ultimate goal is also the creation of social interactions is formed by achieving primary and secondary goals and with the presence of people as the most important influential factor. In fact existence of appropriate and physical factors as the main factors supporting the presence. The possibility of face to face encounters has increased and social interactions are formed. Ghalambardzfuli and Naghizadeh (2014) reveal that; in the field of the role of environmental factors in the creation of social interactions two main concepts are identified, by reading the theoretical concepts presented. One discusses the interaction of space and environment with people and its impact on the formation of social interactions and another discussion of people's interaction with people in the sense of what William White expresses the presence of people as an effective factor in attracting people.

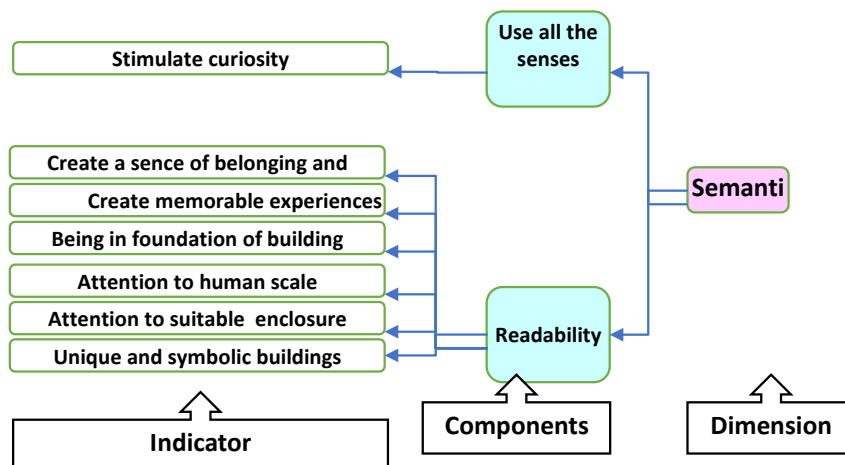


Fig 4: Semantic effective factors on social interaction promotion

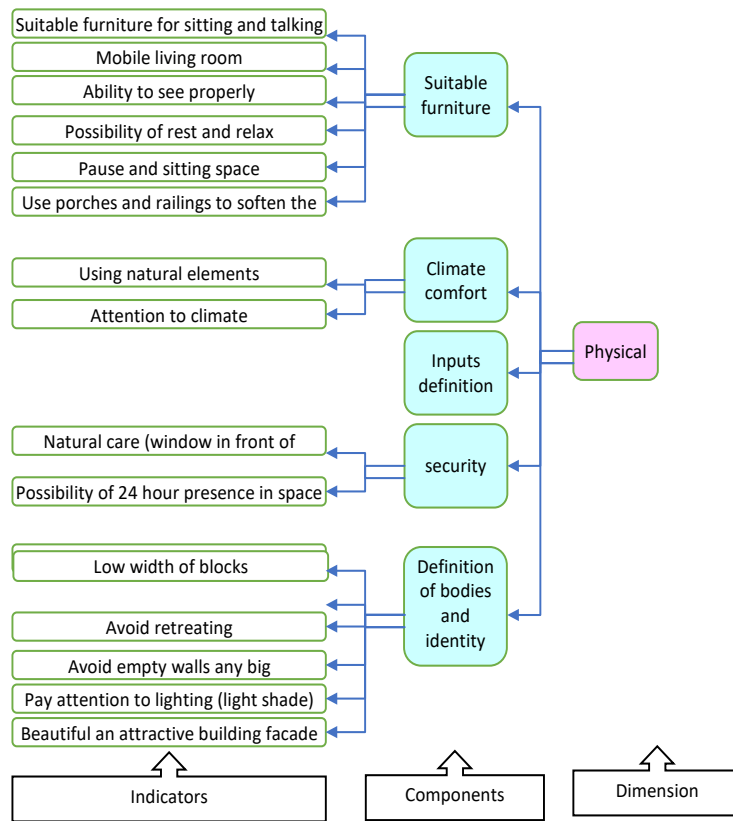


Fig. 5: Physical effective factoors on social interaction promotion

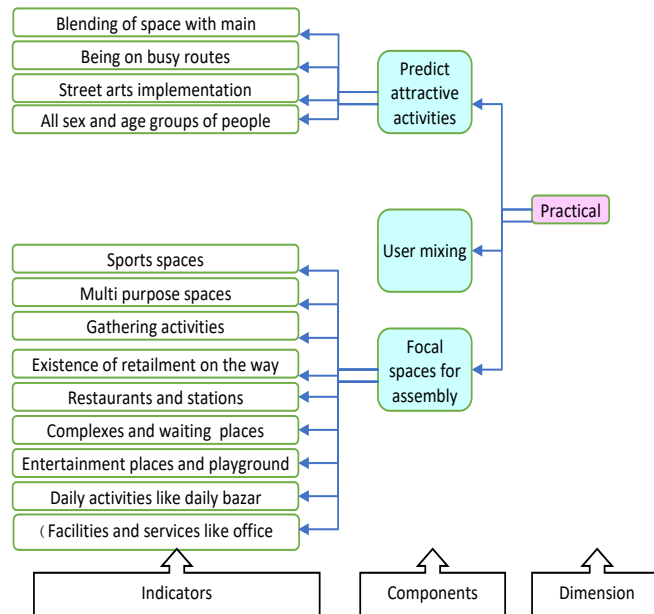


Fig. 6: Effective practical factors on social interaction promotion

Table 2: Semantic dimension subset indices

Stimulate curiosity
Smell quality and the aroma of environment
Ceate a sense of belonging to the space
Create memorable experiences
Pay attention to the human scale
Pay attention to proper confinemen
Cleanliness and beauty of the enviromen
Existance of unique and symbolic buildings and creation of symbols encouraging presence
Existance of haunt
A gathering place for age and sex groups
Location identification
Memorable space and place
Implementaton of street arts
A sex and age activities
Gathering activities
Places of hosting(restuarants and statios)
And playground entertainment places
Being on the way of daily activity(daily bazar)
Retailment on the way
Facilities and services (office)
Constand and continuous pedestrians
Design based on behavioral available patterns
Facilities for disabled people
Organic communication with city foundation and city center
Variety of activities and users
Creating various activities in space
Domminance of retailers and peddlers
Celebrating in space
Proximity to intersections and urban nodes
Communication with shopping malls
Communication with historical and cultural places
Space communication with urban symbols and signs
Respond to events and ceremonies
Being big enough for the people using space

Table 3: Subdivisions of the physical dimension

Suitable furniture for sitting and talking
Possibility of rest and relax
Using natural elements
Paying attention to regions in design
Natural care and supervision of citizens
Possibility of being in space all day and public monitoring of citizens
Security agains vehicle movement
Pay attention to lighting)creating a light shade
Attractive building facade
Visual vision to natural and suitable element
Create consecutive and varied visual sequences
Design of stable city
Use of native elements
Ecosystem balance
Removal or reducing pollution(audio and air)
Establishment of services that lead to the continued presence of citizens
Establishment of leisure users
Body path lighting
Light emphasis on key elements and buildings

The first concept includes environmental factors that affect the possibility of the formation of face to face collisions that can divide these environmental factors in the form of 3 components; physical, semantic and functional factors (Figs. 4, 5 and 6).

Analysis of findings

After studying the basics of the subject and its background, a set of dimensions, components and indicators was obtained, which is presented in the form of a conceptual model. The conceptual model includes the following;

To test the accuracy and validity of the obtained model, a questionnaire was used which was distributed among experts. Experts included university professors in the Department of Urban Management, Urban Planning, Geography and Urban Planning, Social Sciences, PhD students, graduate students, and urban and municipal specialists. Provided that they have experience in the field of urban spaces, urban pause space, social interactions

and public urban spaces. In completing these questionnaires, first the subject of research and its purpose were well explained and then the proposed model that the research has achieved (conceptual model of research) was provided to them. Finally, the descriptive statistics of the statistical community are given (Table 4). Then, the analytical statistics related to the test of the conceptual model of the research (including criteria and sub-criteria of measurement) are inserted. Specialists, experts and professors were asked to answer questions about the validity and appropriateness of the model. The frequency distribution of the population by gender is shown in Table 5, which shows that 77% are men and 32% are women.

An examination of the frequency distribution of the population in terms of education shows that 55% have a doctorate and 44% have a master's degree (Table 6).

Then, the questions asked by experts and specialists regarding the components of the

Table 4: Age composition

		Abundance	Percentage	Variable percentage	The cumulative percentage
Variable	Year 39 to	13	13.0	13.1	13.1
	From 40 to 49 year	57	57.0	57.6	70.7
	Year 50 and higher	29	29.0	29.3	100.0
	Total	99	99.0	100.0	
	Without	1	1.0		
	Total	100	100.0		

Table 5: Gender composition

		Abundance	Percentage	Variable percentage	The cumulative percentage
Variable	Man	77	77.0	77.8	77.8
	Woman	22	22.0	22.2	100.0
	Total	99	99.0	100.0	
	Without response	1	1.0		
	Total	100	100.0		

Table 6: Composition in terms of education

		Abundance	Percentage	Variable percentage	The cumulative percentage
Variable	BA to MA	44	44.0	44.4	44.4
	PHD	55	55.0	55.6	100.0
	Total	99	99.0	100.0	
	Without response	1	1.0		
	Total	100	100.0		

Table 7: Criteria for measuring the appropriateness and validity of the conceptual model of the role of urban pause space in promoting social interactions

Description of criteria / sub-criteria	Criteria
The degree of adaptation to the subject and objectives of urban pause research on the promotion of social interactions?	Suitability
The degree of compatibility with the macro goals of citizens' social interactions in the urban space?	
The degree of adaptation to the current conditions of the country's central cities and metropolises?	
To what extent is the ability to solve problems caused by the lack of urban pause space and weak social interactions in the future?	Effectiveness
How useful is it to improve the conditions for interventions in urban space to improve citizens' interactions?	
Acceptance of the model by experts and professors?	Legitimacy
Acceptance rate in the context of sustainable city policies and sustainable urban development?	
Acceptance of the model by senior municipal experts and urban planning and urban planning experts?	
To what extent is it cohesive as an interconnected set?	Continuity
To what extent is it evaluated as a set of traceable strategies and activities that can be implemented in the long run?	
Ability to test and repeat the pattern in other times and places (different cities of the country)?	Flexibility
To what extent is it applicable to middle cities or metropolises with a similar situation?	
To what extent is it in line with existing laws, regulations and policies in the field of urban design and urban space furniture?	Regularity
To what extent is it in line with the goals and demands of urban management?	
The degree of transparency and unambiguity	Transparency

Table 8: Cronback's alpha test of the measured criteria shows that the reliability of these criteria and sub-criteria is very high

		N	%
Cases	Valid	91	91.0
	Excluded ^a	9	9.0
	Total	100	100.0
a. Listwise deletion based on all variables in the procedure.			
Reliability Statistics			
Cronbach's Alpha		N of Items	
.941		15	

Table 9: Mean and standard deviation of each of the criteria and sub-criteria of the overall evaluation of the research conceptual mode

	Number	Minimum	Maximum	Average	Standard deviation
Suitability	100	3.00	5.00	4.6200	.63214
	100	3.00	5.00	4.6100	.66507
	100	3.00	5.00	4.6300	.63014
Effectiveness	98	3.00	5.00	4.6020	.65393
	99	3.00	5.00	4.5859	.68527
	99	3.00	5.00	4.6263	.64817
Legitimacy	100	3.00	5.00	4.6700	.56951
	99	3.00	5.00	4.6465	.61134
	99	3.00	5.00	4.6566	.60881
Continuity	100	3.00	5.00	4.6100	.66507
	99	3.00	5.00	4.6667	.60609
	100	3.00	5.00	4.6700	.60394
Flexibility	99	3.00	5.00	4.6566	.59181
	100	3.00	5.00	4.5900	.62109
	99	3.00	5.00	4.5859	.63904
Regularity	99	3.00	5.00	4.5859	.63904
Transparency	99	3.00	5.00	4.5859	.63904
Valid N (leastwise)	91				

Table 10: Extracted indicators

Indicators	Components	Dimension
Performing street arts	Attraction of activities	Operational
Activity for all people		
Gathering activities		
Place of restaurants and stations	Focal points of accumulation	
Entertainment places(parks),games and sports		
Being in daily activity path(daily bazar)		
Being retailment on the way		
Being in the path of facilities and services	Accessibility and interaction	
Existence of constant and continuous pedestrians		
Design based on behavioral and available model of people		
Existence of facilities for disabled people		
The relationship between the body and the foundation of the city and city center		
Variety in activities and users	Mixing user and activity	
Existence of various activities in space		
Dominance of retailers and peddlers		
Making different celebration in space		
Proximity to intersections and urban nodes	Deployment position	
Spatial relationship with shopping malls and business centers		
Proximity and connection to historical and cultural places		
Spatial relationship with symbols and signs		
Respond to events and happenings	Size	
Being large enough for the space user population		
Stimulate curiosity	Sensory richness	
Voice quality		
Quality of smell and aroma of the environment		
Create a sense of belonging to space ^l		
Getting memorable experiences	Readability	Semantic
Pay attention to human scale		
Pay attention to suitable siege		
Cleanliness and beauty of environment		
Existence of unique and symbolic buildings and creation of symbols encouraging presence		
Existence of haunt	Behavioral camp	
Places of gathering different sex and age		
Identity of place		
Memorable space and place	Identity	Physical
Suitable furniture for sitting and talking	Proportion of furniture	
Possibility of rest and calmness		
Using natural elements		
Pay attention to climate in design	Eclipse calmness	
Care and supervision of citizens(window in front of street)	Security	
Possibility of being in space 24 hours and monitoring citizens		
Security against transformation movement		
Pay attention to lighting(penumbra)	Definition of body and wall identity	
Beautiful and attractive building facade		
Visual version of desirable natural elements		
Create consecutive and varied visual sequences	Aesthetic	
Urban stable design	Environmental	
use indigenous elements		
Ecosystem balance		
Delete or reduce pollution(voice and air)		
Establishment of service users that lead to the continued presence of the citizens	Vitality	
Establishment of leisure users		
Body path lighting		
Light emphasis on key elements and building		

conceptual model of the research (in the form of a questionnaire) include a set of questions including criteria and sub-criteria, which are described in Table 7.

Table 9 shows the test of each of the sub-criteria related to measuring the validity of the research model:

According to the average score of a propositions (sub –criteria and criteria (higher than 4) is based on 5 and the average is 3, located experts and specialists. On the other hand the standard deviation of the propositions show that the opinions are completely in line and close each other. In this research, firstly the studies of the principles and literature on the subject of urban pause spaces and also social interactions in urban spaces and also social interactions in urban spaces were performed, then set of dimensions components and indicators were identified. The relevant conceptual model was drawn and were available to the experts and elites, in following the proposed conceptual model is tested with this method. In general the research result show that in the study and research of the role of urban pause space on the promotion of social interactions. The following model should be used which includes (Table 10).

CONCLUSION

Growth and development of cities, centralization of facilities and welfare services in downtown have made aggregation problems for urban life, such as crowds and traffic problems. Powerful countries in the world have taken measures to get rid of urban traffic problems that one of them is creating an urban pause space. Urban pause space for optimal use of urban space with a focus on sustainable urban development is done with using underground spaces in cities. The purpose of this study is to achieve a conceptual model including principles and criteria to increase social interactions of citizens in 15 Khordad Square in Tehran, Iran to determine how to realize the appropriate urban pause space, increase social interactions of residents and passers-by in this area. The present study has been done in a descriptive-analytical manner and based on a survey strategy with an exploratory and mixed approach, various aspects of urban space, urban pause space and citizens' social interactions are examined. The standard deviation of the propositions below 1 showed that

3 functional, physical and semantic dimensions and a total of 18 components and 54 indicators in the formation of the final research model were accepted and approved by experts and specialists. Social interactions in parts of the city not only lead to the identity of the neighborhood and the region, but also lead to human communication and the presence of people and personality and give meaning to specific places with historical and nostalgic background in the city. Biological, spiritual and psychological needs and the most important aspect of the principles of urban management. Such a city can be the main link between dynamic urban spaces and tourists.

AUTHOR CONTRIBUTIONS

Z. Yaghoubpour, performed the literature review, experimental design, analyzed and interpreted the data, prepared the manuscript text, and manuscript edition. F. Habib, performed the experiments and literature review, compiled the data and manuscript preparation. Z.S.S. Zarabadi, helped in the literature review and manuscript preparation.

ACKNOWLEDGEMENT

This article is the result of a research conducted to obtain a doctoral degree that has been approved by the Department of Urban Planning, Faculty of Art and Architecture, Islamic Azad University, Science and Research Branch, Tehran, Iran. The Authors would like to appreciate those who had helped in the fulfillment of this research.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors. According to the authors of the present study, there wasn't any conflicts of interest.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons

license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

LIST OF ABBREVIATIONS

UPS	Urban pause space
SI	Social interactions

REFERENCES

- Andishmand, A.M., (2018). A study of the sociability of public libraries. *J. Archit.*, 2(8): **(7 pages)**. (In Persian)
- Alitajer, S.; Sajadzadeh, H.; Saadati vaghar, P., (2016). A Study of sociability factors' influence on educational spaces: the case of the school of art and architecture of bu-ali sina University. *Armanshahr Archit. Urban Dev.*, 9(16): 1-13 **(13 pages)**. (In Persian)
- Asadi Ashkarlati, M.R., (2018). Evaluating and measuring the level of satisfaction with the performance of urban management and municipalities with emphasis on urban services (Case study: Quds city). *National Conference on Urban Planning, Architecture, Civil Engineering and Environment*. (In Persian)
- Badri, N.; Mirsaid, M.; Akbari, S.; Iranzadeh, S., (2018). Identifying and prioritizing the factors affecting the social stability of the place in the educational space (Case study: Faculty of Art and Architecture, Islamic Azad University of Tabriz). 2(5). (In Persian)
- Bahreini, H.; Tajbakhsh, G., (1998). Territory meaning in urban space and urban design role to realization it. *Honarhayeh- Ziba J.*, 6: 18-31 **(14 pages)**. (In Persian)
- Daneshpour, S.A.; Charkhchian, M., (2007). Public spaces and factors affecting collective life, *Bagh-e Nazar*, 4(7): 19-28 **(10 Pages)**. (In Persian)
- Daneshpour, S.A.; Charkhchian, M., (2009). Investigating the components of responsive public spaces design. *Geog. Plann.*, 14(30): 53-86 **(34 pages)**. (In Persian)
- Dines, N.; Cattell, V., (2006). *Public spaces, social relations and well-being in east London*. London: The policy press.
- Efroymsen, D.; Ha, T.T.K.T.; Ha, P.T., (2009). *Public spaces: How they humanize cities*. Dhaka: HealthBridge-WBB Trust.
- Forman, R.T., (2014). *Urban ecology: science of cities*. Cambridge University Press.
- Ghalambardzfuli, M.; Naghizadeh, M., (2014). Urban design the context of social interaction enhancement (Case study: street between neighborhoods). *J. Hoviatshahr*. 9(17): 15-24 (10 pages). (In Persian)
- Giddens, A., (1994) *Sociology*. Translated by M. Sabouri. Publisher: Tehran: Ney Publishing. (In Persian)
- Ghalambardzfuli, M.; Naghizadeh, M., (2014). Designing an urban space to promote social interactions (Case study: Inter-neighborhood boulevard). *City identity*. 8(17). (In Persian)
- Gehl, J., 92013). *Cities for people*. Island press.Hamidi, M.; Sirous Sabri, R.; Habibi, M.; Salimi, J., (1997). *Skeleton of Tehran*, 1: Tehran: Technical and Civil Deputy of Tehran Municipality.
- Haffner, J., (2013). *The view from above: The science of social space*. mit Press.
- Heidari, H., (2015). Functional analysis of social interactions in traditional examples of urban space case study: Traditional urban spaces of Kermanshah. *National Conference on Native Iranian Architecture and Urban Planning*. Yazd-February 2015. (In Persian)
- Hopper, E., (2020). *Maslow's hierarchy of needs explained*. ThoughtCo, ThoughtCo, 24.
- Jacobs, J.M.; Jacobs, J.M., (1996). *Edge of empire: Post colonialism and the city*. Psychology Press.
- Kellert, S.R.; Heerwagen, J.; Mador, M., (2011). *Biophilic design: the theory, science and practice of bringing buildings to life*. John Wiley & Sons.
- Kogani, M.; Pirmohammadi, M., (2015). Investigating the role of urban public spaces in social interactions. *The Second International Conference and the Fourth National Conference on Architecture, Civil Engineering and Urban Environment*. (In Persian)
- Mehta, V., (2014). Evaluating public space. *J. Urban design*, 19(1): 53-88 **(36 pages)**. Mao, M. and Long, Y., (2014), June. Open data, crowdsourcing, and city planning. In *2014 22nd International Conference on Geoinformatics*. IEEE. 1-4 (4 pages).
- Moghtadar, B.; Etesam, I.; Mehrdad, M., (2016). Developing a framework for promoting social interactions in the architecture of industrial towns in rural areas of Tehran. *Islam. Art Stud.*, 39: 440-450 (11 pages). (In Persian)
- Martin, P.J., (2016). *Rock and Role Playing: Sociological Themes in the Work of Simon Frith*. *Popular Music Matters*. 133-144 **(12 pages)**. Routledge.
- Pakzad, J., (2011). *Guidance of urban place design in Iran*. Gisoom publishing Group, Tehran. **(472 pages)**. (In Persian)
- Pasalar, C., (2003). *The effect of spatial on student's interactions in middle schools: Multiple case analysis*, unpublished thesis for degree of doctor of philosophy faculty of North Carolina State University.
- Porahmad, A.; Garousi, A.; Noori, A., (2015). Evaluating the housing indicators in NazarAbad County (towards a healthy city approach). *Phys. Dev. Plann.*, 2(4): 21-33 **(13 pages)**. (In Persian)
- Roy, M.J.; Donaldson, C.; Baker, R.; Kerr, S., (2014). The potential of social enterprise to enhance health and well-being: A model and systematic review. *Soc. Sci. Med.*, 123: 182-193 **(12 pages)**.
- Rebernik, N.; Osaba, E.; Bahillo, A.; Montero, D., (2017). A vision of a smart city addressing the needs of disabled citizens. In *Proceedings Accessibility 4.0, Conference Paper, Malaga 27th*, 70-79 **(10 pages)**.
- Shaftoe, H., (2012). *Convivial urban spaces: Creating effective public places*. Routledge.

- Soltani, A.; Khodaparast, B., (2010). Evaluation of urban streets based on humanistic approach (case study of Somayeh Street in Shiraz). *J. Armanshahr Archit. Urban Plann.*, 3(5): 97-110 **(14 pages)**. (In Persian)
- Soltani, A., (2020). The concept of humanistic city and automobile city in urban planning. IRNA.
- Shahbazi, Y.; OskooiBalali, A.; Shahabi, E., (2017). Assessing the concept of desirable territory in urban public spaces Case study: Tehran Nature Bridge. *Q. J. Urban Stud.*, 6(24): 67-80 **(13 pages)**. (In Persian)
- Sullivan, G. ed., (2010). *Art practice as research: Inquiry in visual arts*. Sage.
- Steuteville, R., (2004). *The New urbanism and alternative to modern automobile-oriented planning development*. Available on: faculty.ncf.edu.
- Steiner, F.R., (2012). *The living landscape: an ecological approach to landscape planning*. Island Press.
- Tibalds, F., (2008). *Citizen-oriented Urbanism: improving public areas and urban environments*, translated by M. Ahmadinejad. Isfahan: Khak Publications.
- Suzuki, H.; Cervero, R.; Iuchi, K., (2013). *Transforming cities with transit: Transit and land-use integration for sustainable urban development*. World Bank Publications.

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Yaghoubpour, Z.; Habib, F.; Zarabadi, Z.S.S., (2022). Conceptual model of the role of urban pause space in promoting social interactions. *Int. J. Hum. Capital Urban Manage.*, 7(3): 309-326.

DOI: [10.22034/IJHCUM.2022.03.02](https://doi.org/10.22034/IJHCUM.2022.03.02)

url: http://www.ijhcum.net/article_251782.html



International Journal of Human Capital in Urban Management
(IJHCUM)

Homepage: <http://www.ijhcum.net/>

ORIGINAL RESEARCH PAPER

Leadership style and company performance in the manufacturing industry

L. Wei¹, H.L. Vasudevan^{1,2,*}

¹ Faculty of Business and Communication, Inti International University, Nilai, Malaysia

² Graduate School of Business, University Tunku Abdul Razak, Kuala Lumpur, Malaysia

ARTICLE INFO

Article History:

Received 14 February 2022

Revised 09 May 2022

Accepted 11 June 2022

Keywords:

Company Performance
China Manufacturing Industry
Tannenbaum and Schmidt
leadership style

ABSTRACT

BACKGROUND AND OBJECTIVES: Leadership styles will have different effects on company performance, so many literatures in China study the relationship between leadership styles and company performance in manufacturing. The purpose of this study is to investigate the relationship between leadership styles and company performance in Chinese manufacturing. As a result of ineffective management in leading employees, China is currently experiencing poor financial and marketing performance, which has resulted in poor business operations and lower productivity, both of which have a direct impact on the company's performance in China's manufacturing industry.

METHODS: This study adopts quantitative research method to collect data of factors affecting company performance through questionnaires, the sampling technique is snowball sampling. A total of 450 questionnaires were sent out to the respondents, and a total of 384 questionnaires were returned. Among them, 290 questionnaires were usable. A preliminary study was conducted to ensure that the adjusted questionnaire items were appropriate and valid for the study. In actual data collection, 290 responses were successfully collected in this study, with a response rate of 65%. The SPSS software was utilized to analyze the data in this study.

FINDINGS: Based on the quantitative data analysis, the findings found that dictatorial leadership style paternalistic leadership style, autocratic leadership style, and laissez-faire leadership style insignificantly correlated with company performance in China. Democratic leadership style significantly correlated with company performance in China. Further, research findings have been discussed in the discussion of results.

CONCLUSION: These findings may provide the purpose of this study that characterize company performance, confirm leadership style in the Chinese manufacturing sector, and apply performance theory to further analyze the effect of leadership style. The Tannenbaum and Schmidt leadership styles should suggest that leadership behaviour varies along a continuum, with a level of follower participation and involvement in decision-making growing as leaders move away from the authoritarian extreme.

DOI: [10.22034/IJHCUM.2022.03.03](https://doi.org/10.22034/IJHCUM.2022.03.03)



NUMBER OF REFERENCES

59



NUMBER OF FIGURES

1



NUMBER OF TABLES

4

*Corresponding Author:

Email: hemaloshinee@unirazak.edu.my

Phone: +60126281490

ORCID: [0000-0002-2767-8044](https://orcid.org/0000-0002-2767-8044)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

In 2021, manufacturing accounted for 27.44% of China's Gross Domestic Product (GDP), making it an indispensable industry in China's economic development (Li, 2018). Compared with the impact of the COVID-19 pandemic in 2020, China's manufacturing industry has recovered very quickly, which is an important condition to support the healthy development of the real economy and promote China's sustainable development (Erjavec *et al.*, 2018). Manufacturing is the processing and production of goods through the interaction of labor and mechanical tools (Akpapere *et al.*, 2019). The sending and distribution of workers and supplies were significantly hampered when COVID-19 occurred, disrupting the global manufacturing industry, especially small industries, which like the rest of the firm, lacked methodical management and skilled leadership to lead it through the crisis and was thus seriously (Muenjohn *et al.*, 2018). Therefore, good leadership is one of the important factors of sustainable development, and Tannenbaum and Schmidt Continuum is a very simple and easy-to-understand leadership theory mode (Li, 2018). Which shows the level of freedom leaders choose to give to the team and the authority used by leaders' relationship between degrees (Ginesti *et al.*, 2018). In China, due to ineffective management, the performance level of multiple manufacturing companies is low, resulting in the proportion of China's manufacturing industry in GDP decreased from 28.95% in 2015 to 26.18% in 2020 (Siagian *et al.*, 2020). Management roles create unfair workplace and ineffective employee management, direct changes in operational productivity and company performance (Yu and Huo, 2018). Different leadership has different ways to build employee loyalty and trust. When a business is poorly run, it can do lasting damage to employee relations and lead to a toxic and unsavory work atmosphere that leads to poor business performance (Yu *et al.*, 2018). Many companies' management failed to detect internal signs of disappointment and external changes in business decline (Bavoso, 2018). Due to poor management, many companies are faced with unethical practices, poor financial performance and high attrition rates that make it difficult to achieve set goals (Romule *et al.*, 2020). The relationship between

management and employees is always crucial to the success of a company because there is a direct cause-and-effect relationship between them, which helps achieve the common goals of the company (Chakraborty *et al.*, 2018). There is a positive correlation between poor management and company performance, the management lacks adaptability to the opinions of subordinates, the rapidly changing business environment leads to the situation of making wrong decisions in strategic planning and forecast, and the company's financial or profit burden is high (Osadchy *et al.*, 2018). The purpose of this research is to see how Tannenbaum and Schmidt's leadership style influences company performance in China's manufacturing business. It aims to learn why it's critical to figure out which leadership style is optimal for each employee to increase company performance. The innovation of this study is to display the effectiveness of a company's performance is influenced by its employees' skills and knowledge, technology, equipment, working environment, strategic setting, and human interaction process (Hamdan, 2018). Therefore, whether different leadership styles in Tannenbaum and Schmidt leadership have a significant impact on the performance of Chinese manufacturing companies, and what leadership styles are preferred by employees and can improve company performance, further research is needed. Environmental factors such as intense competition, changing customer needs, and the rate of technological development affect the performance of many businesses. Internally, the company faced challenges such as unethical business practices, high employee turnover, and poor financial management, all of which resulted in unrealized missions and visions. Because a variety of factors within a company affect its financial and marketing performance and help maintain its survival and competitive position, company performance remains an important research variable in the field of management (Nefdt, 2019). According to the literature review, in China, there are still few research on the relationship between Tannenbaum and Schmidt's leadership theory and manufacturing company performance (Chen and Appienti, 2020). To achieve these objectives, the research survey was conducted among employees in manufacturing at Shanghai, Jiangsu, and Zhejiang in March 2022.

Literature review

Empirical study on the relationship between Tannenbaum and Schmidt's leadership style and company performance

Company performance refers to a company's ability to achieve high profits, good product quality, market share, and good financial results over a period, whether the company can meet the needs of market stakeholders or its own survival goals (Kurilova and Antipov, 2020). In a competitive market, company performance may be considered as a criterion for judging whether a firm can satisfy the requirements of its stakeholders or accomplish its own survival goals. Dictatorial Leadership Style, Paternalistic Leadership Style, Autocratic Leadership Style, Democratic Leadership Style and Laissez-Faire Leadership Style were developed by Tannenbaum and Schmidt, who enhanced the characteristics of the dictatorial to laissez-faire dichotomy, resulting in five distinct leadership styles: Dictatorial Leadership Style, Paternalistic Leadership Style, Autocratic Leadership Style, Democratic Leadership Style, and Laissez-Faire Leadership Style (Davis and Silvestri, 2020). The anti-democratic leadership style creates a political environment in which the concentration of power in individuals must be limited to achieve positive change (Nefdt, 2019). This leadership style also lacks innovative ideas because individual groups are not allowed to participate in decision-making, which has a decision on the company performance (Ivanova et al., 2019). Paternalistic leadership is considered the worst leadership style because it treats employees like children who are not mature and infringes on their rights (Nidadhavalu, 2018). Employers are moving towards paternalistic leadership style over authoritative leadership style because leaders show more concern for employees' individual well-being and employees respond positively (Widodo et al., 2017). It has a beneficial impact on voice behavior, in which company confidence is critical, and the leader must show concern for employees by respecting their opinions (Sungur et al., 2019). Employee's dislike authoritarian leadership because it restricts their freedom. Autocratic leadership style limits innovative problem-solving solutions, and leaders should avoid using it because it has a bad for company performance (Peker et al., 2018). This leadership style focuses solely on performance rather than company welfare (Davis and Silvestri, 2020). Autocratic leadership has certain

advantages, such as being useful in groups of people who lack direction and being effective in emergency situations by allowing quick decisions to be taken, which decreases tension and helps employees to focus (Davis and Silvestri, 2020). When actions must be decided quickly and without consultation with others, an autocratic leadership style is appropriate, it allows staff to focus on their tasks without worry, which some employees prefer (Nasab and Leila, 2019). Nevertheless, democratic leadership promotes employee motivation, engagement, and performance, and it is recommended that this leadership style be used in organizations for success (Nazarian et al., 2021). Democratic leadership has been proven in studies to have developing tendencies that boost company success (Breevaart and Zacher, 2018). On another way, Laissez-faire leadership ignores employee personal development because leaders believe employees are capable of handling responsibilities on their own, yet the results demonstrate a loss in company performance (Hao et al., 2018). Through the components of company performance, employees are the most important component of a company, creating value for the company and Key Performance Indicators (KPI), and the leadership style of managing employees has become an important part (Haran et al., 2020). Therefore, leadership is closely related to company performance and determines the enthusiasm and productivity of employees (Nazarian et al., 2021). Thus, company performance and leadership outcomes may be correlated, since it is an ongoing process of aligning performance with the strategic objectives of the organization through leadership (Wu et al., 2020).

Theoretical framework

Psychologically near leaders, according to contingency leadership theory, are like informal encounters that prioritize interpersonal ties, whereas psychologically remote leaders are separated and extremely work-oriented. According to the Tannenbaum and Schmidt Leadership Theory, leaders may use a variety of leadership styles and actions to affect their employees' performance (Tannenbaum and Schmidt, 1973). Because each sort of leadership style is dependent on distinct events, contingency leadership theory rejects that there are excellent or terrible leadership styles (Chen and Appienti,

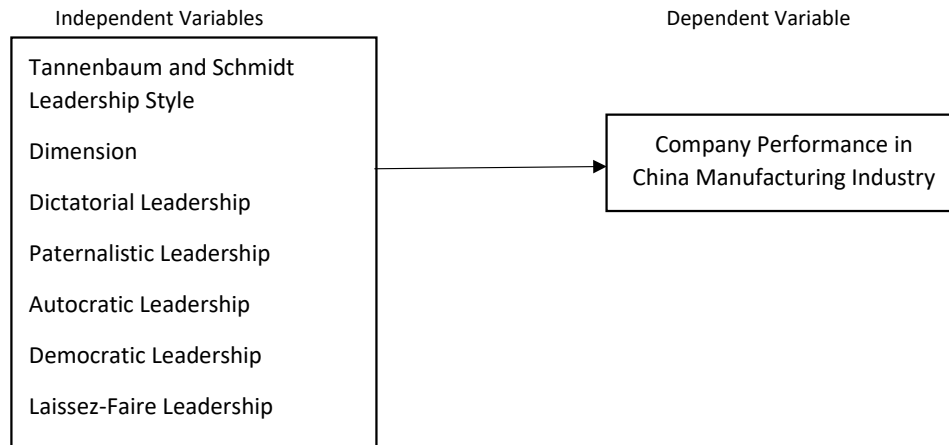


Fig. 1: Leadership style and company performance in the manufacturing industry

2020). The basic approach to leadership appropriate based on the environmental scenario that emerges in the context of a given action or behaviour is the Contingency Theory of Leadership. In this study, Contingency theory become secondary theory due to implement Tannenbaum and Schmidt Leadership Theory. Therefore, the contingency theory also one of the most reliable leadership theories (Waters, 2013). This diversity of evidence leads specialists to conclude that the situational environment influences a leader's performance. The Contingency Theory of Leadership contends that leaders should not be expected to lead in every event and that organizations should try to place leaders in the best possible situations (Finkelstein *et al.*, 2008 in Waters, 2013). That's why various countries have experienced in dealing with the COVID-19 crisis. So that, it is still unknown when the pandemic will end because certain leadership styles are only appropriate for situations in specific countries while cannot be generalized. In this case, Fiedler (1967) created the notion of adaptive leadership, in which leaders establish leadership styles that are appropriate for employees' personalities, qualities, and talents. Different leadership styles are provided by Tannenbaum and Schmidt Leadership Theory, which may be chosen based on many criteria such as leaders' behaviors and workers' perceived traits. According to Chen and Appienti (2020), in emergent leadership style, there are two sorts of leaders: psychological closeness and psychological detachment. Authoritarian leadership style, paternalistic leadership style, authoritarian

leadership style, democratic leadership style, and laissez-faire leadership style are among Tannenbaum and Schmidt's five significant leadership styles (Davis and Silvestri, 2020).

MATERIALS AND METHODS

Survey design and data collection

ANOVA regression results were utilized to analyze the outcomes of hypotheses in this study to evaluate the influence of independent variables on the dependent variable in a regression analysis. As a result, the statistical analysis of this study was done using t-test procedures created in the twentieth century. This is a non-probabilistic, snowball sampling design. The questionnaires were generated on Google forms, and shared with family members, colleagues, and friends through email, WeChat, WhatsApp, etc., among employees in the manufacturing industry in China. The total number of targeted employees in China's manufacturing industry is 12.445 million (China Statistics Bureau, 2021). Therefore, the sample size of this study is 290 respondents for this study. A structured questionnaire was used in the study to assess the factors affecting company performance in China manufacturing industry by Tannenbaum and Schmidt Leadership Styles. Among them, Tannenbaum and Schmidt Leadership Styles, Dictatorial Leadership Style, Paternalistic Leadership Style, Autocratic Leadership Style, Democratic Leadership Style, and Laissez-Faire Leadership Style are variables (Luhana, 2014). The questionnaire is measured using Likert scale from score 1-5 statements in five points: (1)

Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree. The pilot test is approximately 30-50 respondents from sample size. Following the pilot test, the full data collection will be carried out for preliminary run test, respondent demographic profile and hypothesis test (Diamantidis *et al.*, 2019). Questionnaires were used to collect data. This data was analyzed using the SPSS package. Descriptive statistics and inferential statistics are two forms of data analysis. The questionnaire was with respect to the relationship between the two variables, and descriptive statistics were used to indicate the mean scores and percentages were used to describe the background of the respondents. Before conducting research, some preliminary steps must be taken, such as a letter of support from the college, a request from the school for permission to conduct a data collection study. The researchers will then be able to reach out to employees in the Chinese manufacturing industry to answer the questionnaire. The next step is to inform researchers how the research is being conducted online. To answer the questionnaire, the researcher should allocate 15 minutes to the respondents and then click the "submit button" to send it to the researcher. The time frame of the study is known as a one-off study or cross-sectional study because the data will only be collected once at a particular time from respondents of different backgrounds and answered once per respondent. That is, questionnaire survey is distributed to respondents, let them answer once, only collect data once. To avoid error and bias in the sample, the sample must be of sufficient size. However, in the researcher's operation and data analysis, although the sample size is large, the possibility of bias in the research will become smaller, but when the sample size exceeds a certain size, the results obtained will also be affected. The sampling error is determined by the formula to determine the sample size (Gill *et al.*, 2010).

$$n = \frac{P(100-P)}{Z^2/E^2}$$

n is the required sample size

P is the percentage occurrence of a state or condition

E is the percentage maximum error required

Z is the value corresponding to level of confidence required

The sample size of this study is based on Desired Accuracy with Confidence Level of 95% developed by

Gill *et al.*, (2010). China's manufacturing industry has a total of 12.445 million employees in China (China Statistics Bureau, 2021). As a result, a sample size of 384 will be used. A total of 450 questionnaires will be distributed to China's manufacturing industry for this study.

RESULTS AND DISCUSSION

Reliability statistics and factor analysis for variables entering the analysis

As shown in Table 1, all Cronbach's Alpha values for the variable items are greater than 0.7, which indicates that the items meet the consistency of Internals' rule-of-thumb reliability test. These items are therefore considered reliable and acceptable for further analysis. Bougie and Sekaran (2019), reliability tests are used to measure the consistency of items with research constructs. Cooper and Schindler (2006) considered acceptable data for internal consistency with a Cronbach's Alpha value greater than 0.7. The results of the initial test reliability analysis of the variables in this study are as Table 1. Factor analysis is a technically similar construct that reduces variables exponentially and groups shared variables (Quinlan *et al.*, 2019). The minimum standard proposed by Cooper and Schindler (2006) is that the Bartlett sphericity test of KMO measurement must reach 0.6. When the KMO statistic is below 0.5, factor analysis is not suitable for application, and redesign of the variable structure or the use of other statistics should be considered. As mentioned above, the rules for the KMO test are that the value must be above 0.6, and the significance value of Bartlett's sphericity test must be < 0.05 (Cooper and Schindler, 2006). The factor loading value for each item in the questionnaire should be larger than 0.6, and if the factor loading value is less than 0.6, the item should be deleted from the study (Tabachnick *et al.*, 2007). However, because the sample size utilized in the pilot scale is 10% of the overall sampling, components with a factor loading value larger than 0.5 but less than 0.6 are acceptable (Cooper and Schindler, 2006). It can be seen from Table 1 that the KMO and Bartlett's sphericity test results of the dependent and independent variables all meet the rules and are suitable for further research.

Eigenvalues Test

Eigenvalues are used to pool variances to determine the number of eigenvalues greater than

Table 1. Reliability and factor loading statistics results

Constructs	No of items	Items	Cronbach's Alpha	Factor Loading
Company performance	4	I am satisfied with my company's performance in the past.	0.826	0.619
		I am not worried that the company will terminate employees.		0.672
		I believed that my company is one of the top performing companies in the industry.		0.737
		It is very likely that I will be awarded with an increment of salary as my company's financial position is strong.		0.604
Dictatorial Leadership Style	4	Leader orders his or her employees to perform specified duties or jobs.	0.778	0.694
		Leader warns his subordinates about the tasks that must be completed and when they must be completed.		.873
		Employees who did not follow conventional norms and regulations were disciplined by their leader.		0.664
		Leader makes it clear to all his or her subordinates that they must perform at the desired level.		0.607
Paternalistic Leadership Style	4	I maintain a friendly working relationship with my leader.	0.862	0.873
		Leader does little things to make it pleasant to be a member of the group.		0.774
		Leader helps subordinates overcome problems that stop them from carrying out their tasks.		0.623
		Leader behaves in a manner that is thoughtful of subordinates' personal needs.		0.721
Autocratic Leadership Style	4	Without consulting his or her subordinates, my leader takes his own judgments.	0.702	0.620
		Leader does not take suggestions from subordinates into account since he does not have the time.		0.689
		Within my department or team, my leader always has final decision-making authority.		0.684
		For prospective plans and projects, my leader does not solicit staff thoughts or comments.		0.633
Democratic Leadership Style	4	When my leader has a problem, he/she discusses with his or her employees.	0.746	0.601
		Leader is open to recommendations and ideas from his or her workers.		0.603
		Leader solicits advice from his or her staff on how to complete tasks.		0.657
		Leader asks for thoughts on what projects the team should work on.		0.685
Laissez-Faire Leadership Style	4	Leader empowers his or her subordinates to decide what must be done and how it should be done.	0.715	0.616
		Leader empowers new hires to make decisions without seeking approval.		0.615
		Leader doesn't keep an eye on his or her staff to make sure they're following the rules.		0.653
		Leader believes that everyone can lead themselves in the same way that he/she is.		0.624

1, to determine whether a variable is relevant to the study, and whether the structure and dimensions are appropriate (Cooper and Schindler, 2006). Tabachnick *et al.*, (2007) proposed that only eigenvalues greater than 1 were of statistical significance for analysis, and furthermore, the number of eigenvalues greater

than 1 was 50 equals to 4 for variables in independent dimensional studies. If the number of eigenvalues greater than 1 is higher than the dimensionality of the independent variable in the study, a check is needed to determine whether the dependent variable is included in the test, as it should not be,

Table 2: Eigenvalues Test

Constructs	Items	Initial Eigenvalues			Extraction Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Company performance	I am satisfied with my company's performance in the past.	1.785	44.629	44.629	3.413	85.335	85.337
	I am not worried that the company will terminate employees.	1.628	40.709	85.337			
	I believed that my company is one of the top performing companies in the industry.	.311	7.765	93.102			
	It is very likely that I will be awarded with an increment of salary as my company's financial position is strong.	.276	6.898	100.000			
Dictatorial Leadership Style	Leader orders his or her employees to perform specified duties or jobs.	6.900	34.498	34.498	6.900	34.498	34.498
	Leader warns his subordinates about the tasks that must be completed and when they must be completed.	3.261	16.305	50.803	3.261	16.305	50.803
	Employees who did not follow conventional norms and regulations were disciplined by their leader.	1.837	9.185	59.988	1.837	9.185	59.988
	Leader makes it clear to all his or her subordinates that they must perform at the desired level.	1.197	5.983	65.971	1.197	5.983	65.971
Paternalistic Leadership Style	I maintain a friendly working relationship with my leader.	1.176	5.878	71.849	1.176	5.978	71.849
	Leader does little things to make it pleasant to be a member of the group.	.981	4.907	76.756	1.107	3.778	74.568
	Leader helps subordinates overcome problems that stop them from carrying out their tasks.	.743	3.713	80.469			
	Leader behaves in a manner that is thoughtful of subordinates' personal needs.	.626	3.130	83.599			
Autocratic Leadership Style	Without consulting his or her subordinates, my leader takes his own judgments.	.599	2.993	86.592			
	Leader does not take suggestions from subordinates into account since he does not have the time.	.543	2.717	89.309			
	Within my department or team, my leader always has final decision-making authority.	.471	2.356	89.309			
	For prospective plans and projects, my leader does not solicit staff thoughts or comments.	.386	1.928	93.593			
Democratic Leadership Style	When my leader has a problem, he/she discusses with his or her employees.	.300	1.500	95.093			
	Leader is open to recommendations and ideas from his or her workers.	.250	1.251	96.344			
	Leader solicits advice from his or her staff on how to complete tasks.	.226	1.131	97.475			
	Leader asks for thoughts on what projects the team should work on.	.166	.831	98.948			
Laissez-Faire Leadership Style	Leader empowers his or her subordinates to decide what must be done and how it should be done.	.128	.642	98.948			
	Leader empowers new hires to make decisions without seeking approval.	.113	.567	99.515			
	Leader doesn't keep an eye on his or her staff to make sure they're following the rules.	.055	.274	99.789			
	Leader believes that everyone can lead themselves in the same way that he/she is.	.042	.211	100.000			

and the eigenvalues greater than 1 are lower than the study. The dimensions of the independent variables were supported by the literature, will consider combining or eliminating dimensions (Hair *et al.*, 2018). Tabachnick *et al.* (2007) mentioned that only eigenvalues of 1 or more are of statistical significance for analysis. As shown in Table 2, only one component has an eigenvalue greater than 1, which corresponds to the number of dependent variables in the study. Furthermore, Table 2 shows that there are five components with eigenvalues greater than 1, which also correspond to the dimensionality of the independent variables that this study intends to examine. This indicates that all questionnaire items, dependent variables, and independent variable dimensions in this study are complete and stable and can be further analyzed. Cooper and Schindler (2006) postulate that if the number of components combined in the correlation matrix from which eigenvalues are extracted is equal to the number of study variables, no further examination and modification of the item is required.

Multiple Regression – Coefficients

Bougie and Sekaran (2019), researchers should evaluate the regression outcome after confirming the multiple regression assumption. The assumption of multicollinearity for all of the components is validated, as shown in Table 3, all of the dimensions of the independent variable are having Variance Inflation Factor (VIF) value of less than 10, as recommended by Cooper and Schindler (2006). Furthermore, all of the tolerance values for the dimensions of the independent variable are larger than 0.1, the tolerance values for the dimensions of the independent variable suggest a low degree of multicollinearity. This means that the amount of skewness in the data for all of

the variables is within acceptable limits. According to Table 3, all four elements of leadership style were significant when examining each of the dimensions of the independent variable since the p-value for each factor was less than 0.05, which is the rule of thumb suggested by Bougie and Sekaran (2019). In other words, dictatorial leadership ($p = 0.030$, significant at the 0.05 level), paternalistic leadership ($p = 0.011$, significant at the 0.05 level), autocratic leadership ($p = 0.018$, significant at the 0.05 level), democratic leadership ($p = 0.000$, significant at the 0.05 level) and Laissez-faire leadership ($p = 0.042$, significant at the 0.05 level) are all significant predictors of company performance in China's manufacturing industry. Furthermore, democratic leadership has the highest beta coefficient ($=0.226$), indicating that it is the most important component, since it has the most impact on company performance. In comparison to the other characteristics, autocratic leadership has the lowest beta coefficient ($= -0.034$), and so has the least impact on company performance. Dictatorial (-0.129), paternalistic (-0.170) and laissez-faire (-0.030) leadership styles have a somewhat unfavorable impact on company performance. According to the statistical findings, only democratic leadership has a substantial positive connection ($\beta = 0.226$) with company performance in China's manufacturing industry. However, even though other leadership styles have a considerable impact on company performance in China's manufacturing industry, the link is negative ($\beta = -0.129$; $\beta = -0.170$; $\beta = -0.034$; $\beta = -0.030$). This suggests that in China manufacturing industry, company performance decreases when autocratic, dictatorial, paternalistic, and laissez-faire leadership styles are prevalent. The statistical findings demonstrating the negative impact are useful in better understanding how to use leadership style more effectively.

Table 3: Multiple Regression– Coefficient

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	4.743	.304		15.594	.000		
1 Dictatorial	-.171	.079	-.129	-2.178	.030	.776	1.288
Paternalistic	-.154	.061	-.170	-2.547	.011	.607	1.647
Autocratic	-.037	.071	-.034	-.527	.018	.642	1.558
Democratic	.187	.052	.226	3.573	.000	.677	1.476
Laissez	-.026	.057	-.030	-.465	.042	.648	1.544

a. Dependent Variable: Company Performance

Discussion of Research Finding

The analytical assumptions are consistent with the specific analytical queries of this study to find the link between leadership and company performance. Table 4 summarizes the assumptions of this study.

H1: Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry

Regression results of ANOVA show that there is an insignificant relationship between *Tannenbaum and Schmidt* leadership style and company performance of Chinese manufacturing industry, so H1 is rejected. Leadership factors have a significant impact on company performance regardless of the type of leadership theory (Smajlović et al., 2019). According to the current research results, when the leadership style factor is based on the path goal leadership model, it can significantly explain the 51.5% difference in the performance of Chinese manufacturing industry. Regression analysis shows that compared with other leadership theories; path-goal leadership model can better explain the impact of leadership style on company performance. While many researchers have found that company performance is affected by other factors, most of these factors are also related to the leadership style adopted in the organization, such as job satisfaction, company culture, and company welfare (Khan et al., 2019). Therefore, the leadership style adopted may be a dominant factor in a company's performance, according to the findings of the recommendations.

H1a: Dictatorial Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.

Regardless of the type of leadership theory, leadership factors have an impact on company performance, although significant relationship may be negative (Smajlović et al., 2019). Regression analysis shows that compared with other leadership theories; most paths of path-goal leadership model bring negative effects on company performance. When the style of path-goal leadership rises, company performance will decline. While many researchers have found that company performance is influenced by other factors, most of these factors are also related to the leadership style adopted in the organization, such as job satisfaction, company culture, and company welfare (Khan et al., 2019). Therefore, according to the suggested results, only by using leadership style reasonably can the company's performance be positively improved. According to research, dictatorial leadership has a negative impact on workplace outcomes such as team interaction, employee commitment towards the organization, task performance, helping, vocalization behavior, and organizational performance (Pellegrini and Scandura, 2008; Chan et al., 2013; Schuh et al., 2013; Chen et al., 2014; Duan et al., 2018; Harms et al., 2018; Shen et al., 2019). Researchers have discovered that authoritarian or dictatorial leadership has a detrimental impact on employee outputs in the workplace, based on intrinsic motivation theory (Zhang et al., 2014).

Table 4. Summary of Research Findings

No.	Hypothesis	Results
1.	H1a: Dictatorial Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.	Rejected
2.	H1b: Paternalistic Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.	Rejected
3.	H1c: Autocratic Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.	Rejected
4.	H1d: Democratic Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.	Accepted
5.	H1e: Laissez-Faire Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.	Rejected

H1b: Paternalistic Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.

The results show that in Chinese manufacturing companies, paternalistic leadership as a dimension of path goal leadership style has a significant relationship with company performance is rejected. From the beta coefficient table, the relationship between them is negative, indicating that the higher the paternalistic Leadership is, the company performance will decline. Nidadhavalu (2018) think paternalistic leadership is considered the worst leadership style because it treats employees like children who are not mature and infringes on their rights. Dedahanov et al., (2016) and Jogulu (2010) observed that paternalistic leadership is most effective when leadership is missing, particularly in small groups characterized by poor organization and time management, as difficulties in establishing and implementing effective strategies. In this case, depending on the factors utilized by researchers, different leadership styles may have a positive or negative association with organizational performance (Wang et al., 2010). So that, in this study, paternalistic leadership style has an insignificant relationship with company performance because paternalistic leadership style is not suitable to be implemented in the organizational even it will not give any successful intention to the leaders and employees.

H1c: Autocratic Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.

The results show that autocratic Leadership as a dimension of path goal Leadership style is significantly associated with company performance in Chinese manufacturing companies is rejected. According to the beta coefficient table, the relationship between the two is negative so is rejected, indicating that the higher autocratic Leadership, the company performance will decline. Peker et al., (2018) believed that autocratic leadership style limits Innovative problem-solving solutions, and leaders should avoid using it because it has a bad for company performance Style focuses on performance rather than company welfare, leading to negative perceptions of employees that adversely affect company performance. Previous

data also suggest that autocratic leadership has a negative impact on company staff performance. It shows that enacting an authoritarian policy would not affect worker productivity (Jony et al., 2019). Perhaps employees do not have the benefit of sharing expertise and experience to tackle the problem, low motivation can lead to poor performance. When an autocratic leader makes decisions, he or she is unconcerned about what happens to people, and the connection between employees and leaders might deteriorate (Jaafar et al., 2021). It causes the lower company performance to happen due to incorporate relationship between leader and employees.

H1d: Democratic Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.

According to the statistical findings, only democratic leadership has a substantial positive connection ($\beta = 0.226$) with company performance in China's manufacturing industry. The results show that democratic Leadership, as a dimension of path goal Leadership style, has a significant relationship with company performance in Chinese manufacturing companies. Therefore, H1d is accepted. According to the beta coefficient table, the relationship between the two is positive, indicating that the higher the Democratic Leadership is, the higher the company performance will be. Democratic leadership allows employees to have a say in how decisions are made, which free-living and productivity all improve their productivity (Chukwusa, 2018). Meanwhile, Shanmugam et al., (2020) believed that democratic leadership fosters solidarity among employees of all races and fostering an environment in which employees can openly express their opinions and emotions. Democratic leadership style has the benefit of allowing complex issues to be resolved quickly with employee involvement, who varying employee self-confidence, responsibilities, productivity, and quality of work are all supported by the Hypothesis of H1d.

H1e: Laissez-Faire Leadership Style as a dimension of Tannenbaum and Schmidt Leadership Styles has a significant relationship with company performance in China manufacturing industry.

The results show that laissez-Faire Leadership, as a dimension of path goal Leadership style, has a

significant relationship with company performance in Chinese manufacturing companies be rejected. According to the beta coefficient table, the relationship between the two is negative so is rejected, indicating that the higher the Laissez-Faire Leadership is, the company performance will decline. [Mahrani and Noorlailie \(2018\)](#) believed that People view Laissez-Faire leadership to be contradicted because giving employees too much freedom leads to confusion, indecision, low motivation, and underused potential, all of which hinder company performance. At the same time. [Hurd \(2020\)](#) also supported the view that Employees' passion for their employment and faith in their leaders are harmed by Laissez-Faire leadership because employees regard their leaders as ineffectual, resulting in under performance and failure to meet company goals. Moreover, the findings from restaurants of Mymensingh, Bangladesh showed that company performance is proven to be negatively impacted by the laissez-faire leadership style ([Jonny et al., 2019](#)) because the success of restaurants is not influenced by laissez-faire leadership. This technique works best when employees have a clear grasp of their roles and excellent analytical skills and when supervisors have a high level of employee trust and do not blame each other for mistakes.

Limitation and contribution

The interviewees' backgrounds are in the age bracket, with most of the interviewees being between the ages of 21 and 30. This will have an impact on the universality of research on manufacturing business performance. Future research should close this gap by ensuring that respondents come from a diverse range of backgrounds. Future studies could concentrate on context by examining a certain age group independently to better understand the relevant ages. Therefore, the limitation as a cross-sectional in this study can be gained if the study is employed as a longitudinal study for a deeper understanding of company performance in the manufacturing industry. In this case, this study provides a very favorable insight into the relationship between path-goal leadership style and company performance. In addition, this research not only has certain contribution to the industry, but also has certain contribution to the academic circle. It is useful in understanding the company performance of Chinese manufacturing businesses. The independent variable and path-

goal leadership style, suggests that this model has reference value for future researchers' leadership style research. Furthermore, the findings of this study can be used as a foundation for future research. The theoretical framework's importance provides an avenue for scholars to investigate this link. Finally, the success of this study can help scholars duplicate it in new situations or perform similar studies using different approaches. Company performance as the most important point of the organization, the key goal is the focus of company research. In the existing environment, in addition to survival, the company also needs to meet sustainable development and improve the company's performance level and company performance. As an important part of the company, leadership style plays a very important role in company performance and determines the work efficiency of employees. This study establishes some reasonable methods for Chinese manufacturing leadership style, leadership style will improve company performance. Leaders must implement accurate leadership style in management, which is suitable for the development of the company and can be accepted by employees. Only in this way can the company's performance be improved, and different leadership styles can be used in fundamentally different situations to effectively promote company performance. The analysis recognizes the importance of leadership style to company performance and helps improve company performance in China's manufacturing industry. Provide substantial help to the development of the company.

CONCLUSION

The financial and non-financial parts of an organization combine to generate company performance. These factors should be used to determine how successfully a company is executing its business strategy and areas for improvement. As an important part of the company, leadership style plays a very important role in company performance and determines the work efficiency of employees. This study establishes some reasonable methods for Chinese manufacturing leadership style, leadership style will improve company performance. Leaders must implement accurate leadership style in management, which is suitable for the development of the company and can be accepted by employees. Only in this way can the company's performance

be improved, and different leadership styles can be used in fundamentally different situations to effectively promote company performance. The analysis recognizes the importance of leadership style to company performance and helps improve company performance in China's manufacturing industry. Provide substantial help to the development of the company. A democratic leadership style improves company performance because it ensures that employees understand exactly what is expected of them and that they are more likely to achieve the desired goals. The knowledge gap revealed innovation by separating dictatorial and paternalistic leadership styles as new knowledge in the current study to meet the study's goal. It provides comprehensive knowledge to all industrial leaders, including dictatorial and paternalistic leadership. It has a positive effect on democratic leadership. However, dictatorial leadership and employee performance have an insignificant result due to the managerial approach that involves a dominant authority figure who acts as a patriarch or matriarch and treats employees. Instead of three factors (autocratic, democratic, and laissez-faire) that were evaluated with company performance, this study demonstrated novelty by distinguishing dictatorial and paternalistic leadership styles as new knowledge in the current study. As a result, it not only provides a comprehensive knowledge system of personnel management for academia, but also serves as inspiration for the manufacturing business by relating leadership theory to various variables ranging from dictatorial to paternalistic leadership styles.

AUTHOR CONTRIBUTIONS

L. Wei performed the literature review, experimental design, analyzed and interpreted the data, H.L. Vasudevan, prepared the manuscript text, and manuscript edition.

ACKNOWLEDGEMENT

The authors would like to take this opportunity to show their gratitude to everyone that enabled them to complete this type of research study that shares the authors' thoughts and recommendations when conducting their research. The authors are grateful to the IJHCUM committee members for their efforts and time spent during the evaluation process.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

ABBREVIATIONS (NOMENCLATURE)

<i>T</i>	t-value
<i>Sig</i>	Significant
<i>KPI</i>	Key Performance Indicators
<i>GDP</i>	Gross Domestic Product
<i>Ho</i>	Null hypothesis
<i>n</i>	Sample size
<i>p-value</i>	Probability value
<i>R</i>	Pearson correlation coefficient
<i>r-value</i>	Pearson correlation coefficient
<i>R²</i>	Coefficient of determination
<i>R^{2 adj}</i>	Adjusted coefficient of determination
<i>VIF</i>	Variance Inflation Factor

REFERENCES

- Akpapere, J.Y.; Jengre, E.; Mogre, A.A., (2019). The influence of leadership style on organizational performance at TumaKavi Development Association, Tamale, Northern Region of Ghana. *Open. J. Leadersh.*, 8: 1-22 (22 pages).
- Bavoso, V. (2018). *Journal: Corporate Board role duties and composition*, 2: 4-5 (2 pages).
- Breevaart, K.; Hannes Zacher, (2019). Main and interactive effects of weekly transformational and laissez-faire leadership on followers' trust in the leader and leader effectiveness. *J. Occup. Org. Psych.*, 92(2): 84-409. (26 pages).
- Bougie, R.; Sekaran, U., (2019). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Chan S.C.; Huang X.; Snape E.; Lam C.K., (2013). The janus face of paternalistic leaders: Authoritarianism, benevolence, subordinates' organization-based self-esteem, and performance. *J. Organ. Behav.*, 4: 108-128 (21 pages).
- Chakraborty, S.; Vidyapati, K.; Ramakrishnan, K., (2018). Selection of the all-time best World XI Test cricket team using the TOPSIS method. *Decis. Sci. Letters.*, 8(1): 95-108 (14 pages).
- Chen, L.; William, A.A., (2020). Does a paternalistic leader facilitate voice and creative performance? Evidence from Ghana. *J. Psych. Africa.*, 30(6): 507-519 (13 pages).
- Chen X.P.; Eberly M.B.; Chiang T.J.; Farh J.L.; Cheng B.S., (2014). Affective trust in Chinese leaders linking paternalistic leadership to employee performance. *J. Manage.*, 40: 796-819 (24 pages).
- China Statistics Bureau (2021).
- Chukwusa, J., (2018). Autocratic leadership style: Obstacle to success in academic libraries. *Lib. Philos. Pract.*, 1-11 (12 pages).
- Cooper, D.R.; Schindler, P.S.; Sun, J., (2006). *Business research methods*. 9: 1-744. New York: McGraw-hill. (745 pages).
- Davis, C.; Silvestri, M. (2020). *Critical perspectives on police leadership*. Policy Press, (144 pages).
- Dedahanov, A.T.; Lee, D.H.; Rhee, J.; Yoon, J., (2016). Entrepreneur's paternalistic leadership style and creativity: The mediating role of employee voice. *Manage. Desic.*, 54(9): 2310-2324 (15 pages).
- Diamantidis, Anastasios D.; Prodromos C., (2019). Factors affecting employee performance: An empirical approach. *Int. J. Prod. Perform. Manage.*, 68(1): 171-193 (23 pages).
- Duan J. Y.; Bao C. Z.; Huang C. Y.; Brinsfield C. T., (2018). Authoritarian leadership and employee silence in China. *J. Manage. Org.*, 24: 62–80 (19 pages).
- Erjavec, Z.; Jun-ichi I., (2018). Magnetic curves in Sol3. *J. Nonlinear Math. Phys.*, 25(2): 198-210 (13 pages).
- Fiedler, F.E., (1967). *A theory of leadership effectiveness*. MCGRAW-HILL series in Management.
- Finkelstein, S.; Donald, G.; Hambrick, D.C.; Albert, A.; Cannell, Jr., (2008), *Strategic leadership: Theory and research on Executives, Top Management Teams, and Boards*, Oxford University Press, New York, NY (464 pages).
- Gill, J.; Johnson, P.; Clark, M., (2010). *Research Methods for Managers*, SAGE Publications (289 page).
- Ginesti, G.; Caldarelli, A.; Zampella, A., (2018). Exploring the impact of intellectual capital on company reputation and performance. *J. Intellect. Capital.*, 19(5): 915-934 (20 pages).
- Hao, P.; Wei H.; Li-Rong, L., (2018). Why and when empowering leadership has different effects on employee work performance: The pivotal roles of passion for work and role breadth self-efficacy. *J. Leadersh. Org. Stud.*, 25(1): 85-100 (16 pages).
- Haran, M.E., Lo, D.; McCord, M.; Davis, P. Lim, L.C., (2020). Impact of firm-level attributes on listed real estate company performance. *J. Prop. Inv. Finance*, 78(16): 35-57 (23 pages).
- Harms, P.D.; Wood D.; Landay K.; Lester P.B.; Lester G.V., (2018). Autocratic leaders and authoritarian followers revisited: a review and agenda for the future. *Leadersh. Quart.*, 29:105–122 (18 pages).
- Hair, J. F.; Harrison, D.; Risher, J.J., (2018). *Marketing research in the 21st century: Opportunities and challenges*. Brazilian J. Marketing-BJMkt, Revista Brasileira de Marketing-ReMark, Special Issue, 17.
- Hamdan, A., (2018), Intellectual capital and firm performance: Differentiating between accounting-based and market-based performance. *Int. J. Islamic and Middle Eastern Fin. Manage.*, 11(1): 139-151 (13 pages).
- Hurd, J.A., (2020). *Leadership Styles of Head NASCAR Executives: A Historical Perspective* (Doctoral dissertation, East Tennessee State University).
- Ivanova, E.V.; Vinogradova, I.A.; Zadadaev, S.A., (2019). The study of school educational environment in the context of ensuring equal access to quality education. *Educ. Sci. J.*, 21(7): 69-89 (21 pages).
- Jaafar, S.B.; Zamb, N.M.; Fathil, N.F., (2021). Leadership style: Is it autocratic, democratic or laissez-faire?. *ASEAN J. Manage. Bus. Stud.*, 3(1): 1-7 (7 pages).
- Jony, M.T.I.; Alam, M.J.; Amin, M.R.; Jahangir, M., (2019). The impact of autocratic, democratic and laissez-faire leadership styles on the success of the organization: A study on the different popular restaurants of Mymensingh, Bangladesh. *Can. J. Bus. Inf. Stud.*, 1(6): 28-38 (11 pages).
- Jogulu, U.D., (2010). Culturally-linked leadership styles. *Leadersh. Org. Dev. J.*, 31(8): 705-719 (15 pages).
- Khan, Z.; Rao-Nicholson, R.; Akhtar, P.; Tarba, S.Y.; Ahammad, M.F.; Vorley, T., (2019). The role of HR practices in developing employee resilience: A case study from the Pakistani telecommunications sector. *Int. J. Hum. Res. Manage.*, 30(8): 1342-1369 (28 pages).
- Kurilova, A.; Antipov. D., (2020). Impact of digital innovation on company performance. In *IOP Conference Series: Mater. Sci. Engin.*, 986(1): 1-5 (5 pages).
- Li, L., (2018). China's manufacturing locus in 2025: With a comparison of "Made-in-China 2025" and "Industry 4.0. *Technol. Forecast. Soc. Chang.*, 135: 66-74 (9 pages).
- Luhana, S.N.; (2014). Leadership and its management styles. *Manage. Pharmacy* 3(5): 13-15 (3 pages).
- Mahrani, M.; Noorlailie, S., (2018). The effect of good corporate governance mechanism and corporate social responsibility on financial performance with earnings management as mediating variable. *Asian J. Acc. Res.*, 3(1): 41-60 (20 pages).
- Muenjohn, N.; Adela, M.; Mario F.; James H.; Martin, F.; Bernard, M.; Ali, I.; Sarah, B.; Jenny W., (2018). *Leadership*. Cambridge University Press (431 pages).
- Nasab, A.H.; Leila, A., (2019). Authentic leadership and employee performance: Mediating role of organizational commitment. *Leadersh. Org. Dev. J.*, 40(5): 548-560 (13 pages).
- Nazarian, A.; Atkinson, P.; Foroudi, P.; Edirisinghe, D., (2021). Factors affecting organizational effectiveness in independent hotels–The case of Iran. *J. Hosp. Tour. Manage.*, 46: 293-303 (11 pages).

- Nefdt, A., (2019). A persisting minority–narratives of women in corporate leadership. *Agenda.*, 33(1): 129-141 **(13 pages)**.
- Nidadhavalu, A., (2018). Impact of leadership styles on employee job satisfaction and organizational commitment–A study in the construction sector in India. *Master Theses and Specialist Paper.*, 29(1): 65-67 **(3 pages)**.
- Osadchy, E. A.; Akhmetshin, E.M.; Amirova, E.F.; Bochkareva, T.N.; Yu, G.; Yumashev, A.V., (2018). Financial statements of a company as an information base for decision-making in a transforming economy. *Europ. Res. Stud. J.*, 21(2): 339-350 **(12 pages)**.
- Peker, S.; Inandi, Y.; Gilic, F., (2018). The relationship between leadership styles (Autocratic and Democratic) of school administrators and the mobbing teachers suffer. *Europ. J. Contemp. Educ.*, 7(1): 150-164 **(15 pages)**.
- Pellegrini, E.; K.; Scandura T.A., (2008). Paternalistic leadership: A review and agenda for future research. *J. Manage.*, 34: 566–593 **(28 pages)**.
- Quinlan, C.; Barry, B.; Jon C.; Mitch, G., (2019). Business research methods. South Western Cengage. **(697 pages)**.
- Romule, K.; Bak, O.; Colicchia, C.; Shaw, S., (2020). Supplier performance assessment: Evidence from a UK-based manufacturing company and its suppliers. *Benchmarking: Int. J.*, 27(2): 817-838 **(22 pages)**.
- Shanmugam, H.; Juhari, J.A.; Nair, P.; Ken, C.S.; Guan, N.C., (2020). Impacts of COVID-19 pandemic on mental health in Malaysia: A single thread of hope. *Malaysian J. Psychiat.*, 29(1):78-84 **(7 pages)**.
- Shen Y.M.; Chou W.J.; Schaubroeck J.M., (2019). The roles of relational identification and workgroup cultural values in linking authoritarian leadership to employee performance. *Europ. J. Work Org. Psychol.*, 28: 498–509 **(12 pages)**.
- Schuh S.C.; Zhang, X.A.; Tian, P., (2013). For the good or the bad? Interactive effects of transformational leadership with moral and authoritarian leadership behaviors. *J. Bus. Ethic.*, 116: 629-640 **(12 pages)**.
- Smajlović, S.; Umihanic, B.; Turulja, L., (2019). The interplay of technological innovation and business model innovation toward company performance. *Manag. J. Contemp. Manage. Iss.*, 24(2): 63-79 **(17 pages)**.
- Siagian, H.; Jade. K.; Tarigan, Z., (2020). The role of affective leadership in improving firm performance through the integrated internal system and external integration FMCG Industry. *Int. J. Data. Network Sci.*, 4(4): 365-372 **(8 pages)**.
- Sungur, C.; Özlem Ö.; Meltem, S.; Özgür, U., (2019). Paternalistic leadership, organizational cynicism, and intention to quit one's job in nursing. *Hospital topics* 97(4): 139-147 **(9 pages)**.
- Tabachnick, B.G.; Linda S.F.; Jodie, B.U., (2007). Using multivariate statistics. 5: Boston, MA: Pearson: 1-14 **(15 pages)**.
- Tannenbaum, R.; Schmidt, W. H., (1973). How to choose a leadership pattern. *Harvard business review*.
- Waters, R.D., (2013). The role of stewardship in leadership: Applying the contingency theory of leadership to relationship cultivation practices of public relations practitioners. *J. Comm. Manage.*, 17(4): 324-340 **(17 pages)**.
- Widodo, D.S.; Silitonga, P.E.S. (2017). Company performance analysis: Leadership style, corporate culture and human resource development. *Int. Rev. Manage. Market.*, 7(4): 34-41 **(8 pages)**.
- Wu, H.; Gao, X.; Shen, J., (2020). Principal leadership effects on student achievement: a multilevel analysis using Programme for International Student Assessment 2015 data. *Educ. Stud.*, 46(3): 316-336 **(21 pages)**.
- Yu, Y.; Huo, B., (2018). Supply chain quality integration: relational antecedents and operational consequences. *Supply Chain Manag.: Int. J.*, 23(3):188-206 **(19 pages)**.
- Yu, W., Ramanathan, R., Wang, X.; Yang, J., (2018). Operations capability, productivity and business performance: The moderating effect of environmental dynamism. *Indust. Manage. Data Syst.*, 118(1):126-143 **(18 pages)**.
- Zhang, Z.X.; Chen, Y.R.; Ang, S., (2014). Business leadership in the chinese context: trends, findings, and implications. *Manage. Org. Rev.*, 10:199-221 **(23 pages)**.

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.

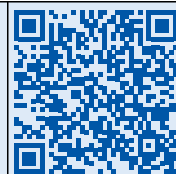


HOW TO CITE THIS ARTICLE

Wei, L.; Vasudevan, H.L., (2022). Leadership style and company performance in the manufacturing industry. *Int. J. Hum. Capital Urban Manage.*, 7(3): 327-340.

DOI: 10.22034/IJHCUM.2022.03.03

url: http://www.ijhcum.net/article_252639.html



ORIGINAL RESEARCH PAPER

Application of Data Envelopment Analysis to assess the efficiency using income aspect in the local government

A. Jafari Shahrestani¹, E. Sangi^{2*}, H. Mazaherian³, S. Movaghar Hoor⁴

¹Department of Economics, Allameh Tabataba'i University, Tehran, Iran

²Department of Art and Architecture, Central Tehran Branch, Islamic Azad University, Tehran, Iran

³Department of Architecture, Tehran University, Tehran, Iran

⁴Department of Industrial Engineering and Management Systems, AmirKabir University of Technology, Tehran, Iran

ARTICLE INFO

Article History:

Received 11 December 2021

Revised 29 February 2022

Accepted 26 March 2022

Keywords:

BCC-O model

Cash income

Data Envelopment Analysis

The Municipality of Tehran

Performance assessment

Sustainable income

ABSTRACT

BACKGROUND AND OBJECTIVES: Given the tremendous progress of today's societies and the expectations of the people from public institutions that are increasing day by day, having complex organizations is inevitable. As a non-parametric border method, data envelopment analysis approach has been presented as a relative assessment tool to evaluate performance assessment of The Municipality of Tehran with 22 districts. This paper aims to assess all 22 districts of Tehran in terms of cash and sustainable income.

METHODS: In this paper, BCC output-oriented model has been opted to employ DEA for the performance assessment of Tehran Municipality in 2020. In order to formulate optimal programs, especially in the income programs of the regions, it is necessary to consider the specific conditions and characteristics of each region. Therefore, while cash and sustainable incomes have been selected as the model's output, number of building permits, number of inhabitants, number of housing deals, and the price of the residential unit have been considered as inputs of BCC-O model.

FINDINGS: BCC-O approach was implemented to classify 22 districts of The Municipality of Tehran. The findings revealed that 50 percent of districts namely 1, 6, 9, 12, 16, 17, 18, 19, 20, 21, 22 operated efficiently. Also, it was determined that there has not been a proportional analogy between cash and sustainable income in comparison with input indices. For such areas an alternative program is proposed using the method.

CONCLUSION: Due to the continuous increase of population of Iran and consequently the increase of citizens' requests and the lack of resources and facilities in Tehran Municipality on the other hand, it is necessary to formulate and implement the annual plans of the regions with higher accuracy. Given that at present the annual plan of cash and stable income of regions are based on past years performance ignoring specific conditions of each region, so it is possible to evaluate a more real and precise value of income plan through DEA model with considering the conditions of each district. Decision-makers of inefficient districts can modify the approved plans of cash income and sustainable income base on the optimal value of the proposed data envelopment analysis model. Based on BCC-O model, guidelines are provided for transferring inefficient districts from the current state to the efficient ones. These values can be the basis for compiling the revenue plan for next year in districts of The Municipality of Tehran.

DOI: [10.22034/IJHCUM.2022.03.04](https://doi.org/10.22034/IJHCUM.2022.03.04)



NUMBER OF REFERENCES

32



NUMBER OF FIGURES

4



NUMBER OF TABLES

3

*Corresponding Author:

Email: elham.sangi@gmail.com

Phone: +989128232612

ORCID: [0000-0003-2989-8830](https://orcid.org/0000-0003-2989-8830)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

As a public, independent, and non-governmental institution with a governmental nature and local function, the municipality is responsible for managing the city and serving the people and tourists, and as one of the main elements of urban management, it tries to manage the city by fulfilling its duties as well as possible and provides more satisfaction and welfare for the citizens. The scope and variety of tasks in the municipality are extensive, so if the municipal organization can evaluate the municipalities of the districts using opportune indicators at appropriate intervals, it will undoubtedly provide the groundwork for success, continuous development, and interest groups' satisfaction. In order to achieve a favorable evaluation, considering the organizational structure and extensive tasks of the municipality, an appropriate assessment method is needed that can provide the necessary feedback on the progress towards the set goals, staff and citizen satisfaction, identify areas for attention, and creation of information for decision-makers. Many organizations try to implement pure concepts in their business, but there is a large gap between the current and desired situations for many of them. To reduce this gap, the organization can achieve a realistic view of its performance by conducting an effective evaluation and plans for performance improvement opportunities. Performance appraisal (PA) refers to the methods and processes used by organizations to assess the level of performance of their employees and subdivisions to provide them with feedback. Having appropriate performance measures in place facilitates the communication of a well-defined structure for moving towards achieving an organization's goals (Neely, 2004). Developed by Charnes *et al.* (1978) based on the earlier work of Farrell (1957), Data Envelopment Analysis (DEA) is a famous technique to assess the performance of similar Decision-Making Units (DMUs). It is a non-parametric method based on linear programming that estimates the relative efficiency of DMUs using multiple inputs and outputs. Kohl *et al.* (2019) applied the DEA in healthcare with a focus on hospitals. They concluded that a further contribution of their research was its function as a roadmap to important methodological literature and publications, which provide crucial information on the setup of the DEA studies. Thus, this paper should be of assistance to researchers planning to apply DEA

in a hospital setting by providing information on (a) possible pitfalls when setting up a DEA analysis, and (b) possible ways to apply the DEA analysis in practice. Finally, they discuss what could be done to advance DEA from a scientific tool to an instrument that is actually utilized by managers and policy-makers. Yang *et al.* (2020) concluded that the foremost broadly utilized strategy for the valuation of the overall performance of a set of identical DMUs that use analogous sources to yield related outputs is DEA. However, the witnessed values of the symmetry or asymmetry of different types of information in real-world applications are sometimes inaccurate, ambiguous, inadequate, and inconsistent, so overlooking these conditions may lead to erroneous decision-making. They utilized the DEA for measuring performance of 13 hospitals of Tehran University of Medical Sciences of Iran. The results exhibited the usefulness of the suggested approach and point out that the model has practical outcomes for decision-makers. Taboada and Han (2020) applied a combination of the DEA Exploratory Data Analytics (EDA) to assess the efficiency and sustainability of urban rail transit for London. The paper dealt with the efficiency and sustainability of Urban Rail Transit (URT) using EDA and DEA. The first stage of the proposed methodology was EDA with already available indicators and suggested indicators to directly characterize the efficiency and sustainability of this transport mode. The second stage was assessing the efficiency of URT with two original models, based on a thorough selection of input and output variables, which is one of the key contributions of EDA to this methodology. The first model compared URT against other urban transport modes, applicable to route personalization, and the second scored the efficiency of URT lines. They claimed that the main outcome of their research was the proposed methodology, which has been experimentally validated using open data from the transport for London Urban Rail Transit Network and additional sources. Mocholi-Arce *et al.* (2022) used DEA to do performance assessment of the Chilean water sector. Their study applied a two-stage network structure model to evaluate water service providers cost and operational performance embracing service quality variables. An empirical analysis of the Chilean water and wastewater industries over the 2010–2018 period was presented. Moreover, in the second stage

of analysis, they analyzed the impact of a set of exogenous variables on the performance of water companies. Results revealed that the Chilean water companies had notable room to reduce costs and improve operational performance. Moreover, it was found that the public water provider performed better than fully private and concessionary water providers. [Shao et al. \(2019\)](#) evaluated the eco-efficiency of China's industrial sectors between 2007 and 2015 by using the Directional Distance Function (DDF) of network DEA, which contains a two-stage structure that divides industrial processes into three linked subprocesses, i.e., the production, wastewater and waste gas treatment processes. They expressed because the industrial process always results in pollutant emissions, pollution treatment has become necessary for the sustainable development of industry. Their results showed that the eco-efficiency of the mining industry was the lowest due to a decline in its performance during the waste gas treatment process, while due to the excellent performance during the production wastewater treatment process, the eco-efficiencies of the electricity, gas production and supply industries were the highest. [Kalinichenko et al. \(2022\)](#) performed a research for exploring the potential of Data Envelopment Analysis for enhancing pay-for-performance program design in primary health care. In recent years, implementation of pay-for-performance (P4P) programs in health care has become a worldwide initiative. However, most P4P programs incorporate systems of Performance Indicators (PI) without accounting for trade-offs between indicators. Their article had two objectives: (1) developing a DEA methodology for performance assessment of primary care providers; and (2) propose an innovative methodology for P4P contracting based on the DEA assessment results. They claimed that the applicability and advantages of the proposed methodology were illustrated with data from Portugal, but it can easily be adapted to different sets of PIs or domains, making it relevant for performance assessment and for P4P reward setting in other contexts and countries. The application of DEA and Malmquist index by [Luo et al. \(2019\)](#) to evaluate the efficiency of green technology innovation in strategic emerging industries. They stated that green technology innovation is the main driving force for sustainable development of China's strategic emerging industries. Improving the efficiency of

green technology innovation is an effective way to achieve this developmental goal. The correct approach to measuring the efficiency of green technology innovation is a hot issue. The empirical results showed that changes in trends of technology innovation efficiency of strategic emerging industries are increasing, due mainly to technological progress and promotion of technology efficiency. [Qi et al. \(2022\)](#) used performance evaluation using DEA for construction safety from a hybrid perspective of cross-sectional and longitudinal in three regions of Jiangsu, Zhejiang and Shanghai from 2003 to 2019. They stated that rapid expansion of urbanization in developing countries such as China brings explosive growth of the construction industry. It is necessary to evaluate construction performance in terms of safety, in order for sustainable development maintaining the speed of construction production without compromising safety performance. It was found that these regions don't maintain the state of fully BCC-efficient after achieving the optimal ratio between inputs and outputs in construction safety management. In consideration of the severity of undesirable outcomes, the construction industry performs better in the avoidance of workplace fatalities than in the prevention of non-fatal accidents. Distinct patterns of input indicators and output indicators during the period can give impetus to pooling their experience for cross reference among Jiangsu, Zhejiang and Shanghai. Additionally, practical experience of these regions can be referred to by other developing countries, in order for the balance between construction safety performance and industrial development in the aspects of added-value of the construction industry, completed-area of building construction, and total number of employees in construction companies. [Zhu et al. \(2018\)](#) used the DEA for analyzing the green Total Factor Productivity (TFP) of China's mining and quarrying industry for the period of 1991-2014 with regard to technology, scale, and management. According to them, China's mining and quarrying industry is characterized by high pollution, high energy consumption, and high emissions. Improving this sector's green TFP is of great importance for furthering the sustainable development of China's economy. Technological progress was the most important contributor, and the decline in scale efficiency and management efficiency were two inhibitors. Fortunately, in recent years,

management efficiency has gradually improved and become a new impetus for green TFP growth. Second, the characteristics of the green TFPs in the sub-industries vary considerably. During the sample period, the green TFPs of the Mining and Processing of Ferrous Metal Ores (MPFMO), the Mining and Processing of Non-Ferrous Metal Ores (MPNFMFO), and the Mining and Processing of Non-metal Ores (MPNO) grew rapidly and became the benchmarks, whereas those of the Mining and Washing of Coal (MWC) and the Extraction of Petroleum and Natural Gas (EPNG) remained very low. Third, the returns to scale of the sub-industries also varied. EPNG, MPNFMFO, MPNO were in the stage of increasing returns to scale or constant returns to scale during the entire period, whereas MWC and MPFMO have recently entered the stage of decreasing returns to scale. The results showed an increase in the green TFP by 71.7%. Technological progress was the most important contributor, and the decline in scale efficiency and management efficiency were two inhibitors. [Rashidi and Cullinane \(2019\)](#) utilized the DEA to derive an efficiency score reflecting the degree to which Sustainable Operational Logistics Performance (SOLP) is achieved within each sample nation. DEA was applied to derive an efficiency score reflecting the degree to which SOLP was achieved within each sample nation. A comparison between the national rankings achieved under the LPI and SOLP evaluation regimes revealed that there is a statistically insignificant monotonic correlation between them. While one country may be a top performer with respect to one of the evaluation approaches, it does not emerge as such under the other. However, the results of the analysis suggest that logistics industries of the United States, the Netherlands, Norway and Australia were found to be top performers under both approaches, while that of Greece, Korea, Italy and Portugal were found to be poor performers under both. The paper concluded that the SOLP approach provides useful information that supplements that provided by the LPI, but that it better facilitates performance improvements within a nation's logistics industry by helping to identify the sources of inefficiency and the nations which possess benchmark performing logistics sectors. [Mostafavi and Sadra Abarghouei \(2018\)](#) conducted a research to assess the efficiency of districts of The Municipality of Tehran by using DEA model. The number of input

and output of their model were 4 and 7, respectively. Results showed that the districts 9, 10, 13, 16, 17, 21 and 22 were categorized as efficient one. [Benito et al. \(2019\)](#) used DEA methodology to examine the efficiency of small Spanish municipalities' drinking water supply services. The results reveal a negative and considerable impact of population density and citizens' level of income on the efficiency of drinking water delivery. When the provision of water is managed directly by the local government, it is more efficient. [Onbaşıoğlu \(2021\)](#) investigated empirically the efficiency, technical efficiency, productivity, and the determinants factor of implementing sustainable development policy of the five major municipalities in North Cyprus by conducting DEA and Tobit analyses during the period from 2004 to 2018 quarterly. The empirical results showed that the size of the economically active population of a city, lower expenditures, and grants result in a higher efficiency, whereas the independent revenue sources (grants) and the per capita expenditures of North Cypriot municipalities had a negative effect on the efficiency. The employment rate in the municipalities had a considerable negative effect on the efficiency score. The results of Tobit analysis also showed that population had a positive impact which may increase the technical efficiency. [Modiri et al. \(2014\)](#) assessed efficiency of urban life quality in the districts of Tehran using DEA as an effective way for efficiency measuring. They claimed that utilized method can help urban planning for perceive and priority of urban issues and finding a solution for removing these problems. [Cooper et al. \(2011\)](#) indicated that the advantages of DEA, which lead to its widespread use, include empirical orientation and the absence of the need for prior assumptions inherent in other approaches, such as statistical regression analysis. Furthermore, they reported that studies of benchmarking practices using DEA have shown inefficiencies in some of the most profitable firms, and it has, therefore, been found to provide a better method for establishing benchmarks than using profitability as a criterion. [Zayyari et al. \(2010\)](#) stated that facing a lack of resources and facilities is the main reason of measuring efficiency to manage and dedicate resources to achieve the maximum level of services or productions. They claimed that DEA can be considered as one of the most effective approaches to measure efficiency. Therefore, they applied DEA

approach for assessing efficiency of Iran's provinces efficiency from view point of development. Their results showed that ten provinces had equal efficiency and opted as the superior ones from perspective of maximum developing along with the minimum level of facilities. Olejniczak (2019) investigate the relationship between Poland municipalities' income potential and the relative efficiency of their expanses by employing the DEA CCR-O model. It can be concluded that there is a link between the level of own revenues per capita and efficiency. Soko and Zoric (2018) measure the municipal efficiency in Bosnia and Herzegovina by implementing DEA with Variable Return Scale (VRS) and Constant Return Scale (CRS). Sixteen percent of municipalities were found efficient under the VRS assumption with an average efficiency score of 0.7115. The average municipal efficiency under the CRS assumption was 0.7458 and only 11% of them were efficient by using this model. The findings reveal a positive and significant impact of the number of residents on municipal efficiency. Lo Storto (2016) aimed at measuring the cost efficiency of 108 Italian major municipalities. The results reveal that Scale inefficiencies were found in some of the municipalities and there was a trade-off between expenditure efficiency and effectiveness. Miri et al. (2014) present an investigation to assess the performance of 22 districts of The Municipality of Tehran. The study employed DEA to evaluate the relative efficiency of decision-making units. The proposed model used fixed assets, employee expenses, and total income as input, and green space development, resumption and waste, development of cultural spaces as well as of passages and highways are assumed as the output of the model. The findings reveal that 9 districts were operating efficiently and 14 districts were inefficient. Lo Storto (2013) applied the DEA model for assessing expenditure efficiency of 103 Italian major municipalities. The percentage of efficient municipalities in the CCR and BCC models were 58% and 64% of the sample. Saranga and Moser (2010) claimed that increasing global competitiveness is forcing companies to cut costs and develop operational excellence. They stated that it is necessary to structure, develop and manage organizational activities in line with organizational objectives to achieve proper function. However, a challenge in respect of business units designated as support

functions is establishing their direct value added to overall corporate financial performance. This is cited as a key objective of senior management, and therefore a crucial focus in developing a performance management system for such units. To utilize performance measurement to establish business units as value-adding, it is necessary to go beyond merely measuring performance to analyze the performance in such a way it can demonstrate the function adds value. In this respect, Neely (2004) has identified a key challenge in managing through measurement as being to shift the focus to the targets. The results indicated that where managers are faced with large amounts of raw performance data, they tend to concentrate on justifying individual figures, as opposed to learning from the current situation and applying it to identify how the targets can be achieved. He proposed that managers need to be educated in how to present the data in such a way as to promote such discussion. The DEA has been successfully applied in various sectors like banking (Thanassoulis, 1999), supplier selection (Levary, 2008; Nourbakhsh et al., 2013), industrial (Fan et al., 2017), logistics (Xu et al., 2009), healthcare (Jacobs, 2001; Khani et al., 2012; Ghotbuee et al., 2012), operational research (Ruiz and Sirvent, 2022), university assessment (Loganathan and Subrahmanya, 2022), manufacturing (Wahab et al., 2008), education (Bessent et al., 1982). The aforementioned studies reveal that the DEA-method has extensive and significant utilization in efficiency assessment of executive units. Various indices could be implemented to perform the efficiency assessment using the DEA. The literature shows no similar research of using DEA approach to evaluate performance assessment based on financial indices. The main motivation of present study is application of the DEA approach to assess the efficiency of 22 districts of The Municipality of Tehran based on two indices i.e. cash income and sustainable income in 2020. Utterly, efficient and inefficient districts are determined and comments are presented to change and improvement. The current study has been carried out in Tehran in 2021.

MATERIALS AND METHODS

The Municipality of Tehran: Tehran City, the capital of Iran, is located at 51° 17' to 51° 33' east longitude and 35° 36' to 35° 44' north latitude. The city of Tehran is the largest and most populous city with a population

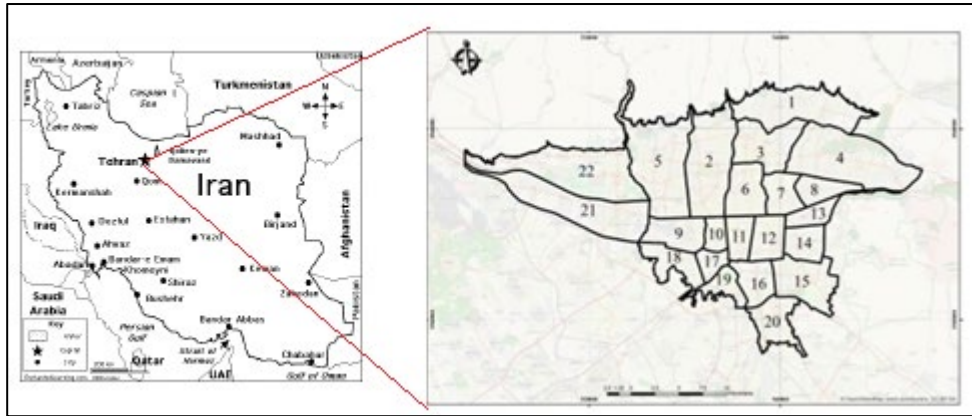


Fig. 1: The map of Tehran along with 22 districts

of about 8.6 million people, according to the 2016 population and housing census, and is the most densely populated center in the country with an area of 615 km². Tehran is divided to 22 districts that has shown in Fig. 1. The largest and the smallest districts of Tehran are 4 and 17 with an area of 62 and 9 km², respectively. The highest and lowest populations with 917,000 and 174,000 are in the Districts 4 and 9, respectively.

Data envelopment analysis

DEA is an applied mathematical state of the art programming method for measuring the relative efficiency of similar matched units that has been developed by Charnes et al. (1978) based on Farrell (1957) method with several input and output indicators. This approach is utilized to assess DMU's performance. DMU is a unit of an organization that is managed by an administrator provided that has a systematic process. In DEA literature, system's input elements and system's output elements are substituted with 'input' and 'output' phrases based on economic science. DEA suppose that DMUs apply similar inputs for similar outputs but with different value levels. It'll be simple and clear the expression of input-output ratios if output function is available and determined. But in many cases, the function is undetermined and inaccessible and it is more complex and even impossible to present. DEA is based on optimization process using linear programming that its function and parameters are undetermined. Therefore, DEA is categorized as non-parametric approach. There are two common models to apply

DEA approach for performance assessment: (1) CCR model (2) BCC model (Azar and Gholamrezaei, 2006).

CCR model

Developed by Charnes et al. (1978), so-called CCR, CCR is the first and a linear programming model of DEA that seeks to maximize the relative efficiency score of the unit pth by selecting a set of weights for all inputs and outputs. However, the score of each unit must be less than or equal to one. According to CCR model, efficiency is defined as the ratio of the weighted sum of outputs to inputs Eq. 1 (Egilmez, 2013):

$$EF_j = \frac{u_1 y_{1j} + u_2 y_{2j} + \dots + u_n y_{nj}}{v_1 x_{1j} + v_2 x_{2j} + \dots + v_m x_{mj}} = \frac{\sum_{r=1}^n u_r y_{rj}}{\sum_{s=1}^m v_s x_{sj}} \quad (1)$$

where x and y, respectively represent input and output, v and u are vectors inputs and outputs, respectively. While s and r are the output and input counts, j demonstrates the jth DMU. The first limitation is the denominator of Eq. 1. To overcome this problem, it is possible to solve CCR model in the form of linear programming. The second limitation ensures that under the selected set of weights, the efficiency score of any decision unit does not exceed one. The linear form is Eq. 2:

$$\begin{aligned} & CCR'_p - I \\ & \text{MAX } w_p = \sum_{r=1}^s u_r y_{rp} \\ & \text{Subjected to} \end{aligned} \quad (2)$$

$$\sum_{i=1}^k v_i x_{ip} = 1 \quad (2-1)$$

$$\sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^k v_i x_{ij} \leq 0 \quad j=1,2, \dots, n \quad (2-2)$$

$$u_r \geq 0 \quad r=1,2, \dots, s \quad (2-3)$$

$$v_i \geq 0 \quad i=1,2, \dots, k \quad (2-4)$$

In this model w_p is relative efficiency of pth DMU_p. The presented model by Eq. 2 should be performed for each decision-making unit to determine the efficiency of each units. Based on the experiments, if the number of units doesn't differ much from the total number of inputs and outputs, after solving, most units will be in the efficient border. In fact, the model would be unrealistic. Dual model is used to avoid this problem. Dual form of Eq. 2 is as Eq. 3:

$$\begin{aligned} & CCR'_p - I \\ & \text{MIN } z_p = \theta \end{aligned} \quad (3)$$

Subjected to

$$\sum_{j=1}^n \lambda_j y_{rj} \geq y_{rp} \quad r=1,2, \dots, s \quad (3-1)$$

$$\theta_{x_{ip}} - \sum_{j=1}^n \lambda_j x_{ij} \geq 0 \quad i=1,2, \dots, k \quad (3-2)$$

$$\lambda_j \geq 0 \quad j=1,2, \dots, n \quad (3-3)$$

θ is sign free. The pth DMU is efficient if and only if limitations of Eqs. (3-1) and (3-2) are required in model Eq. 3. To determine the efficiency of a DMU using an objective function approach via a linear programming, Eq.3 is developed as Eq. 4:

$$\begin{aligned} & CCR_p - I \\ & \text{MIN } z_p = \theta - \sum_{r=1}^s s_r^+ - \sum_{i=1}^k s_i^- \end{aligned} \quad (4)$$

Subjected to

$$\sum_{j=1}^n \lambda_j y_{rj} - s_r^+ = y_{rp} \quad r=1,2, \dots, s \quad (4-1)$$

$$\theta_{x_{ip}} - \sum_{j=1}^n \lambda_j x_{ij} - \bar{s}_i = 0 \quad i=1,2, \dots, k \quad i=1,2, \dots, k$$

$$\lambda_j \geq 0 \quad j=1,2, \dots, n \quad (4-2)$$

$$s_r^+ \geq 0 \quad r=1,2, \dots, s \quad (4-3)$$

$$s_i^- \geq 0 \quad i=1,2, \dots, k \quad (4-4)$$

Where θ is sign free, λ_j , s_r^+ and s_i^- are dual variables. To ensure that no weight is assigned a zero number and all inputs and outputs include in solution, Eq. 2 is justified using ϵ of value 0.001 or 0.0001 as Eq. 5:

$$\begin{aligned} & CCR'_p - I \\ & \text{MAX } w_p = \sum_{r=1}^s u_r y_{rp} \end{aligned} \quad (5)$$

Subjected to

$$\sum_{i=1}^k v_i x_{ip} = 1 \quad (5-1)$$

$$\sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^k v_i x_{ij} \leq 0 \quad j=1,2, \dots, n \quad (5-2)$$

$$u_r \geq \epsilon \quad r=1,2, \dots, s \quad (5-3)$$

$$v_i \geq \epsilon \quad i=1,2, \dots, k \quad (5-4)$$

Introduced by Eq.5 is CCR input-oriented approach. This model tries to approach an ineffective DMU to effective border by keeping the amount of inputs constant and increasing the output proportionally. Output-oriented model is another one that uses outputs as the basis. Keeping the outputs constant and reducing the inputs is the basis of this method. In these two models (input and output oriented), it is assumed that production has constant return to scale.

BCC model

This model adds $\sum_{j=1}^n \lambda_j = 1$ convexity constraint to the initial linear programming of CCR. There, return to scale could be constant, decreasing or increasing. Adding this constraint leads to insert a new variable (u) into dual model of BCC. The initial linear programming and dual of BCC are as Eq. 6:

$$\begin{aligned} & BCC_p - I \\ & \text{MAX } w_p = \sum_{r=1}^s u_r y_{rp} + u_o \end{aligned} \quad (6)$$

Subjected to

$$\sum_{i=1}^k v_i x_{ip} = 1 \quad (6-1)$$

$$\sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^k v_i x_{ij} + u_o \leq 0 \quad j=1,2, \dots, n \quad (6-2)$$

$$u_r \geq \varepsilon \quad r=1,2, \dots, s \quad (6-3)$$

$$v_i \geq \varepsilon \quad i=1,2, \dots, k \quad (6-4)$$

$$u_o \text{ is sign free} \quad (6-5)$$

BCC_p-I

$$\text{MIN } z_p = \theta - \sum_{r=1}^s s_r^+ - \sum_{i=1}^k s_i^- \quad (7)$$

Subjected to

$$\sum_{j=1}^n \lambda_j y_{rj} - s_r^+ = y_{rp} \quad r=1,2, \dots, s \quad (7-1)$$

$$\theta x_{ip} - \sum_{j=1}^n \lambda_j x_{ij} - s_i^- = 0 \quad i=1,2, \dots, k \quad (7-2)$$

$$\sum_{j=1}^n \lambda_j = 1 \quad (7-3)$$

$$\lambda_j \geq 0 \quad j=1,2, \dots, n \quad (7-4)$$

$$s_r^+ \geq 0 \quad r=1,2, \dots, s \quad (7-5)$$

$$s_i^- \geq 0 \quad i=1,2, \dots, k \quad (7-6)$$

Output-oriented of BCC model can be developed with adding $\sum_{j=1}^n \lambda_j = 1$ constraint to the initial linear programming of CCR output-oriented. In this paper, BCC output-oriented model has been implemented to survey districts performance of The Municipality of Tehran.

Indices of performance assessment

Sustainable income definition

According to the comprehensive plan of sustainable incomes and other financial resources of The Municipality of Tehran, sustainable incomes are those municipal incomes owing to the following characteristics:

1. Persistence: It is stable and doesn't undergo extreme fluctuations at least in the short run.
2. Flexibility: the income base increases over time and expands along with expanding expenditures to avoid financial constraints and to define the necessary implementation planning to achieve it.

3. Desirability: Earning money from that source promotes the justice-oriented approach and doesn't damage the environmental, physical, social, and economic structures (Hajilou *et al.*, 2017)

Survey design and data collection

The Municipality of Tehran sources include seven major revenue groups and its credit is provided in both cash and non-cash forms. The main groups are (1) Public incomes, (2) Income of private tolls, (3) Service fees and earnings of profit institutions, (4) Income from the funds and property of the municipality, (5) Government grants and affiliated organizations, (6) Grants and gifts and assets, (7) other sources. According to the approved budget report of The Municipality of Tehran Information and Communication Technology Organization (TMICTO), the share of incomes from public tolls is 86 percent of total income, of which 36 percent is related to sub-codes of tolls on building permits, tolls on balconies and overhangs, and renovation tolls (Tehran Municipality Information and Communication Technology Organization-TMICTO, 2020). These sub-codes make up a significant portion of cash and sustainable income.

Analytical framework

Determining Input and Output variables: In the present study, two indicators of cash and sustainable income are selected as the model outputs. Also, along with the above description, four variables are considered as the inputs of the model (1) number of building permits, (2) number of inhabitants, (3) number of housing deals, and (4) the price of the residential unit. Fig. 2 shows the structure of the model with its inputs and outputs along with unit of measurement. The following constraint has been considered in this model (Bowlin, 1998):

$$\begin{aligned} & (\text{Number of inputs} + \text{outputs}) \\ & \times 3 \leq \text{number of decision-making units} \end{aligned} \quad (8)$$

Decision-making units are considered as a system in DEA that transfer inputs to output. Obviously, a superior and more efficient system produces more output with fewer inputs. DEA models aim to maximize efficiency by providing a systematic approach to decision-making units (Zayyari *et al.*, 2010).

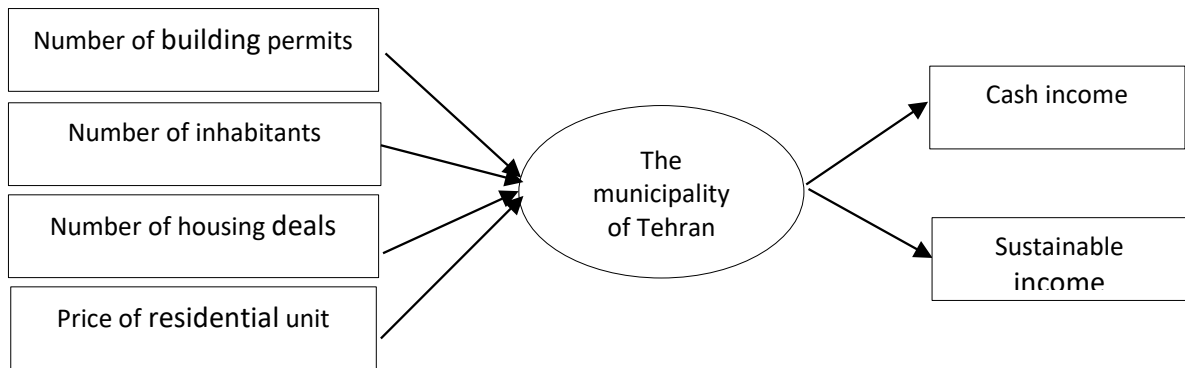


Fig. 2. Components of proposed DEA model

Table 1: Output and input data set of The Municipality of Tehran districts

District	Inputs				Outputs	
	X ₁	X ₂	X ₃	X ₄	Y ₁	Y ₂
	No. of building permits*	No. of inhabitants*	No. of housing deals*	price of residential unit* (Million dollar)	cash income* (Million dollar)	sustainable income* (Million dollar)
1	348	493889	4326	245.0	5999.3	778.8
2	460	692579	7162	179.1	3206.2	339.3
3	324	330004	3606	209.8	3869.8	355.5
4	643	917261	7025	122.5	2384.8	280.5
5	383	856565	12169	141.9	3227.6	255.7
6	232	250753	3029	156.7	3211.2	307.1
7	370	312002	4800	107.6	1393.6	161.0
8	387	425044	4636	106.1	683.1	136.0
9	144	174115	1748	81.4	324.8	48.1
10	236	326885	7025	76.4	338.8	71.9
11	325	308176	3750	76.9	880.2	101.9
12	231	240909	2359	64.0	1977.4	219.3
13	270	253054	2791	99.7	444.0	69.8
14	493	489101	5216	83.3	480.2	103.1
15	999	659468	4201	61.5	461.4	104.5
16	341	267678	1327	60.0	461.4	80.5
17	300	278354	1809	59.0	328.8	57.6
18	243	419249	1890	51.1	1121.4	87.4
19	261	255533	584	61.0	325.5	44.3
20	333	367600	1283	56.0	1246.2	84.8
21	307	186319	1365	80.9	638.1	123.1
22	301	175398	1202	111.1	1304.5	125.5

* Tehran Municipality Information and Communication Technology Organization

Data collection

Input and output variables of each district have been extracted for year 2020 (Table 1). Fig. 3 represents a graphical presentation of input and output variables.

RESULTS AND DISCUSSION

The efficiency of decision-making units based on BCC-O model has been shown in Fig. 4. Referring to Fig. 4, while the efficient districts are 1, 6, 9, 12, 16, 17, 18, 19, 20, 21, and 22, the rest are inefficient. As

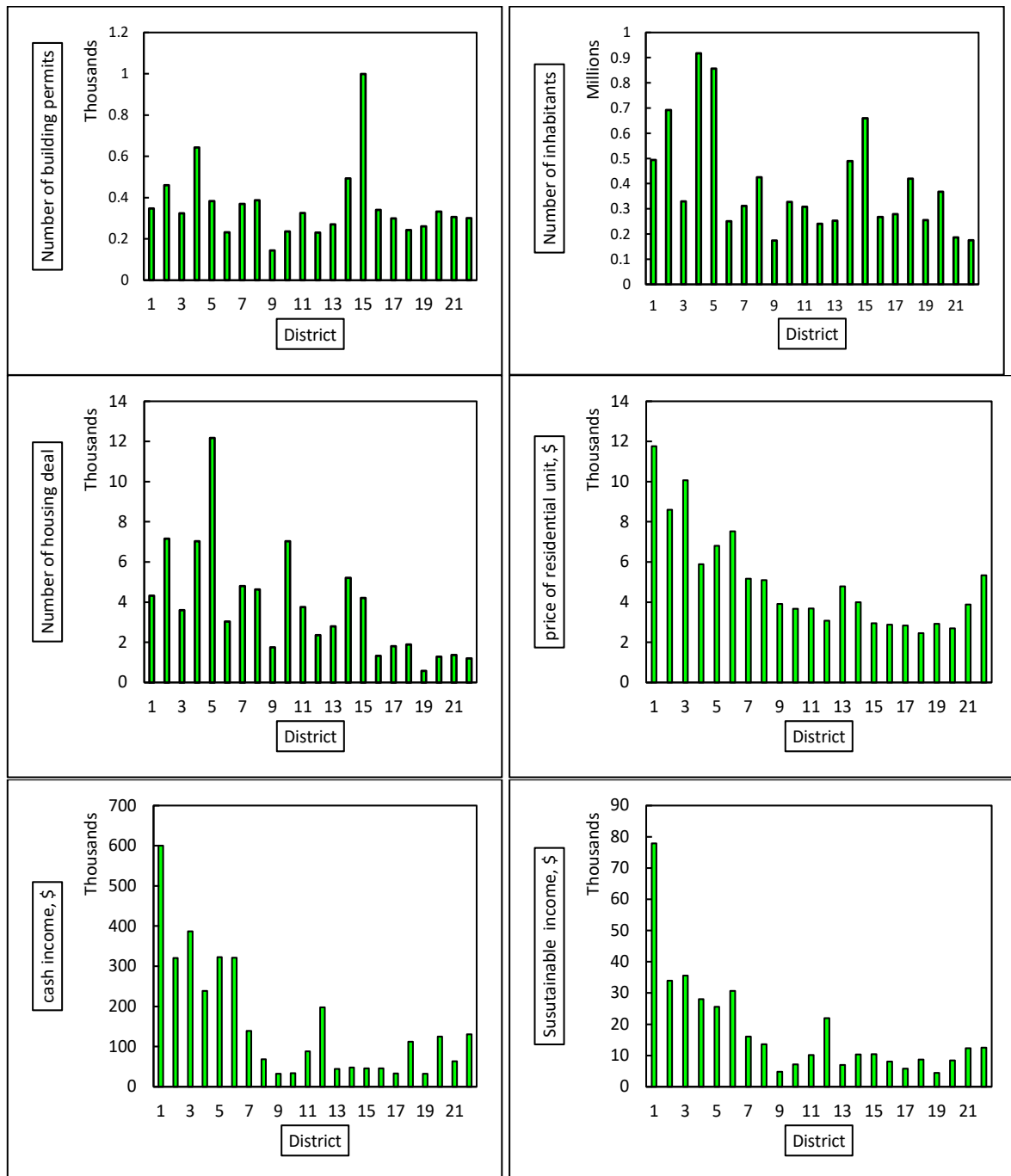


Fig. 3: A graphical representation of BCC-O's input and output

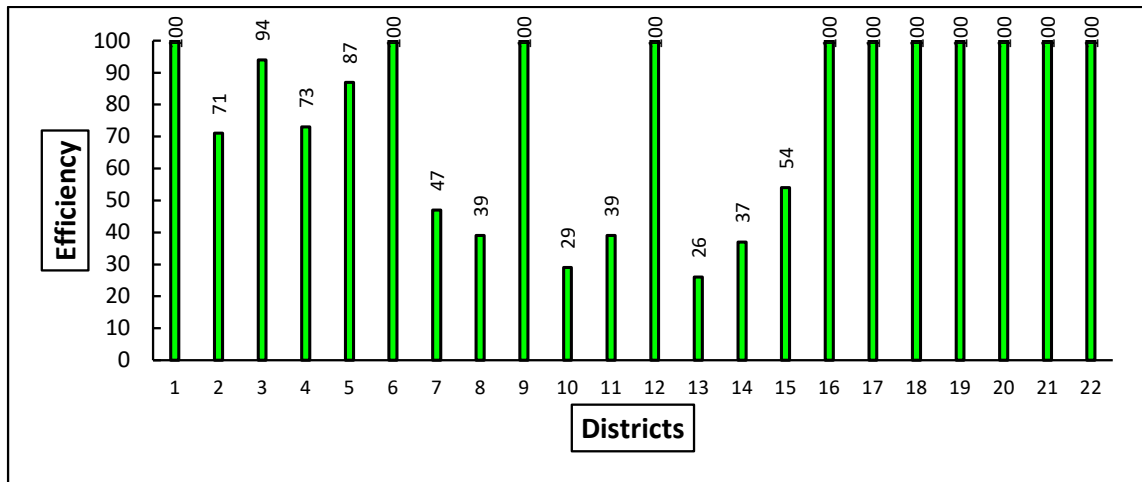


Fig. 4: Districts' efficiency

Table 2: The optimized value of sustainable income based on the BCC-O model

District	Proposed value (BCC-O model) (Million Dollar)	Approved sustainable income (Million Dollar)	Percentage change (BCC-O model to the approved value)
2	57.50	45.12	27%
3	46.10	43.90	5%
4	40.02	41.01	-2%
5	46.00	47.62	-3%
7	35.43	22.86	55%
8	34.95	13.76	154%
10	25.07	11.02	128%
11	25.90	14.02	85%
13	26.69	8.57	211%
14	27.90	14.71	90%
15	19.38	16.36	18%

Table 3: The optimized value of cash income based on the BCC-O model

District	Proposed value (BCC-O model) (Million dollar)	Approved cash income (Million dollar)	Percentage change (BCC-O model to the approved value)
2	453.38	312.72	45%
3	412.00	486.35	-15%
4	327.76	346.57	-5%
5	370.74	361.12	3%
7	294.71	144.32	104%
8	291.40	54.95	430%
10	219.02	33.56	553%
11	226.38	93.47	142%
13	251.00	30.39	726%
14	240.71	50.19	380%
15	181.29	41.33	339%

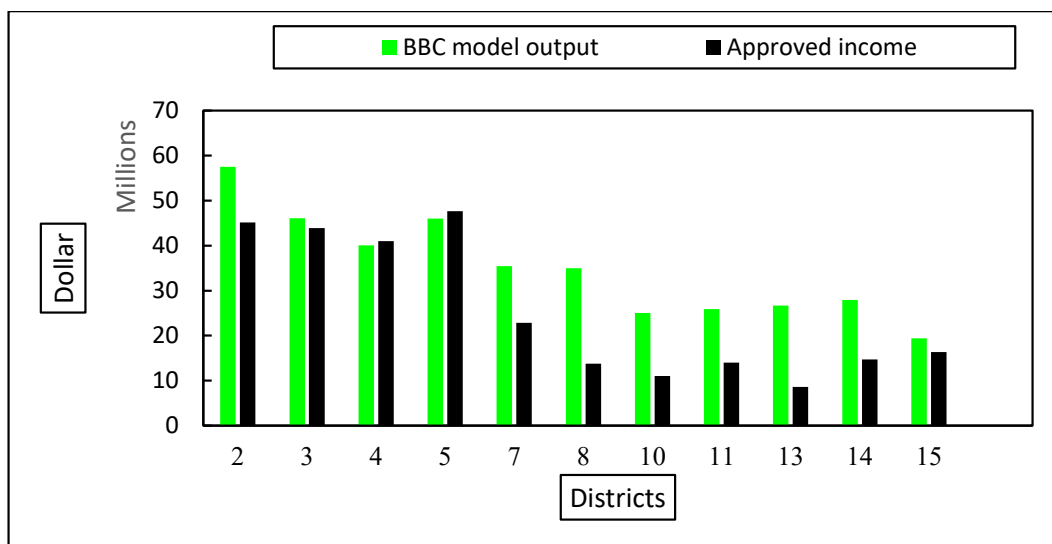


Fig. 5: The proposed value of BCC-O model vs approved sustainable income

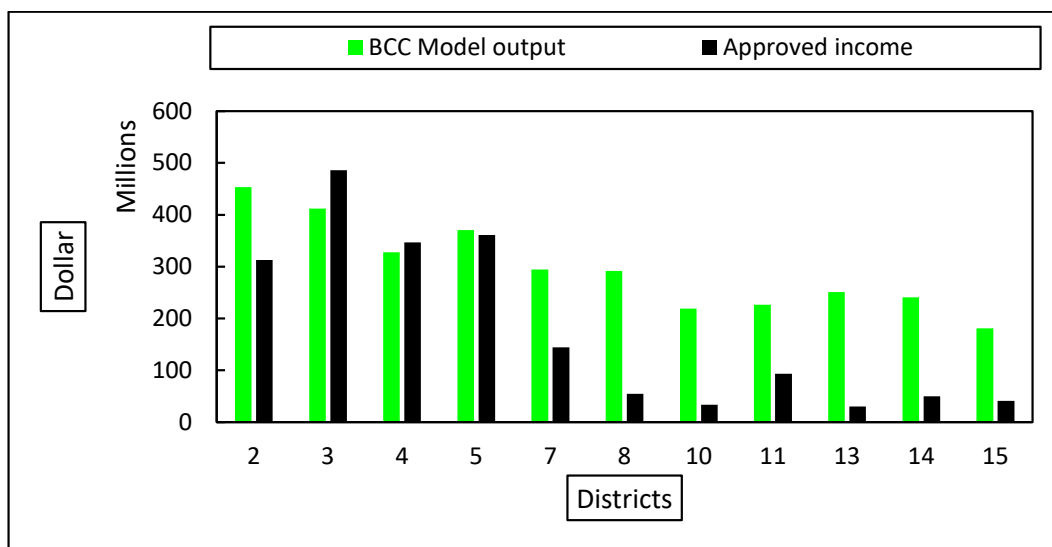


Fig. 6: The proposed value of BCC-O model vs approved cash income

it is clear, the District 13 has the lowest proficiency among inefficient ones.

Proposed plan for inefficient districts

Tables 2 and 3 show the optimized output values using the BCC-O model for inefficient districts. A graphical representation of these tables has been

presented in Figs. 5 and 6. This can be useful for decision-makers of inefficient districts to modify the approved values of cash and sustainable income according to the proposed value of BCC-O model.

The results showed that while 50 percent of districts namely 1, 6, 9, 12, 16, 17, 18, 19, 20, 21, and 22 are efficient districts, the rest are inefficient. These

districts were ranked in terms of efficiency values. The Districts 3, 5 and 4 were located at the beginning of the spectrum and the districts 13, 10 and 14 were placed at the end. It is clear to distinguish efficient and inefficient districts by comparing inputs and outputs of each one. Cash and sustainable income of district 1 has been achieved 9 and 6 times those of the District 8. The optimum values of cash and sustainable income were determined using BCC-O model and were compared with considered incoming plan of 2020 for the districts. The results illustrated that the cash and sustainable income have been brought up very low for the Districts 8, 12 and 13 regards to effective input indices. It can be concluded that using performance assessment is a more logical method to regulate a district revenue plan and is necessary to change the current approach of The Municipality of Tehran for regulating the revenue plan of the districts, generally with emphasis on the performance of previous years. According to [Table 2](#), the approved sustainable income of districts has been considered very low because of their capacities and potentials except the districts 4 and 5. In particular, the districts 13, 8 and 10 have a difference of more than 100 percent between approved and proposed values. According to [Table 3](#), the approved cash income of inefficient districts has been considered very low in 2020. For example, the actual performance of the districts 15, 8, 10 and 13 was much higher than their approved value. Input variables considered in the present study illustrate that it is necessary to increase remarkably their approved cash income for the coming years. Similar researches have been conducted by [Mostafavi and Sadra-Abarghuei \(2018\)](#) and [Miri et al. \(2014\)](#). [Mostafavi and Sadra-Abarghuei \(2018\)](#) used area, district's population, number of employees and approved budget as input variables. Cash and non-cash achieving percent, urban services and environment, traffic, prevention and crisis, cultural and social, human resources and technical and construction projects were opted as output parameters. They used CCR and BCC approaches to determine efficient and inefficient districts. The results showed that the districts 9, 10, 13, 16, 17, 21 and 22 were known as efficient ones using CCR model. Based on the BCC model, the districts 1, 4, 5 and 8 were added to the above-mentioned districts. [Miri et al. \(2014\)](#) used number of total assets, human resources expenses and total income

as the input variables for their BCC input-oriented model. Four output parameters were green space development, resumption and waste, development of cultural spaces and improvement of passages and highways. They claimed that while 9 districts (i.e. the districts 1, 2, 4, 5, 13, 15, 19 and 21) were efficient, the others were found inefficient ones. The average efficiency of these 14 inefficient units was equal to 0.93. The most significant distinct among the present paper with two above-mentioned ones are type and number of inputs and outputs. However, the more confidence can be seen between the results of [Mostafavi and Sadra-Abarghuei \(2018\)](#) and the present study. Based on these researches, the districts 1, 9, 16, 17, 21 and 22 have been introduced as efficient ones.

CONCLUSION

Present study aimed to evaluate the efficiency of 22 districts of The Municipality of Tehran in terms of cash income and sustainable income using DEA. In fact, the purpose of ranking the 22 districts of Tehran City is identifying efficient and inefficient ones in order to improve the current situation and transfer towards higher efficiency in creating cash income and sustainable income. While number of building permits, number of inhabitants, and number of housing deals and price of residential unit opted as four input variables, cash income and sustainable income were selected as output variables. The BCC-O model has been implemented to utilize the DEA model for classifying the 22 districts of The Municipality of Tehran. The results illustrated that utilization of the DEA approach to determine efficiency model for planning could be prioritized for inefficient districts to decline the gap between districts. Hence, the capacities and limitations of each district is basic of districts planning and it will be possible to achieve social justice and development using the results of the DEA model.

SUGGESTIONS

The following recommendations are suggested for future researches:

- Due to the problems and shortcomings in the planning pattern in The Municipality of Tehran, it will be beneficial to use DEA to assess the efficiency of different urban areas including waste management, transportation developing

and assessment of organization and companies. Comparison of temporal assessment of efficiency can be considered too;

- Using residential parcel information as input parameter for implementation of DEA approach;
- Formulation of green space per capita program of districts using DEA method
- Prediction of distressed area renovation;
- Assessment of citizens' satisfaction using DEA approach.

AUTHOR CONTRIBUTIONS

A. Jafari Shahrestani, E. Sangi and H. Mazaherian performed the literature review, extracting indices and gathering information. S. Mavaghar poor performed the calculation. E. Sangi and H. Mazaherian prepared the review of the paper. E. Sangi and A. Jafari Shahrestani prepared the results and explanations of the paper.

ACKNOWLEDGMENTS

The authors would like to appreciate the Municipality of Tehran for the data support.

CONFLICT OF INTEREST

The authors have no conflict of interest to be declared concerning this review paper. Also, the authors have checked all the ethical affairs comprising duplicates, misconduct, data making, informed consent, and plagiarism.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

ABBREVIATIONS (NOMENCLATURE)

<i>BCC</i>	Banker, Charnes, Cooper
<i>BCC-O</i>	The output-oriented BCC model
<i>CCR</i>	Charnes, Cooper, Rhodes
<i>CCR-O</i>	The output-oriented CCR model
<i>CRS</i>	Constant Return to Scale
<i>DEA</i>	Data Envelopment Analysis
<i>DMU</i>	Decision Making Unit
<i>VRS</i>	Variable Return to Scale
u_r	Output weights
v_i	Input weights
x_{ij}	positive inputs of the DMU_j
y_{rj}	positive outputs of the DMU_j

REFERENCES

- Amiri, M.; Darestani Farahani, A.; Mahboob Ghodsi, M., (2017). Multi-criteria decision making, Kian Press, Tehran. (In Persian)
- Azar, A.; Gholamrezaei, D., (2006). Ranking of country provinces using data envelopment analysis approach (applying human development indices). – Iran. J. Econ. Res., 8(27): 153-173 **(21 pages)**. (In Persian)
- Banker, R.D.; Charnes, A.; Cooper, W.W., (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. Manage. Sci., 30(9): 1078-1092 **(15 pages)**.
- Benito, B.; Faura, Ú.; Guillamón, M.D.; Ríos, A.M., (2019). The efficiency of public services in small municipalities: The case of drinking water supply. Cities, 93: 95-103 **(9 pages)**.
- Bessent, A.; Bessent, W.; Kennington, J.; Reagan, B., (1982). An application of mathematical programming to assess productivity in the Houston independent school district. Manage. Sci., 28(12): 1355-1367 **(13 pages)**.
- Bowlin, W.F., (1998). Measuring performance: An introduction to data envelopment analysis (DEA). J. Cost Anal., 15(2): 3-27 **(25 pages)**.
- Charnes, A.; Cooper, W.W.; Rhodes, E., (1978). Measuring the efficiency of decision making units. Europ. J. Oper. Res., 2(6): 429-444 **(16 pages)**.
- Comprehensive plan of sustainable revenues and other financial resources of Tehran Municipality, the Islamic Council of Tehran, (2007). (In Persian)
- Egilmez, G.; McAvoy, D., (2013). Benchmarking road safety of US states: a DEA-based Malmquist productivity index approach. Accid. Anal. Prev., 53: 55-65 **(11 pages)**.
- Fan, Y.; Bai, B.; Kang, P.; Zhang, Y.; Guo, J., (2017). Study on eco-

- efficiency of industrial parks in China based on data envelopment analysis. *J. Environ. Manage.*, 192: 107-115 **(9 pages)**.
- Farrell, M.J., (1957). The measurement of productive efficiency. *J. R. Stat. Soc.: Series A (General)*, 120(3): 253-281 **(29 pages)**.
- Ghotbuee, A.; Hemati, M.; Fateminezhad, R., (2012). An empirical study based on BSC-DEA to measure the relative efficiencies of different health care centers in province of Semnan, Iran. *Manage. Sci. Lett.*, 2(7): 2643-2650 **(8 pages)**.
- Hajilou, M.; Mirehei, M.; Pileh Var, M., (2017). Studying sustainable revenue sources of municipalities (case: Shabestar, East Azerbaijan province). *J. Urban Econ. Manage.*, 5(20): 1-22 **(22 pages)**. (In Persian)
- Jacobs, R., (2001). Alternative methods to examine hospital efficiency: data envelopment analysis and stochastic frontier analysis. *Health Care Manage. Sci.*, 4(2): 103-115 **(13 pages)**.
- Kalinichenko, O.; Amado, C.A.; Santos, S.P., (2022). Exploring the potential of Data Envelopment Analysis for enhancing pay-for-performance programme design in primary health care. *Europ. J. Oper. Res.*, 298(3): 1084-1100 **(17 pages)**.
- Khani, F.; Naderi, H.; Zangeneh, M.; Fazeli, E., (2012). Measuring the relative efficiency of Ilam hospitals using data envelopment analysis. *Manage. Sci. Lett.*, 2(4): 1189-1194 **(6 pages)**.
- Kohl, S.; Schoenfelder, J.; Fugener, A.; Brunner, J.O., (2019). The use of Data Envelopment Analysis (DEA) in healthcare with a focus on hospitals. *Health Care Manage. Sci.*, 22: 245-286 **(42 pages)**.
- Levary, R.R., (2008). Using the analytic hierarchy process to rank foreign suppliers based on supply risks. *Comput. Ind. Eng.*, 55(2): 535-542 **(8 pages)**.
- Lo Storto, C., (2013). Evaluating technical efficiency of Italian major municipalities: a Data Envelopment Analysis model. *Proc.-Soc. Behav. Sci.*, 81: 346-350 **(5 pages)**.
- Lo Storto, C., (2016). The trade-off between cost efficiency and public service quality: A non-parametric frontier analysis of Italian major municipalities. *Cities*, 51: 52-63 **(12 pages)**.
- Loganathan, M.; Subrahmanya, M.H.B., (2022). Efficiency of Entrepreneurial Universities in India: A Data Envelopment Anal. *J. Know. Econ.*, **(25 pages)**.
- Luo, Q.; Miao, C.; Sun, L.; Meng, X.; Duan, M., (2019). Efficiency evaluation of green technology innovation of China's strategic emerging industries: An empirical analysis based on Malmquist-data envelopment analysis index. *J. Clea. Prod.*, 238: 1-20 **(20 pages)**.
- Miri, S.; Alroaia, Y.; Bohloul, S., (2014). An application of DEA method for ranking different Tehran municipality branches. *Manage. Sci. Lett.*, 4(5): 961-966 **(6 pages)**.
- Mocholi-Arce, M.; Sala-Garrido, R.; Molinos-Senante, M.; Maziotis, A., (2022). Performance assessment of the Chilean water sector: A network data envelopment analysis approach. *Util. Policy*, 75: 101350 **(15 pages)**.
- Modiri, M.; Hoseini, S.A.; Kashefidoust, D., (2014). Performance Evaluation of Urban Life Quality Indexes (Case study: Tehran Regions). *New attitudes in human geography*, 6(4): 1-17 **(17 pages)**. (In Persian)
- Mostafavi, F.; Sadra-Abarghuei, N., (2018). Assessment of the 22 districts of The Municipality of Tehran with the data envelopment analysis approach. *J. Geog. New Stud. Archit. Urbanis*, 16: 191-209 **(19 pages)**. (In Persian)
- Neely, A., (2004). The challenges of performance measurement. *Manage. Decis.*, 42: 1017-1023 **(7 pages)**.
- Nourbakhsh, V.; Ahmadi, A.; Mahootchi, M., (2013). Considering supply risk for supplier selection using an integrated framework of data envelopment analysis and neural networks. *International J. Ind. Eng. Comput.*, 4(2): 273-284 **(12 pages)**.
- Olejniczak, J., (2019). Efficiency vs. the level of per capita income of urban-rural municipalities in Poland. *Financ. Internet Q.*, 15(1): 20-29 **(10 pages)**.
- Onbaşıoğlu, D.Ç., (2021). The Turkish Cypriot Municipalities' Productivity and Performance: An Application of Data Envelopment Analysis and the Tobit Model. *J. Risk Financ. manag.*, 14(9): 1-19 **(19 Pages)**.
- Qi, H.; Zhou, Z.; Li, N.; Zhang, C., (2022). Construction safety performance evaluation based on data envelopment analysis (DEA) from a hybrid perspective of cross-sectional and longitudinal. *Saf. sci.*, 146: 105532.
- Rashidi, K.; Cullinan, K., (2019). Evaluating the sustainability of national logistics performance using Data Envelopment Analysis. *Trans. Policy*, 74: 35-46 **(12 pages)**.
- Ruiz, J.L.; Sirvent, I., (2022). Identifying suitable benchmarks in the way toward achieving targets using data envelopment analysis. *International Transactions in Operational Research*, 29(3): 1749-1768 **(20 pages)**.
- Saranga, H.; Moser, R., (2010). Performance Evaluation of Purchasing and Supply Management Using Value Chain Dea Approach. *Eur. J. Oper. Res.*, 207 (1): 197-205 **(9 pages)**.
- Shao, L.; Yu, X.; Feng, C., (2019). Evaluating the eco-efficiency of China's industrial sectors: A two-stage network data envelopment analysis. *J. Environ. Manage.*, 247: 551-560 **(10 pages)**.
- Soko, A.; Zorič, J., (2018). Municipal efficiency and economies of scale in Bosnia and Herzegovina. *Lex Localis*, 16(4): 715-734 **(20 pages)**.
- taboada g.l.; han, I., (2020). exploratory data analysis and data envelopment analysis of urban rail transit. *electronics*, 9(8): 1-29 **(29 pages)**.
- Thanassoulis, E., (1999). Data envelopment analysis and its use in banking. *Interfaces*, 29(3): 1-13 **(13 pages)**.
- Tehran Municipality Information and Communication Technology Organization (TMICTO), (2020). Statistical yearbook information of the city.
- Wahab, M.I.; Wu, D.; Lee, C.G., (2008). A generic approach to measuring the machine flexibility of manufacturing systems. *Eur. J. Oper. Res.*, 186(1): 137-149 **(13 pages)**.
- Xu, J.; Li, B.; Wu, D., (2009). Rough data envelopment analysis and its application to supply chain performance evaluation. *Int. J. Prod. Econ.*, 122(2): 628-638 **(11 pages)**.
- Yang, W.; Cai, L.; Edalatpanah, S.A.; Smarandache, F., (2020). Triangular single valued neutrosophic Data Envelopment Analysis: application to hospital performance measurement. *Symmetry*, 12(588): 1-14 **(14 pages)**.
- Zayyari, K.; Sorkhkamal, K.; Zanjirchi, S.M., (2010). Classical Assessment of Efficiency of Country Provinces from viewpoint of Development Using DEA method. *J. Spat. Plan.*, 14 (3): 255-273 **(19 pages)**. (In Persian)
- Zhu, X.; Chen, Y.; Feng, C., (2018). Green total factor productivity of China's mining and quarrying industry: A global data envelopment analysis. *Res. Poli.*, 57: 1-18 **(18 pages)**.

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Jafari Shahrestani, A.; Sangi, E.; Mazaherian, H.; Movaghar Hoor, S. (2022). *Application of Data Envelopment Analysis to assess the efficiency using income aspect in the local government. Int. J. Hum. Capital Urban Manage.*, 7(3): 341-356.

DOI: [10.22034/IJHCUM.2022.03.04](https://doi.org/10.22034/IJHCUM.2022.03.04)

url: http://www.ijhcum.net/article_251270.html



ORIGINAL RESEARCH PAPER

Toward behavior-based placemaking: the evolution of place concept in urban design knowledge

A.R. Sadeghi^{1,*}, F. Shahvaran¹, A.R. Gholami¹, T. Feyzabi²

¹ Department of Urban Planning & Design, Faculty of Art and Architecture, Shiraz University, Shiraz, Iran

² School of Planning, Department of Architecture & Planning, Dalhousie University, Halifax, Nova Scotia, Canada

ARTICLE INFO

Article History:

Received 06 January 2022

Revised 04 April 2022

Accepted 26 May 2022

Keywords:

Behavior

Behavior observation

Placemaking

Urban Space

Urban Design

ABSTRACT

BACKGROUND AND OBJECTIVES: The concept of place as a multidimensional approach in the evolution of urban design concepts has always sought to improve the quality of urban environments and spaces. "Place" results from humans' environmental experiences and cognition of space which is perceived through meaning in people's minds within the interaction of humans and place. Placemaking is considered a participatory process and a practical approach for urban designers, which can be implemented by improving the physical quality of urban spaces. In urban design studies, several perspectives have been proposed regarding the structure of the place model. This paper aimed to examine the evolution of placemaking in urban design theories to propose a place model based on behavior. How and in what way behavior can contribute to the formation of place is the primary question of this research. In other words, what is the role of behaviors analysis and behavioral patterns in the formation of an urban place?

METHODS: Descriptive-analytical method is used to review the concept of place and its conceptual evolution to provide placemaking recommendations and suggestions based on the proposed place model. In the case study section, Studies have been done using behavioral observation tools such as place-based graphic maps, movement path tracing of individuals, and recording various behavioral patterns by time intervals at the Hafezieh intersection, Shiraz, Iran.

FINDINGS: The results of analyzing behavioral maps of Hafezieh intersection and recommendations from global experiences regarding public life and behavioral studies revealed that the combination of four aspects of form, function, meaning, and ecosystem with emphasis on the specific role of behavioral studies could lead to flourishing placemaking.

CONCLUSION: Paying attention to the role of behavior-based placemaking in recent urban thoughts can promote sustainable urban design and determine optimal policies for social interactions, communication, and the importance of human behaviors that

DOI: [10.22034/IJHCUM.2022.03.05](https://doi.org/10.22034/IJHCUM.2022.03.05) define a thriving place and support its constant progress



NUMBER OF REFERENCES

54



NUMBER OF FIGURES

11



NUMBER OF TABLES

4

*Corresponding Author:

Email: arsadeghi@shirazu.ac.ir

Phone: + 987136131070

ORCID: [0000-0002-0047-7533](https://orcid.org/0000-0002-0047-7533)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

As the setting for human interactions, cities not only include buildings; instead, it is the space between the buildings, pathways, filling elements, open spaces, and citizens' active presence which help create urban existence. Serving as a ground where public activities of urban life occur, urban spaces should provide participation, comfort, entertainment, reciprocal communication, and frequency of citizens. Urban space design involves public life, walkability, active, dynamic, and vital settings which need to be focused attention by urban experts, architects, and designers (Carmona et al., 2003). Urban space is a product of historical and socio-cultural forces of the community, which is more characterized by variable space elements such as activities system and more stable space factors, including the civil capacity of the urban community, than technological, geographical, and physical factors. On the other hand, these socio-cultural forces have created these elements through such elements as institution systems and urbanization dynamism mediated by social groups and their activities (Parsi, 2001). Urban space is a product of historical and socio-cultural forces of the community, which is more characterized by variable space elements such as activities system and more stable space factors, including the civil capacity of the urban community, than technological, geographical, and physical factors. On the other hand, these socio-cultural forces have created these elements through such elements as institution systems and urbanization dynamism mediated by social groups and their activities (Parsi, 2001). Urban space is a significant factor involved in the occurrence of activities and behaviors. These spaces provide opportunities that support human activities or create a barrier that prevents activities and behaviors in space (Nassar, 2005). However, many contemporary urban spaces are not based on behavioral-activity patterns of space users; therefore, urban designers' familiarity with behavioral sciences and social dimension studies to design considering users' cultural needs could create desirable conditions for urban space users. This multifaceted concept involves both the physical and social environments. Simply put, the place combines human activities, roles, and relations. People give meaning to place based on their experiences, social ties, emotions, and thoughts within a physical platform (Lak and Jalalian, 2017). Place is a part of the

space personalized by human presence; i.e., when the relation between man and space is based on a previous experience, the space turns into a place. This relation denotes that place is part of the environment experience and convergent cognitions (Pretty et al., 2003). On the other hand, place denotes the same meaningful space, part of the space characterized by social interaction (Harrison and Dourish, 1996). The primary concerns of urban designs are to promote the quality of urban spaces to increase desirable placemaking in cities; thus, to design desirable and high-quality places where citizens deal with life, labor, and daily activities, it is required to examine socio-behavioral dimensions of urban design. Most research conducted in placemaking areas has concentrated on the physical, functional, and environmental aspects of the place; However, place is formed by a combination of an environment and behavior and is rarely seen as a behavioral setting. This study emphasizes behavioral-activity studies related to placemaking. This study aims to answer the following questions by reviewing the concept of place, the evolution of placemaking in urban design theories and perspectives, and investigating global experiences concerning public life and behavioral studies. This study was applied in terms of nature and content. It sought to examine experts' views and provide a place model based on behavior through a descriptive-analytical approach. It also aimed to explain urban design concepts and public urban spaces and placemaking and behavioral studies using documentary and library studies. It also studies case studies and global cases to devise guidelines on placemaking based on the proposed model.

Literature Review

The placemaking approach focuses on people's experience in space and turning it into a place to meet basic human needs (Project for Public Spaces, 2016), which fundamentally is defined as four features of sociability, uses and activities, access and access linkage, and comfort and image. Wyckoff (2014), in the research of "Definition of Placemaking: Four Different Types," has defined placemaking as a people-centred approach to planning, designing and managing public spaces in cities; due to its emphasis on the relationships between individuals, communities and urban spaces. The research also mentions three types of strategic, participatory and tactical places.

In [Nouri and Costa's \(2017\)](#) study of "Placemaking and climate change adaptation: new qualitative and quantitative considerations for the Place Diagram," placemaking is considered ecologically relevant in terms of adaptation to climate change. In addition, [Gulsrud et al., \(2018\)](#) used the term "green placemaking" concerning place and nature in the study "Innovative urban forestry governance in Melbourne, investigating green placemaking as a nature-based solution." This shows that placemaking must recognize the value of ecological systems and consider the ecological aspect and other physical, functional and semantic aspects. Furthermore, [Ellery and Ellery \(2019\)](#) laid emphasis on the importance of physical, cultural and social aspects in creating a place; including; promoting public interaction, mass communication, community health and safety, social justice, economic development and environmental sustainability, in the study "Strengthening Community Sense of Place through Placemaking." According to the study "Placemaking in action: factors that support or obstruct the development of urban community gardens," [Wesener et al., \(2020\)](#) also describe four semantic dimensions (individual and collective), social exchange, social action (participatory), and empowerment in the formation of a prosperous place. [Ghavampour and Brenda Vale \(2019\)](#), in the study "Revisiting the Model of Place: A Comparative Study of Placemaking and Sustainability," believes that placemaking is the evolution and combination of visual-artistic and social traditions. Visual-artistic focuses on visual forms, and the social function emphasizes the use and experience of individuals in a place. Regarding the socio-behavioral aspect, [Hamzeieha and Tabibiban \(2017\)](#), in the study "Redesign of urban spaces with an emphasis on the relationship between the physical environment of the city and the behavior of citizens," illustrated that the potential of urban places is used to meet the needs of citizens and improve their behavioral pattern. In the study "Engaging youth in placemaking: modified behavior mapping," [Little \(2020\)](#), by examining the behaviors and using the modified behavior mapping technique, showed that individual and collective participation in the design of inclusive places is crucial. According to the reviewed literature, it is noteworthy that placemaking is a process with the aim of improving the quality of urban spaces along with the active participation of citizens in the

creation of the place. Therefore, by emphasizing the components of place structure (form, activity, meaning, and ecosystem), considering the socio-behavioral aspect is essential.

Urban design and public urban space

Urban design is the art of making places for people. It includes the way places work and matters such as community safety and how they look. It concerns the connections between people and places, movement and urban form, nature and the built fabric, and the processes for ensuring prosperous villages, towns, and cities. Good design can help create lively places with distinctive character; streets and public spaces that are safe, accessible, pleasant to use, and human in scale; and places that inspire because of the imagination and sensitivity of their designers ([The Regions et al., 2000](#)). Public space or place is referred to a part of the physical environment related to public functions. On the other hand, the public realm has a broader concept involving all places, people, activities, and social life aspects. Thus, public space and public realm are not synonymous, as the former refers to a part of the public realm ([Madanipour, 2007](#)). An open public space provides motivation and free selection of behaviors, movements, and visual explorations for many people in the city. In other words, it is a flexible space that easily adapts to a variety of behaviors and lays a neutral, albeit inducing, the groundwork for human actions ([Lynch, 1972](#)). In the meantime, one would say that public realms are the essential parts of the cities and urban environments. In such realms, most contacts are characterized by human interaction. These realms involve all urban parts where people interact physically and visually ([Tibbalds, 1992](#)). This environment serves as a place to get the social life moving as it lays the groundwork for citizens' interactions. [Rapaport \(1988\)](#) argues that urban space as a public realm involves collective behaviors that significantly regulate peoples' lives and give meaning to the urban spaces as a whole. One would say that an urban space does not have a spatial and physical dimension; instead, it is the community and people who link together in various levels of the space. Urban spaces refer to a scene where public activities occur. The streets, squares, and parks of a city form human activities. These dynamic spaces form the main parts of a city as they stand against fixed and immobile spaces ([Bahrainy, 2013](#)). Therefore, Urban spaces are

part of cities' open and public spaces, demonstrating public life's nature, where citizens are present. It is a space that allows people to access it and engage in activities there. A public institution should administer this space to meet the public needs (Pakzad, 2013). In other words, these spaces serve as places where most actions and communications occur and are the primary elements that create social links between citizens and collective memories (Lotfi *et al.*, 2013). Thus, as the groundwork of social interactions and main urban elements, urban spaces turn into places by meaning.

Placemaking and its structure

Nurberg Schulz (1980) considers space to be different from place and believes that spaces derive their existence from places, not space per se. It is also believed that the spiritual condition of man helps to understand the environment in which he is present. Places are based on directly experienced phenomena rich in meanings with natural objects and continual activities serving as a significant individual and social identity sources (Relph, 1976). On the other hand, Tuan believes that the concept of place relates to the mind, arguing that the emotional attachment process and meaning and value determination are critical to changing the space to the place; in other words, better cognition and giving value to space helps to make a place (Tuan, 1977). The concept of place refers to social structures which involve experiences of sociability, physical forms, and mixed processes. Since the 70s, theorists have been developing various perspectives on the structure of places. Most views involve three main aspects of the environment form, function, and meaning, which construct the place structure (Scannell and Gifford, 2010). Table 1 shows the place structure based on theorists' views.

The placemaking approach is a permanent participatory process whose users define its identity

and meaning (Horgan, 2020). This idea was raised in the 1960s and 1970s, aiming to focus on visual and audio elements to meet the needs of people in urban environments in terms of urban planning and design (Placemaking-booklet, 2016). Placemaking has practically been founded on ideas proposed by experts since the 60s. From the beginning of the 60s, the concept of the place appeared in theories proposed by Lynch (1960) and Jacobs (1961). In the 70s (when urban designers put their interest in the relation between people and place concepts), such theorists as Relph (1976), Norberg-Schulz (1980), and Canter (1977) proposed concepts regarding the place and spatial models, while in the 80s, Proshansky *et al.* (1983), Jacobs and Appleyard (1987) and Buchanan (1988), eventually in the 90s, Tibbalds (1992), Montgomery (1998), Gustafson (2001), Carmona *et al.* (2003) and Gehl (2011) stated various views concerning placemaking. In this regard, as a non-profit organization, the Project for Public Spaces has been working to encourage placemaking since 1975. The fundamental goal of this organization was to encourage people to participate in public spaces and strengthen their links with these spaces. With the purpose of placemaking following the citizen's views, Project for Public Spaces (PPS) studies and implements projects in their living environments. Table 2 summarizes the history of placemaking.

People are place makers; nevertheless, designers create this occurrence and its spatial structure. Accordingly, regarding design quality and placemaking, one should point out that places are designed and built concerning their function and activities. In this vein, place features make place components meaningful. Urban design aims at placemaking. Thus, physical, functional, and meaningful qualities are interrelated and urban designers can succeed in making places by taking advantage of these three types of qualities (Carmona *et al.*, 2003).

Table 1: Theorists' perspectives in terms of multidimensional structure of the place

Theorist	Place: Multidimensional concept		
	Physical Dimension	Functional Dimension	Perceptual Dimension
(Gustafson, 2001)	Form	Function	Meaning
(Montgomery, 1998)	Form	Activity	Imagination
(Trancik, 1986)	Physical Space	Environmental Features	Meaning
(Norberg-Schulz, 1980)	Perceived Space	Character	Meaning and Memory
(Canter, 1977)	Form	Activity	Imagination
(Relph, 1976)	Form	Activity	Meaning

Placemaking in terms of behavior

Although scholars and theorists have referred to place in their theories, aesthetic aspects of the place concept, along with the behavioral conditions of space users, had remarkable effects on the diversity of activities as the main factors in making thriving urban spaces and places were introduced as unique urban spaces with distinctive identities. The way an activity is done is called behavior. Human behavior is the outcome of his motives and needs, environmental capabilities, the individual's image of the world outside originating from his perception, and the meaning of this image. Thus, any activity affected by the above conditions can take on many forms and result in different behaviors. For instance, sitting on a bench, squatting, and lying down are sitting-related behaviors. Behavior is not a follower of activity alone; instead, it is a combination of activity, time, and place, involving such requirements as various doable activities, a particular part of the environment commensurate with the behavior, the establishment of proper relation about the above case in a specific period (Pakzad, 2014). Consequently, behavior is directed through an individual's views of the social environment and built environment (Hamzeiha and Tabibian, 2017). Users of urban spaces attend to the spaces based on their needs and expose different behavioral patterns. Thereupon, behavior is directed through an individual's views of the social

environment and built environment (Hamzeiha and Tabibian, 2017). Nowadays, urban spaces have already lost their vitality and attractiveness, and citizens attend less to such spaces. Furthermore, to design consciously in a better way, one should be informed of urban space users' differences. These groups can vary depending on their age, gender, and the goals set for their activities. Thus, they demonstrate an activity pattern that is also different. Another thing to note regarding attaching value to behavioral-activity patterns is paying attention to equipment and amenities in urban space provided for space users. Urban spaces can create conditions that attract citizens or, conversely, reduce people's participation. Hence, urban designers need to promote the quality of urban spaces by being aware of the situation of these spaces and effective criteria for enhancing them (Sadeghi et al., 2021). Table 3 summarizes theorists' views on the occurrence of activities and behavioral studies in urban spaces.

Global experiences of behavioral studies

Over time, attention to the social dimension in urban design has gained much consideration, and behavioral studies in urban design have assumed more importance. Gehl's architectural group and design team have conducted studies on behavioral patterns by emphasizing public life and focused on several cities across the world, including Wellington (New

Table 2: Placemaking Background

Theorist	Decade	Point of View
PPS (1975-present)	2000	Emphasis on the role of comfort and image, accesses and linkages, activities and uses, and sociability with determining quantitative and qualitative criteria
Gehl (2011)		Behavioral and public life studies and their roles in place attractiveness
Carmona et al. (2003)		Understanding six-fold components affecting the quality of urban places
Montgomery (1998)	1990	Place success depends on the type of space activity simultaneously with form and meaning
Tibbalds (1992)		Attention to the principle of totality in urban placemaking
Buchanan (1988)		Urban design is based on making places emphasizing the occurrence of events
Jacobs and Appleyard (1987)	1980	Significance of public places in proportion to human needs
Proshansky et al. (1983)		The significance of a balanced relationship between an individual's identity and place features
Norberg-Schulz (1980)		"Place" is a qualitative concept; space is the three-dimensional structure of the place, and character is the public feature of the place
Canter (1977)	1970	Place structure is a mixture of activities, value-related concepts, and physical environment that affects human experiences.
Relph (1976)		Place concept as three characteristics of the form, activity, and meaning; Components of human experience
Jacobs (1961)		"Street" is an urban place with an emphasis on the occurrence of activities
Lynch (1960)	1960	"Place" is unique with identity

Table. 3: Behavioral observation methodology

	Activity patterns		Technique
	Dynamic activity	Tracing	Record activity by the observer Tracking and recording the movement path of people Record changes in the direction of people Record behavioral setting Use intervals of 5 to 15 minutes Activity type notes
Behavior-based placemaking	Static activity	Activity diversity	



Fig. 1: Projects Study Areas from left to right (Wellington, London, Adelaide, Seattle, and Christchurch), (Gehl,2002;2004; 2009)

Zealand, Australia), London (England, UK), Adelaide (South Australia, Australia), Seattle (Washington, US) and Christ Church (New Zealand, Australia) (Fig. 1). In this vein, the researchers have examined global experiences and provided solutions to behavior-based placemaking. As pioneers of behavioral studies, Gehl's design team emphasized public life in the mentioned five projects and initially described the project structure briefly. Then, to describe the studies in each project, they explained the macro-objectives, the procedure, and a brief introduction of the area under study. In the second section, the project analysis has included an analytical examination of studies related to activities and behaviors, including the pedestrian flow (density and people flow rate), networks and transportation modes (such as walkability and cycling), urban spaces (sitting places, urban furniture, behavioral settings, types of activities by time and place, social interactions of space users) and urban space users (gender and age groups). The analysis and understanding section for each subject stated included mapping and diagrams. In the end, each project proposed recommendations in various physical, functional, meaningful, and environmental dimensions (Gehl, 2002, 2004, 2009).

Regarding form and physical aspects, all the projects were mainly focused on permeability, physical accessibility, entry type into the spaces, and transportation moods. In this connection, proposed

suggestions and recommendations have frequently concentrated the entry types into the space, designing the entries, paths types, and connection networks. The following tables explain these recommendations. Earlier, the interaction of function-activity and meaning-imagination in an urban place was discussed. The behaviors and activities of people in space were considered the focal point of the interaction of function-activity and meaning-imagination. The understanding and analysis section considered behavioral discussions, pedestrian volume and traffic, types of activities, behavioral setting, and other related topics (sometimes by time). In this connection, maps have been provided for each case. From an ecosystem perspective, which has recently received more attention in urban design, projects have sought to deal with humans' climatic and biological well-being. The proposed recommendations concentrate on urban furniture and its type, canopies and shading, weather conditions, and green spaces. Due to the proposed models of place, it became apparent that combining three aspects of form, function, and meaning can lead to placemaking. Recently, much consideration has been given to environmental and ecological subjects in urban design. On the one hand, physical-environmental factors such as permeability, accessibility, enclosure, formal and physical symmetry; socio-functional factors such as sociability, flexibility,

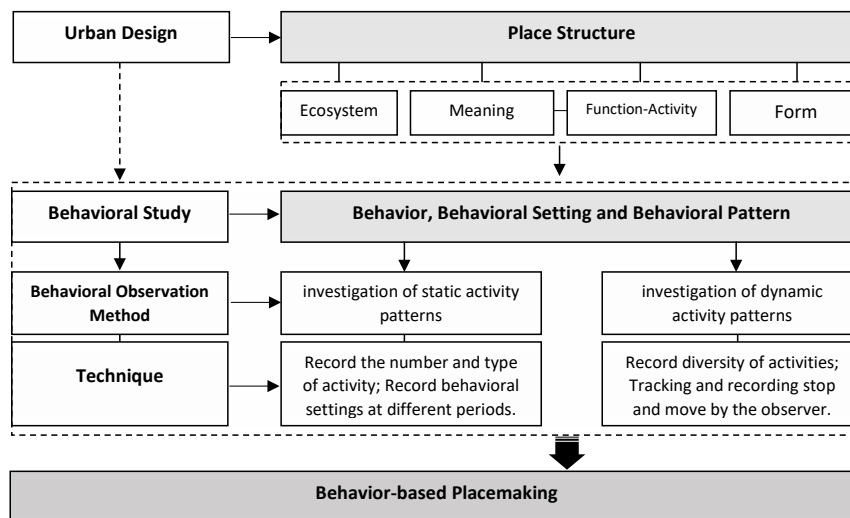


Fig. 2: Proposed Behavior-based Placemaking Model

inclusiveness, vitality, being participative, diversity of land use and activities, and meaningful factors such as legibility, visual attractiveness, imageability, sense of place, and identity also contribute to a successful placemaking (Jacobs, 1961; Lynch, 1981; Montgomery, 2003; Carmona *et al.*, 2003; The Regions *et al.*, 2000; Bentley *et al.*, 2013). Meanwhile, the authors reviewed relevant behavioral studies. They found that various environmental, functional, physical-environmental, perceptual-behavioral, and socio-cultural factors could affect citizens' behavior and behavioral pattern. Such indicators as mobility, permeability, accessibility, climatic comfort, natural elements and landscapes, vitality, diversity of land use and activity, visual attractiveness, inclusiveness, timing, social interaction, and flexibility were also defined concerning these factors (Shole *et al.*, 2017; Alighanbari and Nasr, 2016; Gehl and Svarre, 2015; Baqbeh *et al.*, 2014; Tavassoli and Fathi, 2013; ZolfiGol and KarimiMoshaver, 2019; Lotfi *et al.*, 2014; Paknejad and Latifi, 2019; Sadeghi *et al.*, 2021). The authors used dimensions and indicators affecting successful urban placemaking. They discussed the main factors affecting the behavioral patterns of users of urban spaces to propose a place model by emphasizing behavioral-environmental components. In this model, form, function, activity, meaning, and ecosystem were considered based on the structural aspects of the proposed place model (Fig. 2). It is noteworthy that all aspects of place, affect behavior and behavioral patterns. Furthermore,

the environmental-behavioral components of related studies can affect the behavioral patterns of users who use the places, including the urban spaces. Table 3 describes behavioral observation method based on the proposed place model.

The primary concern of urban design is to improve the quality of urban environments and public realms. Meanwhile, as the essential component of the city's structure, urban spaces, and public realms should boost the presence of citizens and meet their demands. Furthermore, as the users of such spaces, citizens behave differently in urban spaces while meeting their needs. Hence, designing urban spaces that fulfill the needs of citizens based on their behaviors and behavior patterns might be helpful in urban studies from a social-psychological perspective. The current study have been carried out in Shiraz/ Iran in 2022.

MATERIALS AND METHODS

Research Process

In terms of nature and content, this study is among the applied researches in exploring theorists' views, describing the model of behavior-based place derived from the available literature, and examining global experiences with a descriptive-analytical method. In this study, the concepts of urban design, urban public space, placemaking, and behavioral studies are explained in the literature review. The case study has also been evaluated and analyzed utilizing the

behavioral observation technique. Finally, based on the case study recommendations and suggestions for behavior-based placemaking are expressed. Fig. 3 shows the research process.

In the case study section, studies have been done using behavioral observation tools such as place-based graphic maps, tracking the movement path of individuals, and recording various behavioral patterns by time intervals. Hafeziyeh intersection space is located in zone three according to the Municipality of Shiraz County, Iran (Fig. 4).

This area hosts several historic and valuable places, such as the Fars Department of Culture and Islamic Guidance, Hafez Auditorium, Hafeziyeh (Tomb of Hafez), Shiraz Art University, Hafeziyeh Stadium entrance, Shiraz National Garden. Hafeziyeh walkway consists of a pedestrian pathway (the Northern section) and a vehicular pathway (the Southern section). In addition, the National Library and Archives of Iran, and Military zone are located in the street, interrupting the Hafeziyeh Walkway. Therefore, the case study area is

located on an important historical site (Fig. 5). Over time, attention to the social dimension in urban design has gained much consideration, and behavioral studies in urban design have assumed more importance. Gehl's architectural group and design team have conducted studies on behavioral patterns by emphasizing public life and focused on several cities across the world, including Wellington (New Zealand, Australia), London (England, UK), Adelaide (South Australia, Australia), Seattle (Washington, US) and Christ Church (New Zealand, Australia). In this vein, they have examined global experiences and provided solutions to behavior-based placemaking.

RESULTS AND DISCUSSION

Behavioral maps analysis

In the urban space analysis section using behavioral maps, the behavioral maps were prepared as static and dynamic activity patterns (derived from the proposed location model) in three-time intervals within a workday: morning, noon, and night.

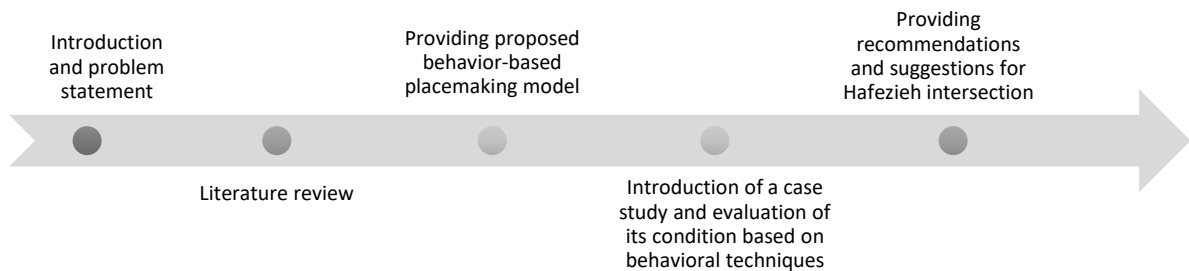


Fig. 3: Research Process

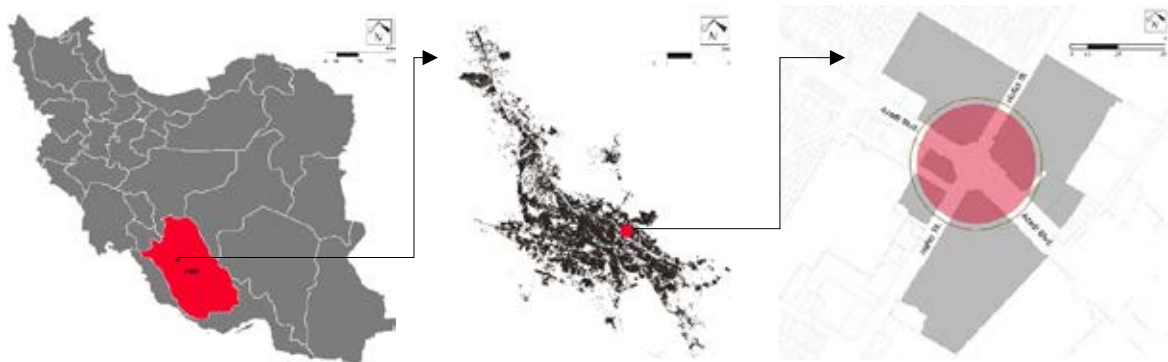


Fig. 4: Hafeziyeh intersection location within Shiraz; source: authors: a) Iran map, b) Shiraz city in Fars, Iran and c) Case study location

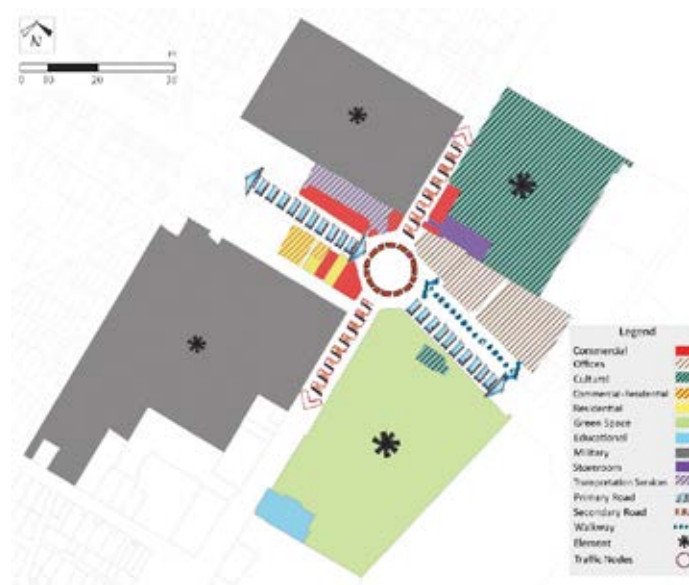


Fig. 5: Cognitive map of Hafeziyeh intersection; source: authors

Static activity pattern (activity diversity)

The location of various occurred activities was examined during the rush hours of the day in the morning, noon, and night (Figs. 6 to 8). Activities were categorized based on the concepts derived from the reviewed literature. The main activities of walking, standing and sitting fall into three categories depending on the goal of each activity. The analyzed data shows that walking activity in the Hafeziyeh Walkway and close-by sidewalks mainly occurred during the daytime (morning and noon), and the maximum was at noon. These results indicated the importance of providing shades for walking in warm and moderate climates. Activities of standing and sitting more frequently have happened in front of commercial and cultural uses and places provided with urban furniture. The analysis implies that the behavioral settings are forming more intensely in the active frontages with the commercial, cultural, and green space uses. Hence, the results show the importance of creating active frontages in designing urban spaces and avoiding dead or lazy frontages, especially at night.

Dynamic activity pattern (tracing)

The movement patterns of users have been studied using tracing over time, which studies the

users' movement patterns over time. The tracing study was carried out by being present in the space within a week and recording the users' movements three times per day in 15-minutes increments every hour, as shown in Figs. 9 to 11. The resulting drawn routes indicate that the pedestrian traffic does not follow any specific pattern. Due to the increase in the number of users during the night, pedestrian walking patterns are more diverse and busier. Pedestrians have preferred to commute through Hafeziyeh Walkway more frequently than the other sidewalks. Thus, designing sidewalks as safe and attractive paths could convert a space into a place.

Studies on urban design knowledge show that most urban design theories have been initially limited to formal and aesthetic aspects. Then it focuses on social dimensions and public perception, and finally, place and placemaking. Placemaking is achieved by designing a meaningful urban space combined with the continuous presence of space users and their social interactions. The presence of humans in urban spaces and their social interactions could pave the way for various activities in urban spaces. Ultimately, after reviewing the recommendations of the global experience and findings and analyses of behavioral studies in the case study, the authors have proposed recommendations regarding behavior-

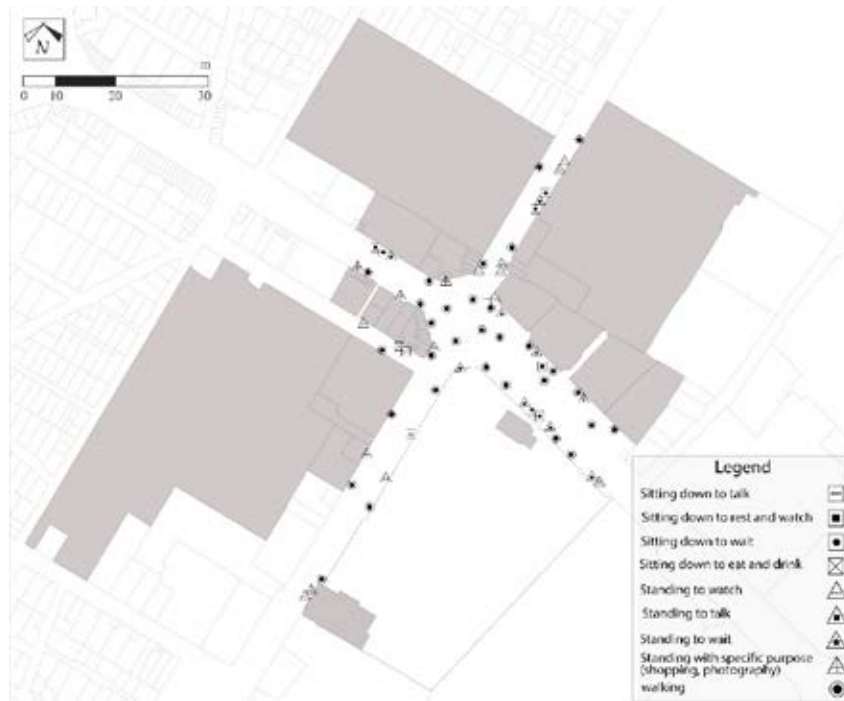


Fig. 6: Locations and types of activities (morning); source: authors

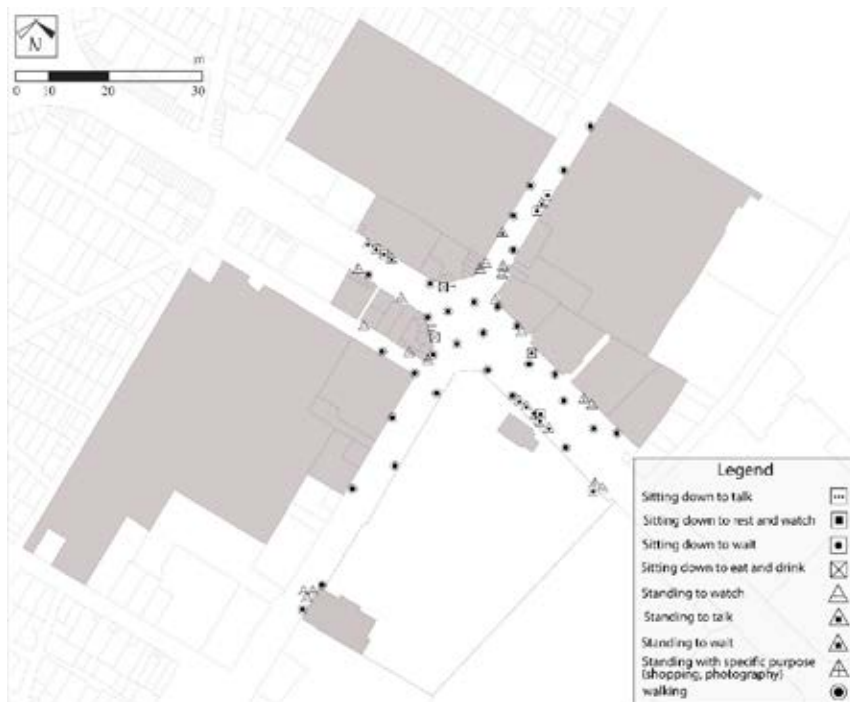


Fig. 7: Locations and types of activities (noon); source: authors

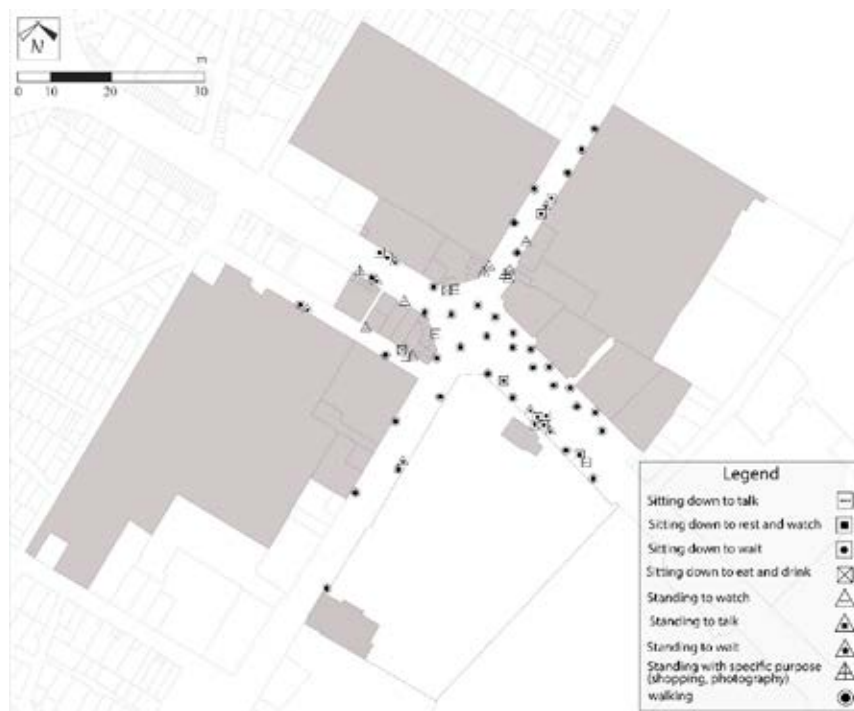


Fig. 8: Locations and types of activities (night); source: authors



Fig. 9: Tracking the path (morning); source: authors



Fig. 10: Tracking the path (noon); source: authors



Fig. 11: Tracking the path (night); source: authors

based placemaking at the Hafezieh intersection in the following table (Table. 4). The recommendations are compiled based on the dimensions of the research's proposed behavior-based placemaking model.

Previous research in the field of placemaking with emphasis on the existence of types of placemaking (Wyckoff, 2014), has often focused on the ecological (Nouri and Costa, 2017; Gulsrud *et al.*, 2018) and physical dimensions (Ellery and Ellery, 2019). They believe that attention to nature, green spaces and climate change play a role in shaping urban place. It is also important to pay attention to the physical

dimension in designing an urban place. Other categories of research have focused on the social dimensions (Ellery and Ellery, 2019; Wesener *et al.*, 2020) and aesthetic issues of place (Ghavampour and Brenda Vale, 2019). On the one hand, these studies believe that social interactions and mass communication, and visual forms and aesthetic aspects, on the other contribute to successful spatial planning. However, research has rarely considered the place as a behavioral setting and the present study emphasizes behavioral-activity studies related to placemaking.

Table. 4: Behavior-based Placemaking Recommendations at the

Dimension	Suggestions and Recommendation
Form	<ul style="list-style-type: none"> Defining entrances using a variety of flooring Using durable materials on sidewalks Encouraging pedestrians to cross the street using the zebra crossing Using specific memorable elements in the definition of entrances Installing tactile paving and ramps for the presence of all people(inclusiveness), especially on the Hafezieh sidewalk Designing cycle path along Hafezieh walkway toward Hafez avenue Designing appropriate passageways, high-quality levels, and lighting along the way Designing a cycling path with the parking lot Designing pavements using high-quality materials Providing all-out access for all people
Function-Activity	<ul style="list-style-type: none"> Allocating mixed-uses with activity overflows to the western and northern edges of the intersection Allocating mixed uses to the upper stories of buildings on the northern and western edges of the intersection Creating pause spaces to make behavioral settlements at the entrance of Melli Garden Laying the groundwork for increasing the citizen's participation in social activities occurrence Considering night activities in order to dynamize the space at night Creating multi-purpose pause spaces with various applications at the Hafezieh walkway Providing facilities and activities for pause and relaxation and inviting visitors to move and stay in urban space Improving space conditions for children to play and entertain Supporting street and spontaneous entertainment Exhibiting critical annual festivals in urban public space Formation of street markets with various topics Creating happy and dynamic spaces for children and teenagers to play Designing attractive frontages and soft edges, especially on the ground floor Designing attractive and appealing facades along with the urban space area Refraining from facades uniformity and stretched building facades
Meaning	<ul style="list-style-type: none"> Considering specific spaces for holding temporary events on the eastern and southern edges of the intersection Using urban elements matching the identity of the area Paying attention to collective memories by considering specific behavioral settlements and diversity of activities Improving the perfect vision of landmarks through diverse flooring Using participation in holding street events and exhibitions Using graphics and illustrations matching the identity of the area on the walls and floor
Ecosystem	<ul style="list-style-type: none"> Increasing livability by using soft frontages on both sides of Azadi and Hafez street Using tall trees to provide desirable shading Defining semi-transparent frontages utilizing ivy and ornamental plants on the facade of the Melli Garden Improving the condition of urban furniture and installing lighting Implementing movable and light furniture that fits the identity of the area Placing a musical fountain on the Hafezieh walkway Eliminating available gaps in the pedestrian network by installing small pockets of greenery Use of green connections at night Setting public furniture commensurate with shelters against the wind Promoting resting amenities by making places next to water fountains

CONCLUSION

In behavior-based placemaking, urban designers should also be acquainted with the evaluation methods of urban spaces based on behavioral studies. As a practical method in behavioral studies, Behavioral observation is based on how people interact with the surrounding environment. In this method, the observer observes the type, time, and place of users' activities, realizes how the environment influences and supports people's behaviors, and which people or groups interact with the space. Observation of behaviors and people's interactions with location helps produce data that can be used to examine people's activities and create a desirable urban place. Thus, attention to behavioral studies, mainly focusing on space users' behavior and behavioral patterns could significantly contribute to successful urban placemaking. This paper aimed to examine the evolution of placemaking in urban design theories to propose a place model based on behavior. First, by examining the importance of the subject and the literature review (Table. 1 and Table. 2), a model of behavior-based placemaking was proposed (Fig. 2). Then in response to the research's main challenge, the authors evaluated the case of the Hafezieh intersection (located in Shiraz County, Iran) (Fig. 4) in terms of static and dynamic activities (Figs. 6 to 11) by using the behavioral observation method (Table. 3). Then, recommendations and suggestions based on the dimensions of the proposed model for for Hafezieh intersection were presented (Table. 4). Behavior-based placemaking emphasizes the behavior aspect as an interaction focal point of functional and meaningful aspects. Humans have an influential role in urban places' desirability by attending to urban spaces and exhibiting diverse behaviors as environmental reactions. Therefore, this type of Placemaking has significant importance in the evolution of urban design knowledge in the contemporary period. Moreover, behavior-based placemaking can be caused to promote sustainable urban design. The most important limitation of this research lies in the prevalence of Covid-19 and the conditions caused by the pandemic that affected the behavior of citizens in urban spaces, which is different from pre-pandemic regular days. This situation also has affected citizens' presence, and most citizens were reluctant to interview and talk to researchers.

Ultimately, The authors recommend that further research on behavioral studies and placemaking

should be undertaken in the following areas:

- The impact of the behavior of different social groups (women, the elderly, children, and the disabled) on place and placemaking
- Determining place improvement behaviors
- How the behavior process is created (from feeling to behavior) in an urban place

AUTHOR CONTRIBUTIONS

A.R. Sadeghi: Supervision, Funding acquisition, Conceptualization, Methodology, Validation, Writing - Review & Editing.

F. Shahvaran: Project administration, Software, Formal analysis, Investigation, Resources, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization.

A.R. Gholami: Project administration, Software, Formal analysis, Investigation, Writing - Original Draft, Writing - Review & Editing.

T. Feyzabi: Project administration, Writing - Original Draft, Writing - Review & Editing.

ACKNOWLEDGEMENT

The authors appreciate the support of IJHCUM's Editorial Office. In addition, the manuscript has greatly benefited from the insightful and constructive comments of the editors and anonymous reviewers.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy, have been completely witnessed by the authors.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's

Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

REFERENCES

- Alighanbari, Z.; Nasr, T., (2016). Investigating the role of behavioral setting in the formation of urban hangouts. National Conference on Applied Research in the New Horizons of Civil Engineering and Architecture, Islamic Azad University of Bushehr, Bushehr, Iran. **(13 Pages)**. (In Persian)
- Baqbeh, K.; Pourjafar, M.R.; Ranjbar, E., (2014). Analysis and evaluation of sitting activity in urban spaces (Case study: Tehran Theater Square). *J. Archit. Urban Plan.*, 7(13): 113-131 **(19 Pages)**. (In Persian)
- Bahrainy, S.H., (2013). *Urban Design Process*. University of Tehran Publishing, Tehran, Iran. (In Persian)
- Bentley, E.Y.; Alcock, A.; Murrain, P.; McGlynn, S.; Smit, G., (2013). *Responsive environments; designers' guides*, translated by M. Behzadfar. Iran University of Science and Technology Publishing, Tehran, Iran. (In Persian)
- Buchanan, P., (1988). What City? A Plea for place in the public realm. *Archit. Rev.*, 1101: 31-41. **(11 Pages)**.
- Canter, D., (1977). *The psychology of place*. architectural place publishing, London, United Kingdom.
- Carmona, M.; Heath, T.; Oc, T.; Tiesdell, S., (2003). *Public places urban spaces; the dimensions of urban design*. Architectural Press, Oxford, United States.
- The Regions.; Commission for Architecture.; the Built Environment.; Great Britain. Commission for Architecture and the Built Environment., (2000). *By design: Urban design in the planning system: Towards better practice*. London, United Kingdom.
- Ellery, P.J.; Ellery, J., (2019). Strengthening community sense of place through placemaking. *Urban Plann.*, 4(2): 237-248. **(12 Pages)**.
- Gehl, J., (2002). *Public spaces and public life study: city of Adelaide*. Urban Quality Consultants Publishing, Copenhagen, Denmark.
- Gehl, J., (2004). *City to waterfront: Public spaces and public life Study: Wellington*. Urban Quality Consultants Publishing, Copenhagen, Denmark.
- Gehl, J., (2004). *Toward a fine city for people: public spaces and public life study: London*. Urban Quality Consultants Publishing, Copenhagen, Denmark.
- Gehl, J., (2009). *Down town Seattle, public spaces and public life study*. Urban Quality Consultants Publishing, Copenhagen, Denmark.
- Gehl, J., (2009). *Public spaces and public life study: city of Christ Church*. Urban Quality Consultants Publishing, Copenhagen, Denmark.
- Gehl, J., (2011). *Life between buildings: using public space*. Island Press, Washington, United States.
- Gehl, J.; Svarre, B., (2015). *How to study public life*. Island Press, Washington, United States.
- Ghavampour, E.; Vale, B., (2019). Revisiting the "model of place": a comparative study of placemaking and sustainability. *Urban Plann.* 4(2): 196-206 **(11 Pages)**.
- Golkar, K., (2001). Constructive components of urban design quality. *Soffeh. J.*, 11(32): 38-65. **(28 Pages)**. (In Persian)
- Gulrsrud, N.M.; Hertzog, K.; Shears, I., (2018). Innovative urban forestry governance in Melbourne: investigating "green placemaking" as a nature-based solution. *Environ. Res.* 161: 158-167 **(10 Pages)**.
- Gustafson, P., (2001). Meanings of place: everyday experience and theoretical conceptualizations. *J. Environ. Psych.*, 21(1): 5-16. **(12 Pages)**.
- Hamzeieha, S.; Tabibian, M., (2017). Redesign of urban spaces with an emphasis on the relationship between the physical environment of the city and the behavior of citizens (Case study: Adl Street in Qazvin). *Int. J. Archit. Urban Des. Plann.*, 7(2): 1-14 **(14 Pages)**.
- Harrison, S.; Darioush, P., (1996). *Re-place-ing space: the roles of place and space in collaborative systems*. ACM Press, Cambridge, United States.
- Horgan, D., (2020). Placemaking. *Int. Enc. Hum. Geogr.*, 145-152 **(8 Pages)**.
- Jacobs, A.; Appleyard, D., (1987). *Towards an urban design manifesto: a prologue*. *J. Am. Plann. Assoc.*, 53: 112-120 **(9 Pages)**.
- Jacobs, J., (1961). *The life and death of great American cities*. Random House Publishing, New York, United States.
- Lak, A.; Jalalian, S., (2017). Experience of the meaning of urban space: application of qualitative content analysis in discovering the meaning of "Ferdows Garden". *Iran. J. Archit. St.*, 7(13): 71-80 **(10 Pages)**. (In Persian)
- Little, S., (2020). Engaging youth in placemaking: modified behavior mapping. *Int. J. Environ. Res. Public Helth.* 17(18): 6527-6537 **(11 Pages)**.
- Lotfi, S.; Golmakani, A.; Hossienpour, M.; Sholeh, M., (2013). Urban design framework for MollaSadra street in Shiraz with the approach of increasing social interactions. *Urban Manage.*, 7(36): 9-24 **(16 Pages)**. (In Persian)
- Lynch, K., (1960) *The Image of the City*. MIT Press, Cambridge, United States.
- Lynch, K., (1972). *The openness of open space*. MIT Press, Cambridge, United States.
- Lynch, K., (1981). *A theory of good city form*. MIT Press, Cambridge, United States.
- Madanipour, A., (2008). *Urban space design*. Sazeman Fanavari Etelaat va Ertebatat Tehran Municipality Publishing, Tehran, Iran. (In Persian)
- Montgomery, J., (2003). Cultural quarters as mechanisms for urban regeneration. part 1: conceptualising cultural quarters. *Plann. Pract. Res.*, 18(4): 293-306 **(14 Pages)**.
- Nassar, U., (2015). Urban space design to enhance physical activities and motivate healthy social behavior in Cairo, Egypt. 2nd International Conference on Education and Social Sciences, Istanbul, Turkey., 1137-1147 **(11 Pages)**.
- Norberg-Shulz, Ch., (1980). *Genius Loci: toward the phenomenology*

- of place. Rizzoli Publishing, New York, United States.
- Nouri, A.S.; Costa, J.P., (2017). Placemaking and climate change adaptation: new qualitative and quantitative considerations for the "Place Diagram". J. Urban. Int. Res. Placemaking Urban Sustain. 10(3): 356–382 **(27 Pages)**.
- Pakzad, J., (2014). Urban design theoretical basis and process. Ministry of Housing and Urban Planning Publications, Tehran, Iran. (In Persian)
- Parsi, H.R., (2001). Recognizing the content of urban space. Fine Arts. J., 3(11): 41-49 **(9 Pages)**. (In Persian)
- Placemaking-booklet., (2016). Retried 16-Oct.
- Pretty, G.H.; Chipuer, H.M.; Bramston, P., (2003). Sense of place amongst adolescents and adults in two rural Australian towns: the discriminating features of place attachment, sense of community and place dependence in relation to place identity. J. Environ. Psych., 23: 273-287 **(15 Pages)**.
- Proshansky, H.; Fabian, A.; Kaminoff, R., (1983). Place-identity: physical world socialization of the self. J. Environ. Psych., 3(1): 57-83 **(27 Pages)**.
- Rapaport, A., (1988). The meaning of the built environment: a nonverbal communications approach. University of Arizona Press, Arizona, United States.
- Ralph, E., (1976). Place and placelessness. Pion Publishing, London, United Kingdom.
- Sadeghi, A.R.; Shahvaran, F.; Dadgar, M., (2021). Improving the quality of urban public spaces based on evaluating behavioural settings and behavioural observation technique, Case study: The forefront space of Vakil Mosque, Shiraz. J. Sustain. Archit. Urban Design., 9(1): 151-171 **(21 Pages)**. (In Persian)
- Scannell, L.; Gifford, R., (2010). Defining place attachment: A tripartite organizing framework. J. Environ. Psychol., 30(1): 1-10 **(10 Pages)**.
- Sholeh, M.; Sadeghi, A.R.; Najafi, P.; Khaksar, Z., (2017). Assessment of public realms based on observation and analysis of activity-behavioral patterns (Case study: Ahmadi sidewalk in Shiraz). Motaleate Shahri. J., 7(25): 45-62 **(18 Pages)**. (In Persian)
- Tavassoli, Gh.A.; Fathi, S., (2013). Effective socio-cultural factors on sustainable design of urban space. Int. J. Soc. Sci., 3(1): 39-46 **(8 Pages)**. (In Persian)
- Tibbalds, F., (1992). Making people-friendly towns: improving the public environment in towns and cities. Longman Publishing, Harlow, United Kingdom.
- Trancik, R., (1986). Finding Lost Space: Theories of urban design. Van Nostrand Reinhold Publishing, New York, United States.
- Tuan, Y.F., (1977). Space and Place. University of Minnesota Press, Minneapolis, United States.
- Wesener, A.; Fox-Kämper, R.; Sondermann, M.; Münderlein, D., (2020). Placemaking in action: Factors that support or obstruct the development of urban community gardens. Sustainability, 12(2): P. 657.
- Wyckoff, M.A., (2014). Definition of placemaking: four different types. Planning & Zoning News., 32(3): 1-10 **(10 Pages)**.
- Zolfigol, S.; Karimi Moshaver, M., (2019). Extraction of perceptual mechanism of behavioral centers in urban spaces using spatial monitoring (Case Study: Tomb Square of Bu Ali Sina, Hamadan). Motaleate Shahri. J., 8(30): 97-108 **(12 Pages)**. (In Persian)

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Sadeghi, A.R.; Shahvaran, F.; Gholami, A.R.; Feyzabi, T., (2022). Toward behavior-based placemaking: the evolution of place concept in urban design knowledge. Int. J. Hum. Capital Urban Manage., 7(3): 357-372.

DOI: 10.22034/IJHCUM.2022.03.05

url: http://www.ijhcum.net/article_252464.html



International Journal of Human Capital in Urban Management
(IJHCUM)

Homepage: <http://www.ijhcum.net/>

ORIGINAL RESEARCH PAPER

Designing organizational trauma models in the sport organizations

A.A. Bayati, A. Khodayari*, S.N. Khalife

Department of sport management of Sport Management, Karaj Branch of Islamic Azad University, Karaj, Iran

ARTICLE INFO

Article History:

Received 29 November 2021

Revised 07 February 2022

Accepted 28 April 2022

Keywords:

Municipality of Tehran

Organizational crisis

Organizational Trauma

Sports

ABSTRACT

BACKGROUND AND OBJECTIVES: The theory of organizational trauma or organizational crisis, is one of the theories to deal with organizational unrest. Some of these crises show signs of a traumatic experience. If not properly managed, the experience of mass harm appears to disappear under the surface behind the mask of silence, leading to dysfunctional tissue behavior. The aim of the present study is to design an organizational trauma model for Sports Organization in the Municipality of Tehran.

METHODS: Survey methods are, mixed with exploratory approaches. Qualitative sampling were performed using the view of 11 faculty / managers and statistical sampling in the snowball sampling method and quantitative section, considering that 5 to 10 people are required for each item, so 350 people were selected by stratified random sampling method. The means of collecting data for the qualitative part of the interview was semi-structured in that the results of the interview were designed in the form of a questionnaire with three main components. Expert content validity and composition validity (exploratory and confirmatory factor analysis) and combined reliability indicators include Cronbach's alpha, divergence and convergence validity, and structural equation modeling, SPSS software Version 23 and LISREL version 8.54 were used.

FINDINGS: The results showed the final model in 3 factors: individual factors 26.268, structural and technological 21.517, environmental factors 15.228, which in total had 62.841% predictability. Also individual (T-Value = 11.70, β = 0.93), environmental (T-Value = 12.122, β = 0.92) and structural factors (T-Value = 9.91, β = 0.76) had a significant effect on the concept of organizational trauma. In the goodness-of-fit test, a total of seven indicators of model fit were confirmed, so all three identified factors can be integrated into the structural model of the research.

CONCLUSION: The results presented in this paper insinuate that in-service training, salaries and benefits based on organizational position and years of service and taking into account various environmental factors can be fruitful in developing the proposed model.

DOI: 10.22034/IJHCUM.2022.03.06



NUMBER OF REFERENCES

33



NUMBER OF FIGURES

1



NUMBER OF TABLES

8

*Corresponding Author:

Email: khodayari@yahoo.com

Phone: +9891944602028

ORCID: [0000-0002-0898-0096](https://orcid.org/0000-0002-0898-0096)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

Today, trauma is considered an infestation phenomenon, which is not well understood, and a lack of control and management in this regard means that it increases the catastrophic consequences. Organizations, as creatures that seek to survive, must be able to deal with physical blows in order to survive in today's volatile environment. Organizations should improve their situation and environment by providing the necessary foundations and adopting strategies to prevent psychological pressures of significant importance (Glazer and Liu, 2017). Therefore, one of the new topics in the field of organization and management is the theory of organizational psychological trauma or organizational trauma. This theory simply states: Just as different blows and injuries are inflicted on the psyche and body of individuals in everyday life, organizations are also exposed to various injuries and blows (Venugopal, 2016). In terms of definition, organization trauma generally means a dysfunctional change in the behavioral patterns that exist at the organizational level (Hormann, 2007; Kahn, 2003). Organizations experiencing trauma are often stagnant, uncontrolled, and bankrupt and disappear from competition if they are unable to deploy the right technology (Lorenzi and Riley, 2013). In a world where organizations and employees are witnessing such changes, it is essential that they learn new skills; be constantly retrained; Update their thoughts and ideas and learn how to be conscious (Marsick, and Watkins, 2015). However, organizational trauma is a prevalent phenomenon today, and one of the emerging topics in the field of organization and management is organizational trauma theory (Cameron and; Dutton, eds., (2003). One might be forced to ask what causes these dysfunctional patterns. The answer is as simple as the fact that they stem from inefficient frameworks and other workplace arrangements. The consequence of these dysfunctional patterns is that they lead to negative effects on the long-term development of such an organization (Kahn et al., 2013), as well as the negative impact that it also brings on the image and identity of such system and the ability to threaten overall existence of a given organization. This theory simply states: Just as different blows and injuries are inflicted on the psyche and body of individuals in everyday life, organizations are also exposed to various injuries and blows (Ebrahimi and Baki Hashemi, 2019). Due to the special nature of their activities, service providers are one of the organizations prone to organizational trauma (Isik, 2017; World Health Organization. Ageing and Life

Course Unit, (2008). In traumatized organizations, an atmosphere of despair and hopelessness prevails in the organization and employees and managers lose motivation and the organization's focus on meeting customer needs, decrease as service abandonment becomes common (winter, 2019). In order to get out of the crises that have formed, the managers of such organizations must adopt special strategies and theories in order to prevent the deepening and spreading of uncertainty and unrest to other sectors. One of the theories and strategies proposed in the field of organization and management, in the face of these unrests, is the theory of organizational trauma or organizational crisis. Organizational trauma refers to the collective experience of employees from shocks and crisis to the organization, whereby the protective and defense structures of an organization are broken and the organization is temporarily or permanently vulnerable and frustrated and receives significant damage (Vivian and Hormann, 2015). It is believed that closing the border between the organization and the environment, focusing on internal relationships, the prevalence of stress and anxiety in the organization, reducing organizational identity, depression, fear, and anger in the pillars, the prevailing spirit of despair and hopelessness are the characteristics and signs of organizations under the trauma systems (Bloom and Farragher, 2013). Nowadays, urban management in planning for citizens' leisure time with the aim of meeting the diverse needs of the people, has resorted to changing the approach and policies of the organization, including the extensive use of modern knowledge and technology, as well as citizen involvement and participation in planning (Rahnamaei and Aghaei 2009). In this regard, the Municipality of Tehran, as the largest urban management in Iran is obliged to provide services to citizens, but with inactive staff with very low efficiency is not only unable to meet and manage the needs of citizens, but also cannot achieve its organizational goals. The Municipality of Tehran Sports Organization, like any other organization, can face organizational injuries. So far, no research which can first, diagnose the causes of existing organizational trauma and next, provide a local model to solve organizational trauma and leaving service of the staff with providing the proper solution to eliminate or reduce the extend of crisis in the Sports Organization, has not been performed. Therefore, one of the necessities of the current research which can be the basic solutions to managers and senior decision makers in the Municipality of Tehran and

the results can be used to increase the level of employee dynamism and vitality and eliminate the problem of organizational trauma. The mega city of Tehran as the capital of the Islamic Republic of Iran and with a population of more than 8693,706 people [Tehran Municipality Information and Communication Technology Organization 2017](#)), 22 districts, 133 regions and 374 urban neighborhoods as a small Iran is of strategic importance in all the national policies.

Also, the development of the Municipality of Tehran Sports Organization during its many years of activity has been considered by urban managers and efforts in the development and improvement of this organization due to the nature of its service to the community and citizens of Tehran is very much emphasized. Historical review shows that from the beginning of the formation of sports in Iran, both in the post-championship and in the public sphere, sports organizations have played an important role. The Municipality of Tehran Sports Organization always needs to pay attention to personal, structural, technological and environmental factors and these factors are of special importance in planning and implementing sports programs and competitions. The Municipality of Tehran Sports Organization is the largest organization and trustee of public and citizen sports in Tehran. Unfortunately, due to the lack of proper planning to prevent organizational trauma, accurate pathology of human resources has not been done in the policies of the Municipality of Tehran Sports Organization. One of the disadvantages of the Municipality of Tehran Sports Organization is the lack of sufficient knowledge about organizational trauma. In the researches of [Deyhimpour and Dolati \(2018\)](#) and [Kolivand et al. \(2015\)](#), the causes of organizational trauma were identified as individuals, goals, structure, technology and environment. [Qalavandi et al. \(1400\)](#) believe that the destructive effects of organizational trauma are of great importance. [Kias and Zahedi \(1400\)](#) state that one of the important phenomena that threatens organizations today is the psychological trauma that is inflicted on employees and leads to destructive consequences. [Gaston \(2021\)](#) and [Rhône \(2021\)](#) believe that human resources have an impact on human trauma, and that organizational managers can reduce organizational trauma recidivism based on coping planning. [Unick et al. \(2019\)](#) concluded that individual factors may play a role in organizational trauma. [Langer \(2005\)](#) determined that environmental factors affect organizational trauma. [Winter \(2019\)](#) also concluded that organizational structure has an effect on organizational trauma. [Venugopal \(2016\)](#)

confirmed that organizational structure factors and organizational communication technology can play a role in organizational trauma. The role of managers in controlling unwanted changes that cause organizational trauma and affect the morale of employees and in the long run creates the ground for the dissolution of the organization is critical. One of the duties of municipalities is to plan for citizens' leisure time in relation to their wants and needs. It should be noted that if the members of the municipal sports organization suffer from organizational trauma, they will have low motivation and the probability of leaving the service will increase. Also, if there is no organizational awareness in employees, they choose to leave the service. Considering that in the last decade, due to the organizational trauma of the employees of the Municipality of Tehran Sports Organization, half of the employees who were contracted and specialized left the service. Since organizational psychological shocks disrupt the morale of employees and have a negative impact on their performance, neglect or lack of management of shocks and trauma can increase the survival of organizations in the long run. Therefore, it raises the question of what factors affect the organizational trauma model in the Municipality of Tehran Sports Organization. Considering that no research has been done to investigate the factors affecting the organizational trauma model of the Municipality of Tehran Sports Organization, this issue has created a scientific vacuum and therefore it is important and necessary to conduct this research to fill such a scientific vacuum. The present study seeks to design an operational model to identify the effective factors in creating organizational trauma and then, then provide solutions to create personnel productivity and create staff organizational dependency. The current study have been performed in Tehran in 2021.

MATERIALS AND METHODS

The method of the present research is mixed (qualitative-quantitative) and structural equations based on the present, in terms of purpose, applied and in terms of data collection is field research. The statistical population in the qualitative and quantitative part of the research included managers, experts and sports personnel of the Municipality Tehran, who were 300 people according to the obtained information from the human resource department. Considering the adequacy of 5 statistical samples for each factor, 350 people formed the statistical sample which were selected at random. After reviewing the research

background and studying the theoretical foundations, the questionnaire was made in two stages. In order to determine the effective factors, a semi-structured interview was conducted with the opinions of experts (faculty members' familiar with the research field and related managers). Sampling by snowball method was continued until the data were saturated with 11 people and confirmed. Then, the data obtained from the interviews were coded and analyzed by the method of [Speziale et al. \(2011\)](#). Coding and in other words, data analysis in this method, based on data collection, was done through selected questions and components. Then, the results of the interviews were translated into written text. In order to analyze the data, descriptive statistical methods (calculation of mean, frequency, percentage, standard deviation) and inferential statistical methods (exploratory factor analysis, confirmatory factor analysis, and structural equations) were used. The collected data were also analyzed using SPSS software version 23 and LISREL version 8.54.

RESULTS AND DISCUSSION

Descriptive findings showed that about 51.1% of the samples were male and about 48.9% were female. The percentages related to official, contractual and contract employment status were 49.3, 14.1 and 36.7, respectively. In term of education, diploma, post diploma, bachelor, master and doctorate percentages were 7.4, 11.1, 35.2, 30.4 and 15.9, respectively. Considering the value of chi-square and significance level ($P < 0.01$ and $\chi^2 = 6048.14$), it is concluded that there is a correlation between the questions ([Field, 2009](#)).

Also, the results of heuristic factor analysis showed that three factors remain and the total percentage of cumulative variance of the factors is equal to 62.841% which is higher than 0.50 and based on the communality, all 31 questions, based on the communality, all 31 questions were retained due to the communality above 0.3 ([Yong and Pearce, 2013](#)). [Table 1](#) shows the factor load matrix of each items of the questionnaire above the acceptable value of 0.3.

As shown in [Table 1](#), the values of the "initial estimate of the communality of each variable" are equal to one. Also the values of "Common factor variance", show the correlation of all factors. In different researches, the criterion for accepting the common correlation of questions equal to 0.3 and 0.5 has been reported. In the current study, the admission criterion was determined based on 0.5. Therefore,

questions 8 and 32 were excluded from the analysis due to the low coefficient of variance of 0.5. As shown in [Table 1](#), the values of the "initial estimate of the share of each variable" are equal to one. Also in the "Common factor variance" section, the numbers obtained show the correlation of all factors. In different researches, the criterion for accepting the common correlation of questions equal to 0.3 and 0.5 has been reported. In the present study, the admission criterion was determined based on 0.5. Therefore, questions 8 and 32 were excluded from the analysis due to the low coefficient of variance of 0.5.

[Table 2](#) shows the eigenvalues, the variance of the factors and the percentage of their cumulative variance. The predictive power of environmental factor is 26.438, structural and technological factor is 215.17 and environmental factor is 15.228 and based on the total percentage of cumulative variance of factors is equal to 62.841 percent.

According to the results of [Table 4](#), the relationships of all questions with their factor are significant with respect to T-value values and ± 1.96 .

[Fornell and Larker \(1981\)](#) consider the criterion of variance derived from structures (AVE) as 0.50 and [Magner et al. \(1996\)](#) as the criterion above 0.40. Both criteria indicate that the variance extracted from the structures is acceptable ([Table 5](#)). Also, the combined reliability and Cronbach's alpha coefficient are acceptable according to the criterion of 0.70. As a result, the convergence validity and reliability of the model are acceptable.

Numbers in the diameter of [Table 6](#) are the square root of the variance of each component as of [Table 5](#). If the root of variance extracted from each component is greater than the value of the relationship between each component and the other component, the divergent validity of the model is confirmed. As a result, divergent validity is confirmed.

The results of confirmatory factor analysis showed that the amount of factor loads of each item should be at least 0.3 ([Gefen and Straub, 2005](#)). Based on the results from [Table 7](#), all factor loads of the research items are acceptable and the values of t-statistic are also significant, so all items are preserved. Also, the results of Cronbach's alpha test showed that the alpha value of organizational trauma was equal to 0.96, which are all values above the acceptable value of 0.7. Therefore, the questionnaire has a good reliability ([Kline, 2015](#)).

In the goodness of fit test, the appropriateness of the organizational trauma data collection was

Table 1: The factor load matrix of each items of the questionnaire

Number of item	Preliminary estimation of the communality of each variable	Common factor variance
1	1	0.75
2	1	0.699
3	1	0.555
4	1	0.725
5	1	0.568
6	1	0.592
7	1	0.582
8	1	0.593
9	1	0.527
10	1	0.501
11	1	0.547
12	1	0.500
13	1	0.500
14	1	0.501
15	1	0.658
16	1	0.574
17	1	0.675
18	1	0.647
19	1	0.665
20	1	0.527
21	1	0.606
22	1	0.671
23	1	0.665
24	1	0.733
25	1	0.769
26	1	0.755
27	1	0.779
28	1	0.736
29	1	0.580
30	1	0.617

Table 2. The results of the variance share of each factor in the 3-factor model of organizational trauma questionnaire

Component number	Component Name	Squares of extracted loads		
		Total variance	Percentage of variance	Percentage of variance
1	Individual factors	7.937	26.438	26.438
2	Structural and technological	6.353	21.175	47.613
3	Environmental factors	4,569	15.228	62.841

examined and its indicators are given in Table 8. A total of seven indicators confirmed the model fit. Therefore, the organizational trauma model is appropriate in terms of fit indicators. In Figs. 1 the organizational trauma model can be seen in a standard and significant way.

There is an allegory in government organizations, including the Municipality of Tehran, which is referred to as a swamp; Employees sink into it over time and do not have enough dynamism and vivacity, and like a person stuck in a swamp, they get lost in their frequent work environment and lose their inner abilities

over time. In the long run, they become tired and frustrated. Failure to meet expectations over time, lack of space for growth and participation, type of work, organizational structure and environmental factors are some of the factors that are involved in the occurrence of psychological trauma in government organizations and over time employees in the swamp of repetitive work. And drowns in motivation and through that their talent is wasted (Forbes *et al.*, 2011). In this regard, the results of this study showed that individual factors ($T_{value} = 11.70$, $\beta = 0.93$) have a significant impact on organizational trauma, which is consistent with the

Table 3. Results of the main components with varimax rotation of the operating load of the items of the questionnaires

Questions	Components		
	Individual factors	Structural and technological	Environmental factors
Loss of near and far relatives	0.838		
Loss of credibility and trust of others	0.774		
Organizational financial problems	0.593		
Incurable disease of relatives and friends	0.770		
Pessimism about career prospects	0.442		
Increased job turmoil	0.430		
Decreased credibility and organizational prestige of individuals	0.479		
Instability within the organization		0.576	
Increasing organizational tasks and responsibilities		0.593	
Lack of client service capacity		0.574	
Weak meritocracy in different parts of the organization		0.621	
Inadequate work environment		0.542	
Reducing organizational motivation		0.583	
Change in the way things are done		0.738	
Lack of necessary expertise to work with modern technologies		0.769	
Lack of organization equipment with the latest technology in the world		0.736	
Lack of development of information technology infrastructure		0.773	
Existence of old equipment		0.773	
Problems of the technology unit		0.696	
Natural disasters such as floods and earthquakes and ...			0.338
Increase inter-organizational competition			0.704
Stress caused by different occasions			0.787
Unexpected visits of managers and officials			0.778
Loss of customer trust			0.803
Inappropriate letter section			0.821
Lack of codified planning			0.786
Decreased organizational productivity			0.813
Organizational helplessness			0.794
Lack of direct control and supervision			0.331
Lack of coordination between organizations and regions in advancing goals			0.370

results of [Deyhimpour and Dolati, 2017](#)), [Kolivand et al. \(2015\)](#) and [Unick et al. \(2019\)](#). [Sepahvand and Zare \(2018\)](#) also found that the workforce plays an important role in organizational trauma. When interpreting this result, it can be said that family problems such as the loss of loved ones, behavioral disorders of family members, divorce, terminal illnesses, as well as employment problems and job problems such as losing credit, inexperience and lack of work skills, increasing managerial changes and increasing job duties, increase the level of organizational trauma of employees. Given that one of the main causes of organizational trauma is the individual, that these people, even if they have the best job position in the organization, but because

individual problems are institutionalized in them, they are dissatisfied with their activities in the organization ([Winter, 2019](#)). Also, in affected organizations, people feel frustrated and hopeless, and do not envision a bright future, which leads to depression and loss of energy and motivation to work. Employees working in organizations that suffer from trauma will also be affected by the side effects of this condition. The results of this study showed that structural and technological factors (T-Value = 9.91, $\beta = 0.76$) have a significant effect on organizational trauma, which is in line with the results of [Deyhimpour and Dolati, 2017](#)), [Kolivand et al. \(2015\)](#) and [Winter \(2019\)](#) are consistent. [Sepahvand and Zare \(2018\)](#) and [Venugopal \(2016\)](#) have

Table 4. Relationships of questions with components

Row	Indicators	Factors	The extent of the relationship	Determination coefficient	T-value	Results
1	Question 1	Individual factors	0.92	0.49	12.71	Confirmed
2	Question 2		0.89	0.54	13.63	Confirmed
3	Question 3		0.73	0.50	13.03	Confirmed
4	Question 4		0.95	0.59	14.56	Confirmed
5	Question 5		0.83	0.54	13.58	Confirmed
6	Question 6		0.87	0.56	14.01	Confirmed
7	Question 7		0.88	0.57	14.13	Confirmed
8	Question 9		0.80	0.54	13.77	Confirmed
9	Question 10		0.76	0.48	12.82	Confirmed
10	Question 11		0.67	0.44	12.10	Confirmed
11	Question 12	Structural and technological	0.80	0.52	13.37	Confirmed
12	Question 13		0.76	0.42	11.75	Confirmed
13	Question 14		0.71	0.42	11.75	Confirmed
14	Question 15		0.77	0.57	14.32	Confirmed
15	Question 16		0.80	0.57	14.33	Confirmed
16	Question 17		0.71	0.50	13.03	Confirmed
17	Question 18		0.84	0.62	15.22	Confirmed
18	Question 19		0.78	0.56	14.34	Confirmed
19	Question 20		0.86	0.65	15.83	Confirmed
20	Question 21		0.66	0.35	10.40	Confirmed
21	Question 22	Environmental factors	0.74	0.51	13.36	Confirmed
22	Question 23		0.76	0.57	14.35	Confirmed
23	Question 24		0.78	0.59	14.71	Confirmed
24	Question 25		0.86	0.67	16.30	Confirmed
25	Question 26		0.87	0.74	17.51	Confirmed
26	Question 27		0.95	0.74	17.57	Confirmed
27	Question 28		0.93	0.76	17.95	Confirmed
28	Question 29		0.93	0.72	17.08	Confirmed
29	Question 30		0.70	0.37	10.88	Confirmed
30	Question 31		0.66	0.41	11.54	Confirmed

The criterion of significance is ± 1.96

Table 5. Variance derived from components and their reliability

Components	Variance derived from structures	Variance derived from structures	Criteria	Variance derived from structures	Variance derived from structures	Criteria	Variance derived from structures
Individual factors	0.756	0.98	0.70	Accepted	0.90	0.70	Accepted
Structural and technological	0.598	0.97			0.93		
Environmental factors	0.657	0.98			0.94		

Table 6. Variance derived from components and their correlations

Components	Individual factors	Structural and technological	Environmental factors
Individual factors	0.87		
Structural and technological	0.86	0.773	
Environmental factors	0.71	0.70	0.811

also emphasized the impact of organizational structure and organizational communication technology and its significant role on organizational trauma. In interpreting this result, it can be stated that many structural changes, increasing the focus on decision-

making, formal relations and reducing informal relations, and eliminating a number of organizational jobs increase the organizational trauma of employees. Also in interpreting this result can be stated Failure to update education, communication, and information

Table 7. Relationships of components with organizational trauma

Row	Components	Concept	The extent of the relationship	Determination coefficient	T- Value	Results
1	Individual factors		0.93	0.87	11.70	Relationship confirmed
2	Structural and technological	Organizational Trauma	0.92	0.85	12.42	Relationship confirmed
3	Environmental factors		0.76	0.58	9.91	Relationship confirmed

Table 8. Results of goodness of fit test of organizational trauma model data collection

Index Abbreviation	Criteria	Obtained value	Results
χ^2/df	Bellow 3 (Some resources up to 5)	3.46	Confirmed
RMSEA	Bellow 0.08 (Some resources up to 0.1)	0.096	Confirmed
PNFI	Higher than 0.90	0.88	Reject
PGFI	Higher than 0.90	0.64	Reject
NFI	Higher than 0.90	0.95	Confirmed
NNFI	Higher than 0.90	0.96	Confirmed
CFI	Higher than 0.90	0.97	Confirmed
IFI	Higher than 0.90	0.97	Confirmed
RFI	Higher than 0.90	0.95	Confirmed
AGFI	Higher than 0.90	0.70	Reject
GFI	Higher than 0.90	0.74	Reject

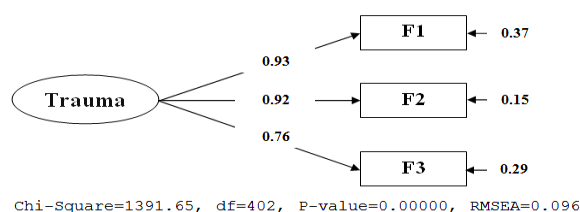


Fig. 1: Organizational trauma model in standard mode

technology, lack of easy access, and the impossibility of using global networks due to security considerations, cause organizational trauma for employees. Therefore, accordingly, it can be said that organizations that have suffered trauma, are usually in a state of recession, bankruptcy, and reduction of financial resources, and due to the lack of appropriate technology, their performance is in a state of decline (Yong and Pearce, (2013). The results of this study showed that environmental factors (T-Value = 12.42, β = 0.92) have an effect on organizational damage that is consistent with the results of Deyhimpour and Dolati, (2017); Kolivand *et al.* (2015) and Longer (2011) are consistent. In this regard, Sepahvand and Zare (2018) concluded that the environment has a significant role in organizational trauma. Explaining this result, it can be acknowledged that reduced acceptance and legitimacy, lack of proper interaction with the environment

and being an island can increase the organizational damage of employees. Factors of natural disasters such as floods and earthquakes, etc., increased inter-organizational competition, pressure from various occasions, unexpected visits of managers and officials, loss of customer trust, inadequate correspondence, lack of continuous planning, reduced interest in organizational side effects, helplessness organizational and lack of direct control and supervision are among the factors that affect organizational trauma in the field of environmental factors.

CONCLUSION

In keeping with the theory of organizational trauma, as in regular life, numerous blows and injuries are inflicted at the thoughts and frame of individuals, companies are also uncovered to various trauma and blows, so the purpose of the current study was to design a version of organizational trauma in the sports organization in the Municipality of Tehran. In order to review this organizational trauma, this article described the concept, dimensions and historical course, studies conducted in this case, the effects and strategies to deal with it in organizations and was done in a mixed method with an exploratory approach. Given that the results showed that individual factors affect organizational trauma. Therefore, it's far endorsed

that an unbiased unit or committee act for the sports activities experts and workforce to check and advise the specialists and workforce who've suffered psychological trauma. Also, meetings should be held for managers to identify and counsel with the employees individual issues, so as to prevent the spread of individual factors of organizational trauma. Given that the results showed that structural and technological factors affect organizational trauma, it is suggested that arrangements be made to apply the latest technology in the organization and determine the duties of individuals according to their knowledge and skills, as well as in-service training for sports experts and staff on the importance of the structure and technology of the sports organization. The Municipality of Tehran should provide an educational calendar, the organization will stabilize. Given that the results showed that environmental factors affect organizational trauma, it is suggested that the organizational position and years of service of employees should be considered and various environmental factors such as competitors, colleagues, and the economic and social conditions of society should be considered in pay calculation.

AUTHOR CONTRIBUTIONS

A.A. Bayati performed the literature review, the experiments, analyzed and interpreted the data, and prepared the manuscript text. A. Khodayari performed the experimental design, compiled and interpreted the data, and manuscript edition S.N. Khalife helped in the research design and manuscript preparation and data correction

ACKNOWLEDGEMENT

This article is the result of a research conducted to obtain a doctoral degree that has been approved by the management department of the Islamic Azad University of Karaj in Iran. The professors and the director of the faculty of management of this university are also appreciated for their cooperation and guidance in this research.

CONFLICT OF INTEREST

This article is the result of a research conducted to obtain a doctoral degree that has been approved by the management department of the Islamic Azad University of Karaj in Iran. The authors would like to appreciate all the professors and the director of the faculty of management for their cooperation and providing guidance regarding the current study.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

LIST OF ABBREVIATIONS

AGFI	Adjusted Goodness-of-Fit Index
CFI	Comparative Fit Index
GFI	Goodness-of-Fit
IFI	Index Instrumentation Facility Interface
NFI	Normed Fit Index
NNFI	Parsimony Normed Fit Index
PGFI	Parsimony Goodness-of-Fit Index
RMSEA	Root Mean Square Error of Approximation
X ² /df	Chi square / Degrees of Freedom Ratio

REFERENCES

- Bloom, S.L; Farragher, B., (2013). Restoring sanctuary: A new operating system for trauma-informed systems of care. Oxford University Press.
- Cameron, K.; Dutton, J. eds., (2003). Positive organizational scholarship: Foundations of a new discipline. Berrett-Koehler Publishers.
- Deyhimpour, M.; Dolati, H., (2018). The effect of factors causing organizational trauma on the rate of military service leave. Q. J. Hum. Resour. Manage. Res., Imam Hossein University. 9(4): 81-106 (26 pages). (In Persian)
- Ebrahimi, S.A.; Baki Hashemi, S.M.M., (2019). Individual consequences of an organizational trauma in a health care provider unit. J. Guilan Uni. Med. Sci., 27(108): 11-24 (14 pages).
- Field, A., (2009). Discovering Statistics using SPSS. London: SAGE.
- Forbes D.; Lewis V.; Varker, T.; Phelps, A.; O'Donnel, M.; Wade D.J.; Ruzek J.I.; Watson, P.; Bryant R.A.; Creamer, M., (2011). Psychological first aid following trauma: Implementation and

- evaluation framework for high-risk organizations. *Psychiatry: Interpers. Biol. Proc.*, 74(3): 224-239 (16 pages).
- Fornell, C.; Larcker, D.F., (1981). Evaluating structural equation models with unobservable variables and measurement error. *J. Market. Res.*, 18(1): 39-50 (12 Pages).
- Gefen, D.; Straub, D., (2005). A practical guide to factorial validity using PLS-Graph: Tutorial and annotated example. *Commun. Assoc. Info. Syst.*, 16(1): 91-109 (19 pages).
- Gaston, D.W., (2021). The transformational leader: managing organizational trauma through seasons of change. In *Role of Leadership in Facilitating Healing and Renewal in Times of Organizational Trauma and Change*. IGI Global. 41-58 (18 pages).
- Glazer, S.; Liu, C., (2017). Work, stress, coping, and stress management. In *Oxford Research Encyclopedia of Psychology*.
- Hormann, S.D.L., (2007). Organizational trauma: A phenomenological study of leaders in traumatized organizations.
- Isik, I., (2017). Organizations and exposure to trauma at a collective level: the taxonomy of potentially traumatic events. Impact of organizational trauma on workplace behavior and performance. 18-56 (37 pages).
- Kolivand, P.H.; Sarlak, M.A., (2015). Factors causing organizational trauma in private hospitals and ways to reduce it: a case study of Khatam Al-Anbia Hospital. *J. Manage. Go. Org.*, 13: 109-120 (12 pages). (In Persian)
- Kahn, W. A. (2003). The revelation of organizational trauma. *J. Appl. Behav. Sci.*, 39(4): 364-380 (17 pages).
- Kline, R.B., (2015). Principles and practice of structural equation modeling. New York: Guilford publications.
- Kahn, W.A.; Barton, M.A.; Fellows, S., (2013). Organizational crises and the disturbance of relational systems. *Acad. Manage. Rev.*, 38(3): 377-396 (20 pages).
- Kiast, K.; Zahedi, A., (2020). Study of the effect of organizational trauma on the weakening of human capital with the mediating role of human resource risks. Fifth International Conference on Financial Management, Commerce, Banking, Economics and Accounting. (In Persian)
- Lorenzi, N.M.; Riley, R.T., (2013). Organizational aspects of health informatics: managing technological change. Springer Science & Business Media.
- Langer, E., (2005). Well-being. New York: Handbook of positive psychology. 214-229 (16 pages).
- Marsick, V.J.; Watkins, K., (2015). Informal and incidental learning in the workplace (Routledge Revivals). Routledge.
- Magner, N.; Welker, R.B.; Campbell, T.L., (1996). Testing a model of cognitive budgetary participation processes in a latent variable structural equations framework. *Account. Bus. Res.*, 27(1): 41-50 (10 pages).
- Qalavandi, H.; Ashrafi, F.; Darwish, Z.A.; Yousefzadeh, B., (1400). Structural analysis of the relationship between organizational damage and organizational innovation, mediated by organizational ethics. *J. Bioeth.*, 11 (36): 1-19 (19 pages). (In Persian).
- Rhone, C.C., (2021). Organizational resilience during times of trauma. In *role of leadership in facilitating healing and renewal in times of organizational trauma and change*. IGI Global. 14. Unick, 170-185 (16 pages).
- Rahnamaei, M.T.; Aghaei, L., (2009). The role of municipalities in the development of sports facilities for citizens to spend their leisure time. *Iran Geog. Res. Sci. Assoc. J.*, 7(22): 25-46 (22 pages). (In Persian)
- Sepahvand, R.; and Zare, F., (2018). The role of organizational awareness on organizational trauma with respect to the mediating role of managers' political intelligence. *Hum. Resour. Manage. Res.*, 7(4): 95-113 (19 pages). (In Persian)
- Speziale, H.S.; Streubert, H J. Carpenter, D. R., (2011). Qualitative research in nursing: Advancing the humanistic imperative. New York: Lippincott Williams & Wilkins.
- Tehran Municipality Information and Communication Technology Organization. (2017). Statistics of Tehran-Statistical Yearbook of the Municipality of Tehran.
- Unick, G.J.; Bassuk, E.L.; Richard, M.K.; Paquette, K., (2019). Organizational trauma-informed care: Associations with individual and agency factors. *Psychol. Serv.*, 16(1): P 134.
- Vivian, P.; Hormann, S., (2015). Persistent traumatization in nonprofit organizations. 47(1): 25-30 (6 pages).
- Venugopal, V., (2016). Understanding organizational trauma: a background review of types and causes. *J. Bus. Manage.*, 18(10): 65-69 (5 pages).
- Winter, L., (2019). Organizational trauma: a phenomenological study of psychological organizational trauma and its effect on employees and organization. *Management*. (18544223), 14(2).
- World Health Organization. Ageing and Life Course Unit, (2008). WHO global report on falls prevention in older age: World Health Organization.
- Yong, A.G.; Pearce, S., (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials Quant. Method. Psychol.*, 9(2): 79-94 (16 pages).

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Bayati, A.A.; Khodayari, A.; Khalife, S.N., (2022). Designing organizational trauma models in the sport organizations. *Int. J. Hum. Capital Urban Manage.*, 7(3): 373-382.

DOI: 10.22034/IJHCUM.2022.03.06

url: http://www.ijhcum.net/article_251982.html



International Journal of Human Capital in Urban Management
(IJHCUM)

Homepage: <http://www.ijhcum.net/>

ORIGINAL RESEARCH PAPER

Is there a connection between tariffs and economic growth? A computable general equilibrium analysis based on the Global Trade Analysis Project model

S.Sh. Hossain*, H. Delin, M. Mingying

Department of Agricultural Economics, The Institute of Agricultural Economics and Development, Graduate School of Chinese Academy of Agricultural Sciences, Beijing, China

ARTICLE INFO

Article History:

Received 28 Mrch 2022

Revised 30 May 2022

Accepted 20 June 2022

Keywords:

Computable general equilibrium
model (CGE)

Economic growth

Policy

Sector

ABSTRACT

BACKGROUND AND OBJECTIVES: Tariff policy has a significant impact on a country's economic progress. The primary objective of this paper was to describe the construction of the Computable General Equilibrium (CGE) model and then analyze the economic impacts among simulated countries by introducing policy shocks like increases and decreases in tariffs.

METHODS: Tariff reductions resulted in an increase in intraregional and interregional trade, which is expected to spur long-term investment and economic growth. To examine the economic implications in multiple ways, this article initially used a tariff removal scenario and subsequently increased the tariff. The relationship between production, activity, elements, and other economic sectors of regions was depicted in this paper using a computational general equilibrium model based on the global trade analysis project model.

FINDINGS: The simulation resulted in a lower tariff having a beneficial influence on Korea's economic growth compared to other countries. In the agricultural and processed food sectors, Korea's trade balance improved dramatically, with exports and imports continuing high, while exports and imports in the manufacturing and service sectors declined. In contrast to other countries, Korea's processed food output surged by 198%. Finally, in comparison to other countries, Korea's welfare grew by \$ US currency 17.56 billion. On the other hand, the trade balance between China and the United States fell by \$US currency 6.25 billion and \$US currency 7.95 billion, respectively. Korea's trade balance increased considerably, rising by \$ 21.78 billion in US currency. Korea's GDP fell by about 0.8%, while China's dropped by nearly 0.3%. Other countries' gross domestic product changed slightly.

CONCLUSION: The influence of various tariff policies on countries is examined in this research paper. Computational general equilibrium analysis of tariff policies in the agriculture, processed food, infrastructure, manufacturing, and service sectors has gotten little attention in the past, so this paper used the Global trade analysis project model to

DOI: [10.22034/IJHCUM.2022.03.07](https://doi.org/10.22034/IJHCUM.2022.03.07) try to fill in the gaps and find the benefits of mutual economic policy among countries.



NUMBER OF REFERENCES

36



NUMBER OF FIGURES

2



NUMBER OF TABLES

7

*Corresponding Author:

Email: hossainsyedshoyeb@gmail.com

Phone: +86-132-6946-3239

ORCID: [0000-0001-8282-8968](https://orcid.org/0000-0001-8282-8968)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

Agriculture, food, manufacturing, services, and infrastructure all play an important role in a country's economic development, promoting prosperity and growth while also improving quality of life (Srinivasu and Rao, 2013). By enhancing international trade, investment and tariff reduction in certain areas can improve regional economic performance. Computable General Equilibrium (CGE) model can analyze economic development of those sectors. CGE model has been widely used for policy analysis in many countries and has been successful (Ochuodho and Alavalapati, 2016). The CGE model can capture each economic agent's economic benefit, and computer-generated quantitative findings can help policymakers understand the economic shift following a shock (i.e. a new policy). To analyze the impact of tariff reduction, CGE models are now commonly used. To examine the effects of the free trade agreement, some articles utilized a static CGE model (Hossain and Delin, 2021; Dasgupta and Mukhopadhyay, 2017; Ganguly and Das, 2017; Jean et al., 2014; Khorana and Narayanan, 2017; Shaikh, 2009); others assessed the effects of the free trade deal using a dynamic CGE model (Hossain and Delin 2021; Itakura and Lee, 2012; Thu and Lee, 2015). Lower tariffs boost welfare while also improving export value, household consumption, and gross fixed capital formation, according to Ahmed and O'Donoghue (2010), who utilized a CGE model to analyze the impact of tariff reductions on Pakistan's macroeconomic and welfare indicators. The impact of tariff reductions on the economies of India, Pakistan, and New Zealand was studied using a CGE model by Khorana and Narayanan (2017), Shaikh (2009), and Winchester (2009). They discovered that lowering tariffs enhances social welfare and strengthens gross domestic product (GDP) growth, the labor force, and production variables (capital and labor). The CGE model was developed by Mabugu and Chitiga (2007), and the findings suggest that trade liberalization reduces national employment while increasing formal employment, harming informal producers while benefiting informal traders due to lower import prices. On the other hand, Ganguly and Das (2017) developed a CGE model to assess the impact of foreign direct investment (FDI) and trade advancement in India, and discovered that any change in trade arrangements will affect not only the trade volumes of various parts, but also the level of GDP,

the exchange rate, and government revenue. Tariff reduction has long been regarded to be beneficial to economic growth, and it has long been a cornerstone of most governments' regional development plans. Tariff reduction creates production facilities that stimulate economic activities; reduce transaction costs and trade costs and provides employment opportunities to the poor Hossain and Delin 2021. In previous literature (Hossain and Delin, 2021; Dasgupta and Mukhopadhyay, 2017; Ganguly and Das, 2017; Jean et al., 2014; Khorana and Narayanan, 2017; Thu and Lee, 2015) also explained how the tariff reduction contribution to the economic growth of country/regions. Tariff reduction has been linked to increased national or regional economic growth in some of these studies. In addition, the Global Trade Analysis Project's (GTAP) model was chosen for this paper because of its comprehensive coverage of interregional trade, making it ideal for analyzing global trade policy. GTAP global computable general equilibrium (CGE) modeling framework is the best technique for undertaking an ex-ante analysis of the economic and trade ramifications of multilateral or bilateral trade agreements. As a result, the effects of a tariff change on GDP, output, export, import, and market price are explored in this study utilizing a Computable General Equilibrium (CGE) model. This paper's model is static, and the rest of the paper evaluates the core model and the study's findings. To meet the study's objectives, the current study was conducted in Beijing, China in 2022, throughout the world's major economies, utilizing the GTAP 9 database 2011 as a reference year.

MATERIALS AND METHODS

Background of the General Equilibrium Model

CGE models have become a standard tool for empirical analysis globally. A CGE model can capture all economic interactions using a price mechanism (Hosoe, 2014; Harrison et al., 1997; Rutherford et al., 1997). All economic linkages are logically included in the CGE model, which then are combines with the predict changes in variables such as prices, output, and economic wellbeing. The CGE model studied various economic shocks in various markets (Wang et al., 2009). In all markets, including commodities, factors, foreign exchange, the CGE model's market clearing condition depicts supply equaling demand (Hertel et al., 2013).

The Global Trade Analysis Project

GTAP model was created by Purdue University's Center for Global Trade Analysis, and the complete concept was introduced by the Center for Global Trade Hertel (1999). Production, consumption, global savings, and investment are all linked under the GTAP model. It also analyzes demand for local and foreign-produced goods, international transportation costs, global investment allocation, regional household demand, and welfare decomposition, in addition to substantial modeling of inter-regional links primarily through international trade (Hertel *et al.*, 2003; Aguirre 2013). In the GTAP model, the behavioral and identity equations are typically presented in percentage-change format rather than level format. The model's household spending is governed by a utility function that allocates private, government, and savings expenditures. In the typical closure of regional families, the Cobb-Douglas function ensures stable budget shares. Cross-country and cross-market linkages are captured by the model's simulation design. Many international trade models, particularly computable general equilibrium models like GTAP, use the Armington structure (McDaniel and Balistreri, 2002). As a result, Armington elasticity is a measure of substitution and differentiation between domestic and imported goods, as well as between exporting countries. The model employs the Armington postulation to handle bilateral trade. To characterize regional economic ties, it uses detailed bilateral trade, transportation, and protection data, as well as individual nation input-output databases that account for cross-sectoral links. For each commodity in the model, ESUBD and ESUBM are the Armington elasticity. The ESUBD denotes the ease with which domestic and imported items can be substituted, whereas the ESUBM denotes the degree of substitution among different countries of origin for imports. In GTAP, there are four types of behavioral parameters: substitution elasticity's (in both consumption and production), transformation elasticities (which determine how mobile primary factors are across sectors), regional investment allocation flexibility, and consumer demand elasticities. In initial equilibrium, the parameters that describe the demand behavior of a representative private households are region-specific. In GTAP, the Constant Differences of Elasticities (CDE) expenditure is employed to describe consumer behavior, which

is most naturally calibrated to income and own-price elasticities of demand. The CDE specification gives additional flexibility when it comes to expressing different levels of substitution between consumer goods purchases. The international trade elasticities, as well as the agricultural factor supply and demand elasticities, have been econometrically evaluated in the GTAP model. GTAP is a linearized model that assumes perfect market competition, constant returns to scale in all production and trade activities, and profit and utility-maximizing behavior in businesses and households. The GTAP model includes a number of equations. GTAP's mathematical equation system consists of two types of equations. The accounting relationships, which ensure that each agent's receipts and expenditures are balanced, are presented on one side, while the behavioral equations based on microeconomic theory are covered on the other. The input-output tables in the model summarize the relationships between all industries and agents. In the GTAP model, thousands of marketplaces are aggregated into groups.

Model Database

The Global Trade Analysis Project (GTAP) database version 9 was used in this paper's model. The database version 9 in the model covers 140 regional units and 57 sectors with three reference years such as 2004, 2007, and 2011 (Aguirre *et al.*, 2016). Different groups around the world use the GTAP database for modeling, such as Multi-Region Input Output analysis (Hertel *et al.*, 2013), Global Social Accounting Matrix modeling (Scott *et al.*, 2007), modeling for Integrated Assessment (Elliott *et al.*, 2010), and complex network research (Ukkusuri *et al.*, 2016). The main GTAP database features a number of extensions that are intended to make the database more relevant to current policy challenges. The labor categories in the GTAP 9 database were determined by Walmsley and Carrico (2016). The accompanying files are given with two alternative aggregation tools, such as FlexAgg and GTAPAgg, which allow users to adapt sectoral and regional aggregation due to the huge size of the data source. Villoria and McDougall (2015), described about the FlexAgg command line data aggregation program. GTAPAgg is a Windows program with a convenient, graphical user interface that also

aggregates the GTAP database and is described in [Horridge \(2015\)](#). The GTAPView design gives a more instinctive and easy to use approach to look at the GTAP Information Base ([Bacou et al., 1999](#)). Another broadly utilized format is the global social accounting matrix (SAM), which is reliable with the GTAP model and is clarified in [McDonald and Thierfelder \(2004\)](#). The import and export duties calculated from the database are the extensive measures, portrayed in detail in [Narayanan et al., \(2015\)](#). The latest reference year 2011 has been used for the model calibration in this paper. Land, capital, skilled and unskilled labor, and natural resources are among the production components included in the database. Global bilateral trade patterns, international transit margins, and protection matrices that connect different countries/regions are all described in the database. For each country/region, the database presents values of production and intermediate and final consumption of commodities and services in millions of U.S. dollars. To define all economic activities in each country included in the database, the GTAP database classifies agriculture, food, resource extraction, manufacturing, and service activities.

Structure of this Paper's Model

The Global Trade Analysis Project (GTAP) 9 database contained 140 regions, which were aggregated into 10 regions in this study like Germany, France, Italy, the United Kingdom, China, the United States, Australia, Japan, Korea, and the Rest of the World. The ten regions were chosen because they represent the world's most powerful economies. However, there is no independent agriculture, food, manufacturing, service, and

infrastructural sector in the GTAP 9 database and it is necessary to separate those sectors from other sectors. With this GTAP database, this study added 5 new sectors into the GTAP 9 database. Sectors are aggregated into agriculture; processed food; manufacture; service; and infrastructure. Land, Skilled Labor, Unskilled Labor, Capital, and Natural Resources are the five categories of production factors. Land and natural resources have limited cross-sector mobility ([Table 1](#)). Aggregation of the model has been done by using the GTAP aggregation software tools.

The variable that simulates the impact of the policy change in the GTAP database is $tms(i,r,s)$, which will affect the final policy results (where i,r,s denotes Value of exports of i from r evaluated at domestic market prices and destined for s). The structure of the GTAP model can be found in [Hertel and Tsigas, 1997](#). The "shock" in this model is the introduction of tariffs into the agriculture, processed food, manufacturing, service, and infrastructure sectors. The model in this study reduces agricultural sector tariffs by -15%, processed foods sector tariffs by -25%, and infrastructure sector tariffs by -15% in response to a policy shock. On the other hand, the model of this paper increases tariff in manufacturing sectors by 30% and service sectors by 25%. This study utilized those tariff reduction and increase as an experiment purpose to know what will be the impact of the economy. The model's purpose is to calculate the region's overall economic impact. The GTAP model simulations are performed using runGTAP software, and Gragg's 2-4-6 stages solution approach is employed to get the highest level of accuracy. This study is a static model so there is no baseline scenario in the model calibration.

Table 1: Aggregation used in the model

Regions	Sectors	Factors
Germany	Agriculture	Land
France	Processed Food	Unskilled Labor
Italy	Manufacturing	Skilled Labor
United Kingdom	Service	Capital
China	Infrastructure	Natural Resources
USA		
Australia		
Japan		
Korea		
Rest of the World		

Note: Rest of the world means countries included in the GTAP database (excluded above mentioned simulated regions).

RESULTS AND DISCUSSION

In this study, all simulation results are in changes in the economy in the year 2011 because economic shock has been created in the year 2011 (Hossain and Delin, 2021). The tariff decrease and increase into agriculture, processed food, infrastructural, manufacturing, and service sectors result in changes to trade balances. Overall countries experience a decrease and increase in its trade balance. As shown in Table 2, trade balance decreases in Germany by \$US currency 0.63 billion, Italy by \$US currency 0.44 billion, China by \$US currency 6.24 billion, USA by \$US currency 7.95 billion, and the rest of the world by \$US currency 10.49 billion. Interestingly, France, UK, Australia, Japan, and Korea experiences a \$US currency 0.53 billion, \$US currency 0.28 billion, \$US currency 0.16 billion, \$US currency 3.01 billion and \$US currency 21.79 billion increase in its trade balance. The significance of the changes in the trade balance is better seen in Korea and remains the highest by comparing other countries (Table 2).

As indicated in Table 3, the agriculture sector trade balance falls most of the countries except

Table 2: Change in trade balances (US million of dollars)

Country	Change
Germany	-629
France	527
Italy	-439
UK	283
China	-6245
USA	-7953
Australia	161
Japan	3013
Korea	21778
Rest of the World	-10496

China, USA, and Japan increases by \$US currency 1.65 billion, \$US currency 22.74 billion, and \$US currency 0.04 billion. Korea remains the lowest by decreasing \$US currency 22.70 billion. Processed food sector trade balance follows the same pattern and remains France, Italy, UK, China, USA, Japan, and the rest of the world in decreasing trend significantly. Korea, Australia, and Germany's trade balance increase by \$US currency 64.17 billion, \$US currency 3.59 billion, and \$US currency 0.23 billion. The manufacturing sector's trade balance increases

Table 3: Change in trade balances by sector (US millions of dollars)

Sectors	Germany	France	Italy	UK	China	USA	Australia	Japan	Korea	ROW
Agriculture	-671	-352	-222	-27	1646	22737	-1514	43	-27704	1868
Processed Food	225	-2472	-1367	-1054	-8168	-7128	3597	-11645	64174	-43695
Manufacturing	10628	7331	4977	5505	21396	2757	-943	16530	-168140	109267
Service	-2185	-352	-596	-614	-445	-5019	-158	1517	-1636	9486
Infrastructure	-8625	-3627	-3232	-3527	-20674	-21301	-823	-3432	155084	-87422

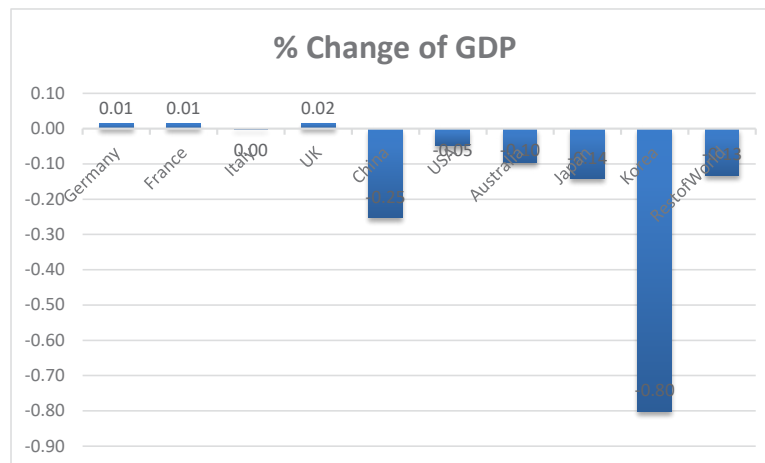


Fig. 1: Changes in gross domestic product (% Change)

most of the countries. Korea remains the lowest by decreasing \$US currency 168.14 billion in trade balance and Australia by \$US currency 0.94 billion. Service sector trade balance decreases in most countries and the USA remains lowest by decreasing \$US currency 5.02 billion. Japan and the rest of the world's trade balance increase by \$US currency 1.52 billion and \$US currency 9.49 billion. On the other hand, the infrastructure sector trade balance also is in a decreasing trend almost all countries. Korea's trade balance in the infrastructure sector remains the best in the world, expanding by \$US currency 155 billion (Table 3).

GDP is affected by changes in the trade balance. GDP falls in all simulated regions, indicating a drop in the economy's average interest rates. China, Australia, Japan, Korea, and the United States all saw their GDP fall. Korea continues to have the biggest GDP loss of 0.8%, while China's GDP decreases by 0.25%. Germany and France both had a 0.1% gain in GDP. Customer purchasing power and spending patterns will be impacted by the drop in GDP, which will have an impact on the overall business of the economy (Fig. 1).

The tariff shock has had a significant impact on agricultural and processed food exports in Korea. Exports in the manufacturing and service sectors fell by 89% and 56%, respectively, while infrastructure exports increased by 86%. In the agriculture, processed food, service, and infrastructure sectors, aggregate exports decreased in most nations, with France, Italy, and the United Kingdom remaining

the lowest. On the other hand, agriculture export increases in China (9.5%), USA (21.9%); processed food export increase in Australia (42.2%), Japan (10%); manufacturing export increases in Germany (1.2%), France (2.1%), Italy (1.5%), UK (2%), Japan (1.6%); service sector export increase in Japan (0.4%); and infrastructure export increase in Japan. Changed in aggregate exports are presented in Table 4.

Aggregate import patterns are also affected. In Korea, while imports of the manufacturing and service sectors decrease, import increase in other sectors, including agriculture (215%), processed food (141%), and infrastructure (65%). Agriculture and processed food import increases in Italy, the UK, China, the USA, and Australia. Manufacturing and service sector import decreases in China, USA, Australia, Japan and Korea, and increases in a little amount in Germany, France, Italy, and the UK. An increase in aggregate imports will cause depreciation in the exchange rate. So the country will have to supply more money to be able to buy imports (Table 5).

In Korea, total domestic production increases in processed food and infrastructure sector, and decreases in agriculture, manufacturing sectors. Korea processed food production increases by 198%, while output falls in agriculture (28.9%), manufacturing (28.9%). In France, Italy, UK and China domestic production of agriculture, processed food, service, and infrastructure decrease, on the other hand, processed food and manufacturing production increases in Germany and Australia. USA and Japan also follow the same pattern (Table 6).

Table 4: Change in aggregate exports by sector (%)

Sectors	Germany	France	Italy	UK	China	USA	Australia	Japan	Korea	ROW
Agriculture	-2.33	-1.27	-1.82	-1.10	9.47	21.91	-4.95	-4.43	1693.30	0.02
Processed Food	0.71	-4.92	-4.69	-4.79	-0.66	-7.29	42.24	10.03	2475.85	-4.79
Manufacturing	1.20	2.08	1.45	2.00	-0.23	0.12	-1.04	1.63	-89.19	1.42
Service	-1.14	-0.40	-0.57	-0.27	-1.27	-1.92	-0.86	0.40	-56.07	0.33
Infrastructure	-3.36	-2.08	-3.65	-2.55	-0.64	-2.70	-1.37	0.49	86.38	-1.38

Table 5: Change in aggregate imports by sector (%)

Sectors	Germany	France	Italy	UK	China	USA	Australia	Japan	Korea	ROW
Agriculture	0.48	-0.08	0.24	0.07	0.13	5.18	2.19	-0.17	214.83	-0.78
Processed Food	0.65	-0.09	0.21	0.14	27.85	5.12	5.14	36.90	140.74	5.22
Manufacturing	0.42	0.06	0.20	0.07	-2.16	-0.05	-0.88	-1.24	-35.87	-0.36
Service	0.54	0.09	0.34	0.01	-0.41	-0.09	-0.45	-1.57	-27.89	-0.61
Infrastructure	0.08	-0.40	0.13	-0.14	5.42	1.83	0.77	1.66	65.50	2.65

Table 6: Change in output volume by sector (%)

Sectors	Germany	France	Italy	UK	China	USA	Australia	Japan	Korea	ROW
Agriculture	-0.75	-0.66	-0.55	-0.48	-0.07	3.93	-1.48	-0.35	-28.94	-0.25
Processed Food	0.16	-1.37	-0.96	-0.81	-1.10	-0.92	5.83	-2.35	198.08	-1.77
Manufacturing	0.63	0.92	0.54	0.91	0.65	0.15	0.07	1.20	-28.93	1.05
Service	-0.05	-0.01	-0.02	-0.03	-0.18	-0.04	-0.08	-0.09	1.02	-0.11
Infrastructure	-0.75	-0.39	-0.38	-0.48	-0.43	-0.32	-0.16	-0.15	18.25	-0.62

Table 7: Change in market price by sector (%)

Sectors	Germany	France	Italy	UK	China	USA	Australia	Japan	Korea	ROW
Land	-2.19	-2.10	-1.55	-1.54	-0.39	14.98	-5.11	-1.52	-76.34	-1.18
UnSkLab	0.23	-0.07	0.13	-0.05	-0.11	0.18	-0.15	-0.32	5.47	-0.32
SkLab	0.22	-0.01	0.13	-0.01	-0.21	0.23	-0.17	-0.39	5.23	-0.28
Capital	0.17	-0.07	0.08	-0.05	-0.11	0.23	-0.11	-0.41	4.49	-0.19
NatRes	0.67	0.22	0.59	0.91	0.53	0.63	-0.10	0.64	-28.41	0.94
Agriculture	-0.01	-0.14	0.01	-0.13	-0.16	1.62	-0.61	-0.47	-26.08	-0.37
Processed Food	0.11	-0.05	0.06	-0.04	-0.24	0.35	-0.18	-0.91	-28.94	-0.31
Manufacturing	0.16	0.01	0.11	0.04	0.17	0.25	-0.01	-0.10	12.16	0.01
Service	0.18	-0.03	0.10	-0.02	-0.09	0.22	-0.12	-0.36	4.22	-0.22
Infrastructure	0.17	-0.01	0.10	0.00	-0.01	0.20	-0.07	-0.27	6.87	-0.16

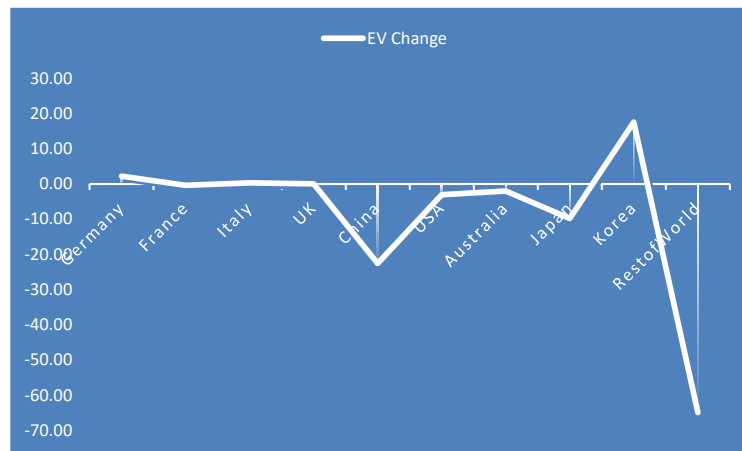


Fig. 2: Changes in welfare (in USD billion dollars)

Market prices are reflected through changes in output and trade. In Korea, the extra supply of agriculture and processed food products pushes the market price down by -26% and -29%; on the other hand, manufacturing, service, and infrastructure sectors market price increase by 12%, 4%, and 7% respectively. The market prices of all other factors and output increased marginally in Italy and the USA; market price in Japan and Australia decreases slightly. On the other hand, the market price of agricultural

sectors decreases slightly in most countries. The consumer in France remains more benefited by decreasing market prices in all sectors. Meanwhile, the expanded supply of the agriculture and processed food sector pushes its market price down in all regions (Table 7)

Finally, a basic question for any shock to the economy is the overall welfare effect on the citizens of that region. Korea is the biggest winner compared to other regions by rising welfare index \$US currency

17.56 billion. On the other hand, welfare index falls in France, China, USA, Australia Japan, and the rest of the world by \$US currency 0.35 billion, \$US currency 22.59 billion, \$US currency 3.03 billion, \$US currency 1.97 billion, \$US currency 9.79 million, and \$US currency 64.88 billion. The biggest losers include China and the rest of the world by decreasing welfare by \$US currency 22.59 billion and \$US currency 64.88 billion (Fig. 2).

CONCLUSION

This study employs a regional static CGE framework to investigate the effects of the tariff. For the economic growth and poverty reduction agriculture, processed food, manufacturing, service, and infrastructure sectors play an important role in the economy. The results of this experiment shows that a decrease in tariff in agriculture, processed food, and infrastructure sectors have the greatest impact on the economic growth and reduction of the general level of prices. Korea is the most benefited country among simulated regions. Agriculture and processed food export and import increase significantly which in term increases the supply of agriculture and processed food in Korea's domestic market which pushes the market price down. On the other hand, tariff increase in manufacturing and service sectors affects Korea's GDP in slight decrease. Both the manufacturing and service sectors have negative trade balances, indicating that a country's currency is in downward pressure. On the other hand, export and import both decreases in manufacturing and service sector and the result showed decrease in export higher than import. The output of the manufacturing sector decreases while a slight increase in the service sector observed. A decrease in the output of Korea's manufacturing sectors pushes an increase in market price in local economy. Finally, the result showed that the implemented tariff policy positively affects the overall welfare in Korea's economy compared to other countries. The results of this limited experiment suggest that all aggregated regions should consider taking a balanced approach to the development of their countries.

AUTHOR CONTRIBUTIONS

S.S. Hossain performed the review, experimental design, analyzed and interpreted the data, prepared the manuscript text, and manuscript edition. H. Delin

performed the review and manuscript preparation. M. Mingying performed the editing and model data analysis of this paper.

ACKNOWLEDGEMENTS

The authors would like to thank to all lab mates and mentors for various suggestions for the economic model building in this paper.

CONFLICTS OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

ABBREVIATIONS

CGE	Computable General Equilibrium
ESUBD	Elasticity of substitution between domestic and imported goods
ESUBM	Elasticity of substitution among imports from different destinations
GDP	Gross domestic product

GTAP	Global Trade Analysis Project
NATRES	Natural Resources
SKLAB	Skilled labor
runGTAP	Visual interface to various General Equilibrium Modelling PACKAge programs.
TMS (i, r, s)	Import tariff
UNSKLAB	Unskilled labor

REFERENCES

- Aguir, A.; Narayanan, B.; McDougall, R., (2016). An outline of the gtap 9 database. *J. Global Econ. Anal.*, 1(1): 181- 208 **(28 pages)**.
- Ahmed, V.; O'Donoghue, C., (2010). Global economic crisis and poverty in Pakistan. *Int. J. Microsimulation*, 3(1): 127-129 **(3 pages)**.
- Aguiar, A., (2013). GDP consistency in GTAP 8. Center for global trade analysis, Purdue University, GTAP Res. Memorandum25: **(19 pages)**.
- Bacou, M.; Hertel, T.; Yu, W., (1999). GTAP 4 dataBase Documentation - Chapter 10, **(5 pages)**.
- Dasgupta, P.; Mukhopadhyay, K., (2017). The impact of the TPP on selected ASEAN economies. *J. Econ. Struct.*, 6(1):1-34 **(34 pages)**.
- Elliott, J.; Foster, I.; Kortum, S.; Munson, T.; Cervantes, F.P.; Weisbach D., (2010). Trade and carbon taxes. *Am. Econ. Rev.*, 100(2): 465–469 **(5 pages)**.
- Ganguly, A.; Das, K., (2017). Multi-sectoral analysis of foreign investment and trade liberalization in India: A CGE modelling approach. *Glob. Bus. Rev.*, 18(5): 1345-1372 **(28 pages)**.
- Hosoe, N., (2014). Japanese manufacturing facing post-Fukushima power crisis: a dynamic computable general equilibrium analysis with foreign direct investment. *Appl. Econ.*, 46(17):2010–2020 **(11 pages)**.
- Hossain, S.S.; Delin, H., (2021). Measuring economic impact in Korea, Japan, India, China, and ASEAN considering agricultural sectors: a dynamic CGE approach based on GAMS., *Rev. World Econ.*, **(43 pages)**.
- Hossain, S.S.; Delin, H. (2021). Comparison and analysis of tariff reduction of infrastructural sectors and its economic impact: ACGE approach. *Int. J. Hum. Capital Urban Manage.*, 6(3): 253-262**(10 pages)**.
- Hertel, W.T., (1999). Future directions in global trade analysis. Working papers 283437, Purdue University, center for global trade analysis, global trade analysis project **(20 pages)**.
- Hertel, T.W.; Tsigas, M.E., (1997). Structure of GTAP. Chapter 2, *Global Trade Analysis: Modeling and Applications*, Cambridge University Press **(63 pages)**.
- Hertel, T.; Hummels, D.; Ivanic, M.; Keeney, R., (2003). How confident can we be of CGE-based assessments of free trade agreements? GTAP working paper no. 26 **(42 pages)**.
- Hertel, T.; Hummels, D.; Walmsley, T., (2013). Developing a multi-region input-output framework from GTAP for analyzing the vulnerability of the Asia-Pacific supply chain to natural disasters **(2 pages)**.
- Horridge, M., (2015). GTAPAgg data aggregation program. In *global trade, assistance, and production: The GTAP 9 database*, edited by B.G. Narayanan, A. Aguiar, and R. McDougall. chap. 5 **(5 pages)**.
- Harrison, G.W., Rutherford, T.F., Tarr, D.G., (1997). Economic implications for Turkey of a customs union with the European Union. *Eur. Econ. Rev.*, 41(3-5): 861-870 **(10 pages)**.
- Itakura, K.; Lee, H., (2012). Welfare changes and sectoral adjustment of Asia-Pacific countries under alternative sequencings of free trade agreement. *Glob. J. Econ.*, 01(02): 1250012-22 **(22 pages)**.
- Jean, S.; Mulder, N.; Ramos, M.P., (2014). A general equilibrium, ex-post evaluation of the EU–Chile free trade agreement. *Econ. Model.*, 41: 33-45 **(13 pages)**.
- Khorana, S.; Narayanan, B.G., (2017). Modelling effects of tariff liberalisation on India's key export sectors: Analysis of the EU–India free trade agreement. *J. Appl. Econ. Res.*, 11(1): 1–22**(22 pages)**.
- McDaniel, C.A.; Balistreri, E.J., (2002). A review of Armington trade substitution elasticities. **(19 pages)**.
- Mabugu, R.; Chitiga, M., (2007). South Africa Trade Liberalization and Poverty in a Dynamic Microsimulation CGE Model, Working Papers 200718, University of Pretoria, Department of Economics **(44 pages)**.
- McDonald, S.; Thierfelder, K., (2004). Deriving a global social accounting matrix from GTAP versions 5 and 6 data **(52 pages)**.
- Ochudho, T.O.; Alavalapati, J.R., (2016). Integrating natural capital into system of national accounts for policy analysis: An application of a computable general equilibrium model. *For. Policy Econ.*, 72: 99-105 **(7 pages)**.
- Rutherford, T.F.; Rutström, E.E.; Tarr, D., (1997). Morocco's free trade agreement with the EU: a quantitative assessment. *Econ. Model*,14(2): 237-269 **(33 pages)**.
- Shaikh, F.M., (2009). Analysis of bilateral trade liberalization and South Asian free trade agreement (SAFTA) on Pakistan's economy by using CGE model. *J. Int. Trade Law Policy*, 8(3): 227–251 **(25 pages)**.
- Srinivasu, B.; Rao, P.S., (2013). Infrastructure development and economic growth: Prospects and perspective. *J. Bus. Manage. Soc. Sci. Res.*, 2(1): 81-91 **(11 pages)**.
- Scott McDonald, S.; Thierfelder, K.; Robinson, S., (2007). Globe: A SAM Based Global CGE Model using GTAP Data **(108 pages)**.
- Thu, M.; Hiro Lee, H., (2015). Assessing the impact of deeper trade reform in Vietnam Using a general equilibrium framework. *J. Southeast Asian Econ.*, 32(1): 140-162 **(23 pages)**.
- Ukkusuri, S.V.; Mesa-Arango, R.; Narayanan, B.; Sadri, A.M.; Qian, X., (2016). Evolution of the commonwealth trade network. International trade working paper 2016/07, Commonwealth secretariat, London **(48 pages)**.
- Villoria, N.; McDougall, R., (2015). FlexAgg2.0: An improved version of the data aggregation program FlexAgg. Center for global trade analysis, Purdue University, chap., 4 **(6 pages)**.
- Winchester, N., (2009). Is there a dirty little secret? Non-tariff barriers and the gains from trade. *J. Policy Model.*, 31(6): 819-834 **(16 pages)**.
- Wang, K.; Wang, C.; Chen, J., (2009). Analysis of the economic impact of different Chinese climate policy options based on a CGE model incorporating endogenous technological change. *Energy Policy.*, 37(8): 2930-2940 **(11 pages)**.
- Walmsley, T.; Carrico, C., (2016). Disaggregating labor payments. In *global trade, assistance, and production: The GTAP 9 database*, edited by B. G. Narayanan, A. Aguiar, and R. McDougall. chap. 12.B **(17 pages)**.

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Hossain, S.Sh.; Delin, H.; Mingying, M., (2022). *Is there a connection between tariffs and economic growth? A computable general equilibrium analysis based on the Global Trade Analysis Project model*. *Int. J. Hum. Capital Urban Manage.*, 7(3): 383-392.

DOI: [10.22034/IJHCUM.2022.03.07](https://doi.org/10.22034/IJHCUM.2022.03.07)

url: http://www.ijhcum.net/article_252819.html



International Journal of Human Capital in Urban Management
(IJHCUM)

Homepage: <http://www.ijhcum.net/>

ORIGINAL RESEARCH PAPER

Designing and explaining the model of factors influencing the formation of a career path with a postmodern approach

M. Saveh¹, D. Gholamzadeh^{1,*}, H. Safarzadeh²

¹ Department of Public Administration, Central Tehran Branch, Islamic Azad University, Tehran, Iran

² Department of Entrepreneurship Management, Central Tehran Branch, Islamic Azad University, Tehran, Iran

ARTICLE INFO

Article History:

Received 11 February 2022

Revised 30 April 2022

Accepted 11 June 2022

Keywords:

Career path

Postmodern approach

Personal characteristics

ABSTRACT

BACKGROUND AND OBJECTIVES: Rapid technological advances, widespread globalization advances, and the strong desire of people to change their career paths make the question of job and career path selection and decision making, and future predictions important today. Future work self is a new concept in the career path process that originates from the postmodern approach that has entered in the field of management in the last ten years and organizations that guide and manage individual career paths need to understand the factors that influence career path design. Therefore, this study was conducted with the aim of designing and explaining models of factors that influence the design of career paths by the postmodern approach.

METHODS: This study is a mixed method (qualitative-quantitative) in terms of development goal. First, library methods, scientific texts and related articles, and internal and external research on the topic were reviewed, followed by qualitative interviews with the participation of 15 professors, experts and the middle management of Municipality of Tehran in the field of human resource management, psychology, career counseling and, which were selected by purposive sampling method, was performed. The data of this stage were collected with the help of semi-structured interviews and analyzed by the Thematic analysis method. The statistical population of the quantitative section included experts of human resources of the Municipality of Tehran, who were familiar with the subject of research, from which 94 people were selected by simple random method. The data of this stage were collected with the help of a questionnaire and analyzed using structural equation modeling.

FINDINGS: At the individual level, 38 keywords in the form of 9 Sub-themes and 3 Main-themes, which were: self-concept, job concern, personality, and at the environmental level, 46 keywords, in the form of 16 Sub-themes, and 6 Main-themes, which were: key personalities, family circumstances, educational conditions, community conditions, media and technology and political conditions were extracted from the interviews. Findings from double confirmatory factor analysis showed that the factor numbers are all greater than 0.4 and the significance of the relationship between indices, components and constituent dimensions has been confirmed and all items had a t-statistic greater than 1.96, so none of the items were removed from the model and in total, all coefficients were significant at the 95% level. And the study of model fit indices and the result of 0.573 showed a strong fit of the model.

CONCLUSION: According to the results of this study, individual factors (self-concept, job concern and personality) and environmental factors (key personalities, family conditions, educational conditions, community conditions, media and technology and political conditions) that affect the formation of career path were identified and the effect of these factors was determined through the model.

DOI: [10.22034/IJHCUM.2022.03.08](https://doi.org/10.22034/IJHCUM.2022.03.08)



NUMBER OF REFERENCES

42



NUMBER OF FIGURES

3



NUMBER OF TABLES

9

*Corresponding Author:

Email: golamzadeh33@yahoo.com

Phone: +989122050798

ORCID: [0000-0002-3623-3813](https://orcid.org/0000-0002-3623-3813)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

From the moment humans turn to the world, from birth to death, humans grow, evolve, and go through various stages of growth. One of the dimension of human growth is the career path. This has a continuous and evolutionary process throughout a person's life and is done in parallel with human growth (Hartung et al., 2005; Mayer, 2018). Nowadays, career path is considered as a process that includes all the roles of an individual in life, going through the stages of growth and performing the tasks related to each stage, and achieving self-satisfaction and that of society along the way (Gyansah and Guantai, 2018; Karacan-Ozdemir and Ayaz, 2021). Career paths have become discontinuous and without boundaries (Arthur and Rousseau, 1996), becoming more pronounced with increasing periods of transition and job uncertainty, for example, employees often change companies and rarely stay in a stable job (Pfeffer and Baron, 1988). People choose careers and career paths that are more in line with their current and future values and needs (Rousseau et al., 2006). From a general point of view, career path theory can be divided into traditional, modern and postmodern theories. Traditional approaches include theories of traits and types that examine the characteristics of each individual. For example, in the theory of Myers Briggs and Holland, personality traits are presented in different categories, and in Davis theory, skills, needs and values are examined. In these theories, after examining the characteristics of the individual, the occupational characteristics are examined and finally the personal characteristics are harmonized with the occupational characteristics (Zunker, 2021). Modern approaches can be considered as theories that move from static to dynamic and focus on specific areas, the most important of which are the theory of social learning and the theory of social cognition (Miller, 2006). In the modern approach, the role of beliefs and learning in various occupational topics is discussed (Brown and McPartland, 2016). Postmodern approaches include career path construction theories that are constructivist psychological approaches (Maree, 2020). This approach includes theories that believe in the personal truth and reality of each individual. These theories believe that each person has a personal attitude and perception of life events and relationships and presents their chosen behavior in the face of problems, behavior that is derived from meanings related to experiences with others (Hartung

and Taber, 2008). In postmodern approaches, much emphasis is placed on giving meaning to people's careers. In this approach, to examine issues related to a career path, personal experiences of each person's life are used, and human life is viewed as a steady and continuous process (Savickas, 2016). Postmodern approaches are not subject to a specific pattern such as the traditional and modern approaches and focus more on understanding the life story of people and the story and anecdote of life (Goodson and Gill, 2011; Brott, 2004). Savikas career path construction theory is a postmodern career path theory that emphasizes self-regulatory resources to create person-environment fit (Savickas, 2016). This theory sees future work self as a source of motivation in the career path for personal-environment adaptation (Zijun et al., 2015). Therefore, in this study, the career path is examined with a postmodern approach. The advent of nonlinear career paths has led researchers to the idea of how they can pay more attention to how people shape themselves can actively shape their future careers (Seibert et al., 2001; Campion, 2010). Acknowledging the active role of individuals in organizations is a departure from the traditional belief about the responsiveness and passivity of employees to their environment (Parker et al., 2011), also, on a broader scale, it confirms the importance of the proactive nature of employees in the workplace (Grant and Ashford, 2008). The proactive feature states that people do not wait to be instructed on what to do, and it is not only when a problem arises that they take action, but they can anticipate opportunities and problems and actively shape themselves to the conditions in such a way as to shape a different future (Strauss and Kelly, 2016). Proactive features requires a goal-setting process in which people visualize and plan for a different future, perform specific behaviors, and lead to work progress. The more effectively people engage in the goal-setting process and the greater the effort to achieve the goal, the greater the likelihood of achieving a different future and major change (Parker et al., 2011). Creating a proactive goal consists of at least two processes: envisioning and planning (Frese and Fay, 2001). Envisioning involves the perception of a present or future problem or opportunity and the perception of a different future that can be achieved by actively engaging in that problem or opportunity. Envisioning involves predicting future consequences and mentally replacing a person, situation, or event at a specific

point in time (Grant and Ashford, 2008). According to Brandtstädter (1999), as people move through their life cycle, they constantly re-evaluate and reinterpret their goals and plans in response to past events and in response to changes in their abilities, motivations and needs. Job foresight is a concept that affects the formation of a person's career path by creating a mental image of work future (Strauss *et al.*, 2012). The concept of future work self that has entered the field of management and research since 2012 has examined most aspects that include the consequences of future work self but no research that is focused on the comprehensively on the factors affecting its formation has not been done so far. In Iran, too, no research has been done on the subject of future work self, and from this perspective, the present study is completely new and innovative. In Tehran Municipality, job and post shifts are abundant and considering that the experts of human resources of Tehran Municipality became acquainted with postmodern theories of career path and related concepts during the training courses, the researcher decided to design and explain the model of factors influencing the formation of career path with a postmodern approach to answer the question: what are the factors influencing the formation of career path?

Literature review

Nowadays, considering sweeping changes, successful and effective organizations are those organizations which can predict changes and transformations and direct these changes in the way to create optimal transformations in order to make a better future in addition to adjust with contemporary society changes (Talebi *et al.*, 2015; Tajpour *et al.*, 2018). The concept of Future Work Self-concept was first introduced by Strauss *et al.* (2012). It is an image and visualization of the person in the future that reflects the person's hopes and aspirations in relation to work. FWS is part of the dynamic individual system that leads to risk motivation and ushers to ambitious goals and individual planning and creativity in achieving goals. This source of motivation creates self-productive goals and strategies to guide professional behavior in the future. The differences between a person's current and future work are mainly identified through comparisons and mental simulations, which in turn motivates them to invest in future-related behaviors (Zhang *et al.*, 2016). Hicks and King (2011) showed

that positive imagery of the future can lead to positive expectations of the future. A person tries to imagine himself with all the goals, dreams, and abilities which have been achieved, according to the tasks and goals that have been set for himself. FWS for employees is a tool such as a «work compass» that helps people orient their careers by smoothing motion in the fog and showing the right path across multiple routes (Lin *et al.*, 2016) and causes one can focus on information that is relevant to the future of one's work and tries to identify contradictions and threats and create a balance between information and feedback. The root of FWS is the self- concept and has three structures of hope and desire, expectations of oneself and fear and anxiety (Zhang *et al.*, 2016). The self- concept affects one's behavior, such as motivation, creating images of one's future in desirable and unfavorable states, creating a conceptual connection between cognition and motivation. At best, an employee with strong communication skills can envision the position of a human resource manager or public relations manager. One connects one's self- concept to one who wants to become one in the future, and this image is the motivation and stimulant to achieve the ideal future (Javornik *et al.*, 2021). In fact, futurism is a work that originates from individual desires, desires, threats and fears, but these ideals and fears are influenced by specific social, cultural, environmental trends of the individual and the values of society (Giacalone and Jurkiewicz, 2010). According to Pfeffer (1983), the information that a person receives from the social environment influences the formation of a person's tendencies and attitudes, and behaviors. Such information causes a person to pay attention to a particular attitude (such as a particular work environment), and eventually, cause behaviors and attitudes that are dominant in the person. Organizations are social systems that aim to meet social and individual needs and they require efficient members to survive (Hosseini, 2020).

According to the systematic review of the theoretical foundations and research background and Table 1, the design and explanation of the model of factors affecting the formation of the career path with a postmodern approach (future work self) was done. Since future work self is an interdisciplinary subject, the subject area of this research is human resources and psychology and it has been done as a case study in Municipality of Tehran. The current study have been performed in Tehran in 2021.

Table 1: Studies and research conducted in relation to the subject of research

Reference	Research topic	Research results
Parker <i>et al.</i> (2011)	Making things happen: A model of proactive motivation	The researchers examined proactivity and found that individual differences (personality, values, knowledge and ability) and environmental factors (leadership, jockeying, interpersonal relationships and processes) affect proactive goals
Wu and Parker (2011)	Proactivity in the work place: Looking back and looking forward	Researchers have investigated the role of motivational mechanisms that underlie proactivity and futurism, and have found that individual differences and environmental factors influence proactivity
Cai <i>et al.</i> (2015)	Self-esteem and proactive personality as predictors of future work self and career adaptability: An examination of mediating and moderating processes	Using career construction theory and self-verification theory, the researchers examined work futurism and found that self-esteem, proactive personality, career exploration, and career adaptability influence work futures
Kasaei Isfahani <i>et al.</i> , (2015)	Comparison of the effectiveness of traditional, modern and postmodern approaches to career counseling on increasing the adaptability of the career path of students of the University of Isfahan	Researchers examined career path counseling from the perspective of three approaches: traditional, modern and postmodern, and found that the impact of modern and postmodern approaches on career paths is greater than the traditional approach
Savickas (2016)	Reflection and reflexivity during life-design interventions: comments on career construction counseling	The researcher examined various job counseling and determined that the characteristics of the environment and everything that happens to a person during life affect the career path of the person
Sharf (2016)	Applying career development theory to counselling	The researcher examined career paths using career development theory, gave several case studies of career counseling, and showed that the characteristics of the environment, key personalities, and influential people influence the formation of a person's career path
Zhang <i>et al.</i> (2016)	Future work self-concept, measurement and related research	Researchers have explored work futurism as a futuristic concept and determined that self-esteem, proactive personality, and career exploitation affect future work self
Zikic and Kehe (2016)	Job loss as a blessing in disguise: the role of career exploration and planning in predicating reemployment quality	Researchers examined career adaptability and found that self-concept and social support are influential in shaping a person's career path
Urdzinca-Merca and Dislere (2018)	Information and Communication Technology-Based career guidance model for young people	Researchers have found that career counselors use information and communication technology in counseling and training professionals to influence youth employment through educational content
Hossaini <i>et al.</i> (2020)	Identifying and ranking the factors affecting the anchors of employees' career path	Researchers examined career anchors and found that technical-functional orientations, government management, independence and independence, security and stability, creativity-entrepreneurship, sense of service and self-sacrifice, sense of work and valuable income influence job choice
Falco and Shaheed (2021)	Putting theory into practice: a conceptual framework for career group counseling in school settings	The researchers found that group counseling for students is a way to provide career development services and affects the formation of their career path

MATERIALS AND METHODS

The present research is developmental based on the type of purpose and in terms of method, qualitative and quantitative, and has an inductive and deductive approach and it is also cross-sectional

research in terms of time horizon, which has been conducted in the field in two stages. In the first stage, the theoretical foundations and background of the research were examined and the initial indicators of the model were extracted. At this stage, books,

articles, sources and electronic data contained in information sources were reviewed. Access to these resources through internal databases (such as Jihad Daneshgahi Scientific Information Center, comprehensive database of articles and conferences, Iran Research Institute of Information Science and Technology, etc.) and reputable foreign databases (such as Science Direct, Emerald, Online Library, Psychent, etc.). The data collection tools of this stage were receipts and notes that were used to record indicators, components and dimensions. In the second stage, semi-structured interview tools were used to obtain the opinion of experts and Thematic analysis method was used to analyze the interview data. This method is done in 6 steps: 1) familiarity with the data, 2) creating primary codes, 3) search for selective codes, 4) formation of sub-themes, 5) naming of main themes, 6) preparation of reports (Clarke and Braun, 2006). Participants in the qualitative section and interview courses were professors and experts in the field of human resource management, psychology, career counseling, and middle managers of the Municipality of Tehran, who made a total of 15 people as the members of the specialized panel as follows: professors of human resource management, organizational behavior and government management (5 people), experts in psychology and job counseling (5 people) and middle managers of The Municipality of Tehran (5 people). A basic prerequisite for selecting members of the expert panel was that they have experience with the topic and were familiar with the subject. The sampling method in the qualitative part was judgmental and purposeful and the selection of samples was continued until the data adequacy or theoretical saturation was reached. In the quantitative part, 124 people were the statistical community of human resources experts of the Municipality of Tehran, who were familiar with the subject of work foresight and according to Morgan table, the questionnaire was randomly distributed among 94 of them. Qualitative data collection tools were semi-structured interviews. The questions asked in the interviews were: "Have you ever dealt with people who have a vision of their future career in mind, how these people drew their mental image for you and talk about it?" Then the main question of the research was asked: "In your opinion, what factors affect the formation of this image in people's minds?" Since the interview was

conducted in a semi-structured manner, the rest of the questions were formed during the interview and according to the interviewee. The interview went so far that the participants no longer had anything to present. The content validity of the interviews was examined based on the opinions of experts and used after confirmation. The interviews were validated using the Guba and Lincoln (1994) four criteria, which include: Credibility, dependability, transferability, and Conformability. The confirmation of the validity and reliability was evaluated by selecting the interviewees who dealt with the subject under the study. In addition, the validity and reliability were assessed by reviewing and analyzing the research findings several times by experts. Finally, to ensure the transcripts, the interviewees were asked to review the transcript summary and confirm whether it really reflects their point of view. Furthermore, the experts were asked to read the main and sub-themes and re-examine the transcripts to ensure that the main and sub-themes were properly presented. To assess reliability, the stability index was used. Achieving conformability would be possible during data collection and analysis during research, review of raw data, interpretations, suggestions, and findings (Andreas, 2003). If the coding process is credible, the results of the interviews will be reliable. To evaluate the reliability of the interview coding process in Thematic analysis method, the stability index can be used (Abbaszadeh, 2012). The research consistency index is calculated by following formula (Bowen and Bowen, 2008).

$$\frac{\text{Number of agreements} \times 2}{\text{Total number of codes}} = \text{Stability index}$$

In the next stage, 2 interviews randomly were selected from each group of interviewees (professors, psychologists and middle managers in the Municipality of Tehran) and each of them was coded twice at two different times with an interval of one month. The stability index in interviews with professors, psychologists and the middle managers of the Municipality of Tehran were 91%, 87% and 85% respectively, which showed the appropriate reliability of the interviews. The data were analyzed in two stages of open and axial coding. In this way, the main codes were extracted and finally the main themes were identified. After determining the indicators, a researcher-made questionnaire was designed to collect data and provided to human resources experts who were familiar with the concepts

related to the career path during training courses and were selected by simple random sampling method. The reliability of the questionnaire was assessed by Cronbach's alpha. Moreover, in order to assess the validity, confirmatory factor analysis and Amos software were used. The conceptual model of the research was evaluated by the structural equation model and the reliability of the structure was assessed by convergent and divergent validity through Smart PLS software.

RESULTS AND DISCUSSION

After analyzing the interviews using MAXQDA software, the data were analyzed in two stages of open and axial coding and the interviews were validated using four criteria Guba and Lincoln (1994). The qualitative method is shown in Tables 2 and 3. The results obtained from the qualitative method are shown in Table 2.

According to Table 2, 9 Sub-themes and finally 3 Main-themes were extracted from the combination of keywords at the individual level. According to Table 3, from the combination of keywords, 16 Sub-themes and finally 6 Main-themes were extracted at the environmental level. The data collection tool was a researcher-made questionnaire in the quantitative part. A questionnaire with 78 questions that was provided to the statistical community after design.

Using Kolmogorov-Smirnov test, it was found that the research data did not have a normal distribution, so in the inferential analysis of the data, non-

parametric methods and software were used. Since the value of Kaiser-Meyer-Olkin Measure of sampling adequacy (KMO) index was 0.789 (more than 0.6), so the number of samples is sufficient for factor analysis, also the sig value of Bartlett test is less than 0.05 indicates factor analysis for identification the structure of the factor model is appropriate (Table 4).

Through confirmatory factor analysis test, the validity of the structure was measured by Amos software Fig. 1, the results of which are shown in Table 5.

Considering that the factor numbers are all greater than 0.4, their significant relationship with the related variable is confirmed. Cronbach's alpha was used to evaluate the reliability, which was confirmed at the individual level with a value of 0.785 and at the environmental level with a value of 0.875.

In order to evaluate the conceptual model of the research and also to ensure the existence or non-existence of a causal relationship between the research variables and to investigate the appropriateness of the observed data with the model, the research hypothesis was tested using the structural equation model (SEM). Factors were coded according to Table 6.

The coefficients and parameters obtained in Fig. 3 indicate the significance of all the obtained coefficients, since the value of the significance test for each of them is greater than 1.96 and less than -1.96. Based on the analysis results, all dimensions listed in Tables 2 and 3 were confirmed. In other

Table 2: Descriptive keywords, Sub-themes and Main-themes at the individual level

Row	key words	Sub-themes	Main-theme	Frequency
1	Enthusiasm - Attraction - Interest - Desire - Hope and Desire - Attraction - Motivational Parameters - Preferences	Desire and motivation		
2	Talent-Ability- Capability-Creativity- Aptitude	Talents and abilities	Self- concept	110
3	Individual values - Ignoring the family because of work - Competing with others	Individual values		
4	Self-esteem - A positive feeling about oneself - Values oneself	Self-esteem		
5	The Importance of Work - Career Concern - Career Foresight	Concern		
6	Job Awareness - Job Information - Theoretical Foundations of Job - Aristocracy and Technical Proficiency in Job - Internship - Job Experience	Knowledge and experience	Job concern	47
7	Characteristics - Intrinsic Traits - Personality - Extraversion - Proactive Personality - Introversion - Ambition - Seclusion	Proactive personality Extraversion Introversion	Personality	56

Table 3: Descriptive keywords, Sub-themes and Main-themes at the environmental level

Row	key words	Sub-themes	Main-theme	Frequency
1	Influential people - The importance of key people for the individual - The role of teacher and neighbor and ...	Patterns		
2	Friends' comments - The people the person interacts with- The feedback that peers give to the person- The person's tagging by friends- The importance of a better job among friends	Influencers	Key Characters	25
3	Prominent heroes- The role of the individual favorite models	Type of activity of heroes		
4	Charitable family - The serious role of money in the family - The paradigm of the family	Family values		
5	Educational style - Relationships of family members - Encouragement by the family - Attention to the child - The degree of independence and individual freedom	Family behavior	Family circumstances	55
6	Economic status of the family - Family resources and facilities - Family income	Family economy		
7	Family history - Customs and norms – profession of the past	Customs		
8	School environment- teachers, teaching methods- teaching content	Educational facilities Educational content Teaching method	Training conditions	15
9	Society Problems - Community Constraints - Limitations and Problems of Life	Limitations		
10	Unemployment - Economic conditions of society - labor market demands	Economic conditions of the community	Community Conditions	47
11	Prestige - Social paradigm - Social value chain - Respected position - Valuation of the individual	Social values		
12	Lifestyle in Movies - The values that are portrayed in the movies- Technology	Lifestyle in the media Technology	Media and Technology	25
13	Political conditions of society - Political stability - Immigration	Political stability Immigration	Political condition	15

Table 4: KMO and Bartlett test of the questionnaire

Test KMO	0.789
Bartlett Test	0.93106
Sig	000.0

words, the significance of the obtained coefficients for these indicators was proved.

Average Variance Extracted (AVE) was used to measure the fit of the model, which shows the correlation of a structure with its indices. The mean extraction variance was 0.526 for individual factors and 0.643 for environmental factors, which has an acceptable convergent validity (Table 7).

To express the existence of partial correlations between the indices of one structure and the indices

of other structures, discriminant validity (Fornell and Larcker matrix) was used. The output of Smart PLS software indicates that the research model has good diagnostic validity (Table 8).

The overall fit of the model was assessed through the Goodness of Fit (GOF) criterion. This criterion is calculated using the following formula:

$$GOF = \sqrt{\text{communalities} \times R^2}$$

The mean of Communalities is the mean of the common values of each construct and the mean of R^2 of the endogenous constructs of the model.

Considering the three values of 0.01, 0.25 and 0.36 as weak, medium and strong values for GOF, the achievement of 0.573 in Table 9 shows a strong fit of the model.

Table 5: Confirmatory factor analysis of the first and second order

Factor	Indices	First-order factor analysis	Second-order factor analysis
Individual factors	Self-concept	0.823	0.835
	Job concern	0.594	
	Personality	0.871	
	Key personalities	0.703	
	Family circumstances	0.564	
Environmental Factors	Educational conditions	0.694	0.894
	Community conditions	0.865	
	Media and Technology	0.853	
	political conditions	0.618	

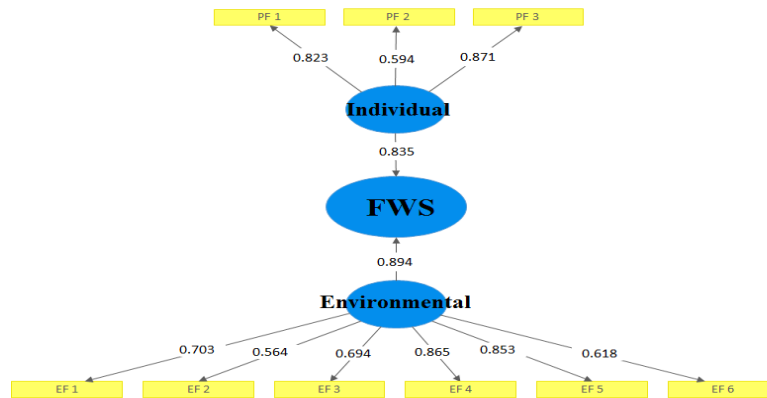


Fig. 1: First and second order factor analysis

Discussion

To draw the final model of the research, in the first stage, the theoretical foundations and research background were examined and the initial indicators of the model were extracted. The data were collected and analyzed using a questionnaire tool and structural equation modeling. The model of factors influencing the formation of career path with a postmodern approach, consists of 3 Main-themes, 9 Sub-themes and 38 keywords at the individual level and 6 Main-themes, 16 Sub-themes and 46 keywords at the environmental level. It is noteworthy that some themes and codes have been identified for the first time. In this model, at the individual level, 3 Main-themes were identified in the form of 9 Sub-themes: self-concept, job concern, personality. In the self-concept theme, indicators of desire and motivation, talent and ability, individual values, and self-esteem were identified, which were also found by [Zikic and Klehe \(2006\)](#), the impact of self-concept and individual values on the formation of futurism was consistent with the work of [Parker et al. \(2011\)](#). The results of the studies of [Zhang et al. \(2016\)](#) and the research of [Cai et al. \(2015\)](#) show that

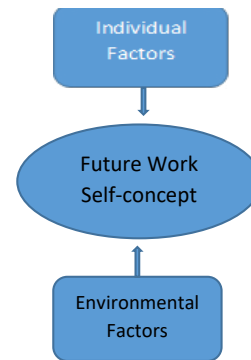


Fig. 2: Conceptual model of factors affecting the formation of career path with a postmodern approach

self-esteem and proactive personality are effective on the future work self that is consistent with the results of this study. The results of research by [Savickas \(2016\)](#) which states that career path concerns affect a person's career future, are in line with the findings of this study. In the present model of this study, at the environmental level, 6 Main-themes were identified in the form of 16

Table 6: Guide to Identifying the Abbreviations of Model Variables

Factors	Indices	Abbreviations
Individual Factors	Self-concept	PF1
	Job concern	PF2
	Personality	PF3
Environmental Factors	Key personalities	EF1
	Family circumstances	EF2
	Educational conditions	EF3
	Community conditions	EF4
	Media and Technology	EF5
	political conditions	EF6

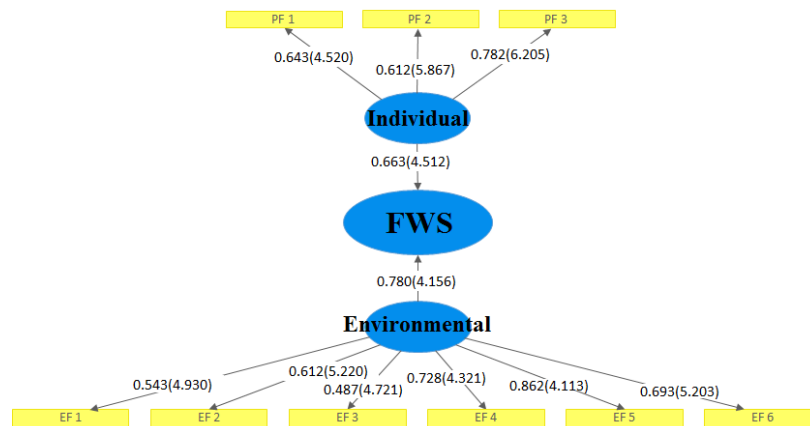


Fig. 3: Path coefficient and t-value

Table 7. Mean extraction variance (convergent validity)

Factors	AVE	Situation
Individual Factors	0.526317	Confirmed
Environmental Factors	0.643690	Confirmed

Table 8: Fornell and Larker matrix (divergent validity)

Factors	Individual Factors	Environmental Factors
Individual Factors	0.86	
Environmental Factors	0.43	0.92

Sub-themes, which are: personalities, family conditions, educational conditions, social conditions, media and technology, and political conditions. In the theme of key characters, the characteristics of the role of the individual favorite models, influential people, and the type of activity of the heroes were identified, and these findings are very much in line with the [Savickas \(2016\)](#) and [Sharf \(2016\)](#) studies, who stated that key characters play an important role. Their role in the future is one-sided, and the person chooses to imitate parents,

Table 9: Results of the overall model fit		
Communality	R2	GOF
0.626	0.496	0.573

teachers, friends, and other people with whom the person somehow interacts. In the family status theme, the family values index, family behavior, family economy, and customs influence the formation of a person's work prospects which are also found by [Wu and Parker \(2011\)](#) and [Parker et al. \(2011\)](#) are in line with the effects of

coordinated environmental features. In the theme of educational conditions, the index of the impact of education and counseling on the formation of people's career path was identified, which was in line with the results of Urdzınca-Merca and Dislere (2018) and Falco and Shaheed (2021). The results also showed that in the theme of social conditions, indicators of constraints, societal economic conditions, and social values are influential on the formation of future work self, and the findings of Savickas (2016) and Gottfredson (2002) theory also show this alignment. In the Media and Technology theme, the media lifestyle index influences the formation of future work self, a finding consistent with Sharf (2016), who states that television personalities play an important role in decision-making about work. This research has been conducted with the aim of presenting a model of factors affecting the formation of career path with a postmodern approach. According to the postmodern approach and focus on creating person-environment fit, individual factors (self-concept, job concern and personality) and environmental factors (key personalities, family conditions, educational conditions, community conditions, media and technology and political conditions) which affect the career path of the individual were identified. By identifying these factors and according to the needs of the labor market, the career path of individuals can be guided.

CONCLUSION

Career decision making, as postmodern approaches suggest, is a continuous process that is defined throughout a person's life as career aspirations, field of study, organization selection, attainment of a particular position. But what are the impressive factors behind these decisions is not properly defined. But the reason for this difference and diversity in an individual's responses and in what circumstances decisions are made and what effect the decision factors is not clear. Today, numerous staff changes and many changes in the career path of individuals reflect the fact that the postmodern approach has been formed in accordance with the developments of the present century and individual models for the career path are designed by individuals themselves. The concept of future work self, which expresses a person's mental image of future work, originates from a postmodern approach and determines a person's career path. This image is formed in the individual's mind and develops and changes over time. Future work self is an important source of motivation and an important prerequisite for achieving the desired attachment, participation and performance of individuals. Even though more than 50

years have passed since career path was first looked at, this topic is still of interest to many scientists and researchers are investigating various related aspects and factors, but the research gap in the postmodern career path approach and in particular in the concept of futures research is something that the current study have taken a step towards a better understanding of this concept and has designed and explained the model of factors that influence the formation of the career trajectory, but there are still many factors that need more research to better understand the issue.

Suggestions

Based on the experiences gained from this research, the following suggestions are presented:

- In tests and interviews, organizations should recruit people whose job concerns are in line with the goals and missions of the organization, according to the individual factors influencing the formation of work prospects.
- Tehran Municipality in the field of education of citizens should inform families of the impact of key personalities, values that govern the family and customs on the formation of the career path of individuals by holding counseling courses.
- Due to the mismatch between supply and demand in our country's labor market, it is possible to take an effective step to increase people's awareness of various jobs through education and display of lifestyles in the media and make people interested in jobs needed by society.
- By developing concepts related to future work self and publishing and expanding the teaching of these concepts in universities, the limitations related to the lack of internal scientific research and the small number of knowledgeable experts about future work self can be eliminated.
- Due to the novelty of this topic, researchers can use the theoretical foundations of this research as a criterion and based on it, propose and test several hypotheses. This research can be the source of other research and help to develop knowledge in this area.
- In future researches, the statistical population can be the employees of different organizations and even individual and environmental factors that affect the future of students.
- Considering that future work self is influenced by various factors during a person's life, conducting longitudinal research can provide many achievements.
- Organizations, especially in the field of human resources of Tehran Municipality, according to

the results of this research, can more accurately pathologize the causes of numerous requests of employees to change jobs and positions.

Limitation

The limitations of the current study include the small number of national and international scientific researches and studies, related to future work self, and the small number of experts related to the subject.

AUTHOR CONTRIBUTIONS

M. Saveh reviewed the literature, collected, analyzed and interpreted the data. D. Gholamzadeh in charge of correspondence, reviewed the results and the text editing. H. Safarzadeh was responsible for reviewing the literature and interpreting the data.

ACKNOWLEDGEMENT

The authors would like to express their gratitude to the professors and experts in the field of human resource management, psychology, career counseling and also the middle managers and the human resource experts of the Municipality of Tehran who provided information in interviews and helped the researchers to complete the questionnaires.

CONFLICT OF INTEREST

The authors have no conflict of interest to be declared concerning this review paper. Also, the authors have checked all the ethical affairs comprising duplicates, misconduct, data making, informed consent, and plagiarism.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

ABBREVIATIONS

AVE	Average Variance Extracted
FWS	Future Work Self
GOF	Goodness Of Fit
KMO	Kaiser-Meyer-Olkin Measure of sampling adequacy

REFERENCES

- Andreas, M., (2003). Validity and reliability tests in case study research: a literature review with "hands-on applications for each research phase. Qual. Market Res. Int. J., 6(2): 75-86 (12 pages).
- Abbaszadeh, M., (2012). Reflections on the validity and reliability of qualitative research. Appl. Sociol., 1: 19-34 (16 pages). (In Persian)
- Arthur, M.B.; Rousseau, D.M., (1996). The boundaryless career: A new employment principle for a new organizational era. New York: NY:Oxford University Press.
- Bowen, C.; Bowen, W., (2008). Content analysis in Kaifeng Yang and Gerald Miller. Taylor and Francis.
- Brandtstädter, J., (1999). The self in action and development. Action and self-development. 37-65 (29 pages).
- Brott, P., (2004). Constructivist assessment in career counseling. J. Career Dev., 30: 189-200 (12 pages).
- Brown, S.D.; McPartland, E.B.; Walsh, W.B.; Savickas, M.L., (2005). Career interventions: Current status and future directions. Handbook of vocational psychology: Theory Res. Pract., 3: 195-226 (32 pages).
- Campion, E.D.; Caza, B.B.; Moss, S.E., (2020). Multiple jobholding: An integrative systematic review and future research agenda. J. Manage., 46(1): 165-191 (27 pages).
- Cai, Z.; Guan, Y.; Li, H.; Shi, W.; Guo, K.; Liu, Y.; Li, Q.; Han, X.; Jiang, P.; Fang, Z.; Hua, H., (2015). Self-esteem and proactive personality as predictors of future work self and career adaptability: An examination of mediating and moderating processes. J. Vocat. Behav., 86: 86-94 (9 pages).
- Clarke, V. Braun, V. (2006). Using thematic analysis in psychology. Q. Res. Psychol., 3 (2): 77-101 (25 pages).
- Falco, L.D.; Shaheed, C., (2021). Putting theory into practice: A conceptual framework for career group counseling in school settings. J. Special. Group Work, 46(1): 6-19 (14 pages).
- Frese, M.; Fay, D., (2001). 4. Personal initiative: An active performance concept for work in the 21st century. Res. Organ. Behav., 23: 133-187 (55 pages).
- Gottfredson, L.S., (2002). Gottfredson's theory of circumscription, compromise, and self-creation. Career Choice Dev., 4: 85-148 (64 pages).
- Grant, A.M.; Ashford, S.J., (2008). The dynamics of proactivity at work. Res. Organ. Behav., 28: 3-34 (32 pages).
- Gyansah, S.T., Guantai, H.K., (2018). Career Development in Organizations: Placing the Organization and Employee on the same pedestal to enhance maximum productivity. Eur. J. Bus. Manage., 10(14): 40-45 (6 pages).
- Goodson, I.; Gill, S.R., (2011). Narrative pedagogy: Life history and learning. 386: Peter Lang.

- Guba, E.G.; Lincoln, Y.S., (1994). Competing paradigms in qualitative research. London CA: Sage.: Handbook of qualitative research.
- Giacalone, R.A.; Jurkiewicz, C.L., (2010). The science of workplace spirituality. Handbook of workplace spirituality and organizational performance. 2: 3-26 **(24 pages)**.
- Hartung, P.J.; Porfeli, E.J.; Vondracek, F.W., (2005). Child vocational development: A review and reconsideration. J. Vocat. Behav., 66(3): 385-419 **(35 pages)**.
- Hartung, P.J., Taber, B.J., (2008). career construction and subjective well-being. J. Career Assess., 16: 75-85 **(11 pages)**.
- Hosseini, S. A.; Asghari Alaei, M.; Awati Jami, S., (2020). Identify and rank the factors affecting the anchorages of employees' career paths. Q. J. Contemp. Res. Manage. Account. Sci. 2(4): 46-66 (21 pages). (In Persian)
- Hosseini, E., Tajpour, M., Lashkarbooluki, M. (2020). The impact of entrepreneurial skills on manager's job performance. Int. J. Hum. Capital Urban Manage., 5(4): 361-372. **(12 pages)**.
- Hicks, J.A.; King, L.A., (2011). Subliminal mere exposure and explicit and implicit positive affective responses. Cogn. Emotion, 25(4): 726-729 **(4 pages)**.
- Javornik, A.; Marder, B.; Pizzetti, M.; Warlop, L., (2021). Augmented self-The effects of virtual face augmentation on consumers' self-concept. J. Bus. Res., 130: 170-187 **(18 pages)**.
- Karacan-Ozdemir, N.; Ayaz, A., (2021). Adolescents' future expectations of work and education within adaptation model of career construction theory. J. Career Dev., p.08948453211037043.
- Kasaei Isfahani, A.R.; Abedi, M.R.; Abedi Baghban, I.; Hosseini, S., (2015). Comparison of the effectiveness of traditional, modern, and postmodern approaches to career path counseling on increasing the career path adaptability of Isfahan University students. Job Organ. Counsel. Q., 7(22). (In Persian)
- Lin, W.; Wang, L.; Bamberger, P.A.; Zhang, Q.; Wang, H.; Guo, W.; Shi, J.; Zhang, T., (2016). Leading future orientations for current effectiveness: The role of engagement and supervisor coaching in linking future work self-salience to job performance. J. Vocat. Behav., 92: 145-156 **(12 pages)**.
- Maree, K., (2020). The need for contextually appropriate career counselling assessment: Using narrative approaches in career counselling assessment in African contexts. Afr. J. Psychol. Assess. 2: p.7.
- Mayer, K.U., (2018). Whose lives? How history, societies, and institutions define and shape life courses. In Special Issue: Contextual Influences on Life Span/Life Course Development (pp. 161-187). **(27 pages)**.
- Miller, J.H., (2006). Extending the use of constructivist approaches in career guidance and counseling: Solution-focused strategies. Aus. J. Career Dev., 13: 50-59 **(10 pages)**.
- Parker, S.K., Bindl, U. K., Strauss, K. (2011). Making things happen: A model of proactive motivation. J. Manage., 36: 827- 856 **(30 pages)**.
- Pfeffer, J., (1983). Organizational demography. Res. Organ. Behav., 5: 299-357 **(59 pages)**.
- Pfeffer, J.; Baron, N., (1988). Taking the work back out: Recent trends in the structures of employment. Res. Organ. Behav., 10: 257-303 **(47 pages)**.
- Rank, J.; Nelson, N.E.; Allen, T.D.; Xu, X., (2009). Leadership predictors of innovation and task performance : Subordinates' self-esteem and self-presentation as moderators. J. Occup. Organ., 82(3): 465-489 **(25 pages)**.
- Rousseau, D.M.; Ho, V.T.; Greenberg, J., (2006). I-deals: Idiosyncratic terms in employment relationships. Acad. Manage. Rev., 31: 977-994 **(18 pages)**.
- Savickas, M.L., (2016). Reflection and reflexivity during life-design interventions: Comments on career construction counseling. J. Vocat. Behav., 97: 84-89 (6 pages).
- Seibert, S.E.; Kraimer, M.L.; Crant, J.M., (2001). What do proactive people do? A longitudinal model linking proactive personality and career success. Pers. Psycho. 54: 845-874 **(30 pages)**.
- Sharf, R.S., (2016). Applying career development theory to counselling (6th edn.).Independence, KY: Brooks/Cole.
- Strauss, K.; Griffin, M.A.; Parker, S.K., (2012). Future work selves: How salient hoped-for identities motivate proactive career behaviors. . Appl. Psychol., 97(3): 580-598 **(19 pages)**.
- Strauss, K.; Kelly, C., (2016). An identity-based perspective on proactivity. Proactivity at work: Making things happen in organizations. p. 330.
- Tajpour, M.; Moradi, F.; Jalali, S.E. (2018). Studying the influence of emotional intelligence on the organizational innovation. Int. J. Hum. Capital Urban Manage., 3(1): 45-52 **(8 pages)**.
- Talebi, K.; Rezazadeh, A.; Najmabadi, A. D., (2015). SME alliance performance: the impacts of alliance entrepreneurship, entrepreneurial orientation, and intellectual capital. Int. J. Entrep. Small Bus., 24(2): 187-207 **(21 pages)**.
- Urdzina-Merca, I.; Dislere, V., (2018). Information and communication technology-based career guidance model for young people. In Proceedings of the International Scientific Conference Rural Environment, Education, Personality (REEP). 11: 406-415 **(10 pages)**.
- Wu, C.; Parker, S.K., (2011). Proactivity in the work place: Looking back and looking forward. In K. Cameron and G. Spreitzer. The Oxford Handbook of Positive organizational Scholarship. Oxford University Press.
- Zhang, M.; Ye, M.; Peng, J.; Chen, Y., (2016). Future work self: Concept, measurement and related research. Adv. Psychol. Sci., 24(5): p.794.
- Zikic, T.; Klehe, U., (2006). Job loss as a blessing in disguise: The role of career exploration and planning in predicating reemployment quality. J. Vocat. Behav., 69: 391-409 **(19 pages)**.
- Zunker, V., (2021). Career counseling A Holistic Approach. Belmont: Thomson Brooks/Cole.9th edition.

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Saveh, M.; Gholamzadeh, D.; Safarzadeh, H., (2022). Designing and explaining the model of factors influencing the formation of a career path with a postmodern approach. Int. J. Hum. Capital Urban Manage., 7(3): 393-404.

DOI: 10.22034/IJHCUM.2022.03.08

url: http://www.ijhcum.net/article_252640.html



International Journal of Human Capital in Urban Management
(IJHCUM)

Homepage: <http://www.ijhcum.net/>

CASE STUDY

An investigation into vandalism and its effects on urban beauty

S. Arefpour, Gh.R. Miri *, M.R. Anvari

Department of Geography and Urban Planning, Zahedan Branch, Islamic Azad University, Zahedan, Iran

ARTICLE INFO

Article History:

Received 30 December 2021

Revised 21 April 2022

Accepted 11 May 2022

Keywords:

Façade

Space

Urban beauty

Urban furniture

Vandalism

ABSTRACT

BACKGROUND AND OBJECTIVES: Vandalism or intentional destruction of public property and belongings is one of the social hazards that always leads to huge jeopardy and damage to municipal facades, furniture, municipal spaces and distorts the beauty of the city. In this regard, the present study investigated vandalism and its impacts on urban beauty in the city of Chenaran.

METHODS: The research methodology applied in this study was mixed (qualitative-quantitative). At the outset, the qualitative section was conducted in a semi-structured interview with 16 people who were graduates of geography, urban planning and sociology in 4 focus groups of 4 people. Following that, by applying the information of this section, the main examples and cases of vandalism (destructive vandalism and written vandalism), various types of vandalism (recreational, property, ideological and vindictive vandalism), the effects of urban beauty vandalism (destruction of facades, destruction of furniture and destruction of urban spaces) as well as factors affecting vandalism (individual and social) were identified. Analyses were performed in NVIVO 7 software. Then, by using the findings of the qualitative section and theoretical studies, a questionnaire (Based on the Likert scale) was prepared and distributed among the sample size of the quantitative section (382 citizens of Chenaran). Questionnaire analysis was performed with Pearson correlation coefficient and regression analysis model in SPSS software.

FINDINGS: The findings demonstrated that factors like socio-economic status, degree of socialization, feelings of injustice and discrimination, association with vandals and individual factors are influential in vandalism. The results of regression analysis also illustrated that 63% of the alterations in vandalism are as a result of the relationship between a linear combination of independent variables and the remaining 37% or "Coefficient of Non-Determination" is as a consequence of other factors which were not considered in this study. Feelings of injustice and discrimination (0.168) and association and communication (0.161) have a direct impact, but the socio-economic status (-0.166), the degree of socialization (-0.154) and individual factors (-0.145) have the opposite effect

CONCLUSION: Vandalism affects the beauty of the city in several ways, including feelings of abuse and discrimination with a value of 0.168 and then meetings and communication with a value of 0.161 in which factors such as alteration of people's notions, reconstruction and fixing damaged equipment and the participation of citizens are crucial.

DOI: [10.22034/IJHCUM.2022.03.09](https://doi.org/10.22034/IJHCUM.2022.03.09)



NUMBER OF REFERENCES

40



NUMBER OF FIGURES

4



NUMBER OF TABLES

8

*Corresponding Author:

Email: gholam_reza_miri@yahoo.com

Phone: +989151430967

ORCID: [0000-0002-7442-2404](https://orcid.org/0000-0002-7442-2404)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

The city is a place with legal boundaries that is located in the geographical area of the district and in terms of construction context, employment and other factors has an appearance with its own characteristics (Parliamentary Research Center, 1983). The city (in Iran) according to the law of division of the country in 1983 refers to a place that has a municipality and the criterion for the presence of the municipality is a population of at least 10,000 (ten thousand) people (Shurcheh, 2016; Parliamentary Research Center, 1983). In addition to legal criteria, the city should have its own beauties and urban beauty is one of the main criteria for distinguishing cities. The elements and criteria that create the beauty of the city on a small scale are as follows; 1. Urban views: Urban view is a collection of all the views in the city, including the view of buildings, the view of city balconies, the view of sidewalks and squares. 2. Urban furniture: Urban furniture includes fountains and benches, kiosks, flooring, notice posters, electrical wires, mailboxes, trash cans, billboards, ornamental plants, lawns, trees and shrubs, flowers, shelters etc. 3. Urban spaces: The urban space constitutes the living environment of the citizen. An urban space should be satisfactory in terms of performance and beauty (Chapman, 2015). Disasters are interpreted as elements that can revitalize old fractures and lines of separation that are at the very basis of the processes of national formation (Farinella and Saitta, 2019). Countless natural and human hazards threaten the beauty of cities. Floods, earthquakes, storms, droughts, lightning, dust and other factors such as natural hazards and environmental pollution, marginalization, wars, riots, roadblocks and destructive phenomena called vandalism, including human and social hazards threatens and destroys the beauty of cities (Ghanbari et al., 2017). Another Research on urban spaces has showed that vandals have mostly destroyed completely public and completely private spaces more than semi-public and semi-private spaces (Bakhtiyari, 2017). Findings of Ramezani and Servati (2017) showed that the variables of social repression, social belonging, feelings of relative deprivation and social failure have a significant relationship with the variables of vandalism. Parks Furniture's, public toilet walls and street trees have received the most amount of damage from vandals. The results of Ghanbari et al. (2017) indicate that among the measures related to

the destruction of public property in urban furniture, graffiti on the walls, which is 8%, and breaking street lamps and green spaces, which is 6.4%, are the most notable and highlighted ones. Ceccato and Haining (2005) demonstrated that vandals are mainly faced with emotional and social disorders. Those with deeper deficiencies cause deep damage to major city spaces such as squares, and those with milder deficiencies destroy most semi-public-semi-private spaces, such as apartment dwellings. Graffiti writing, tearing down, arson, and breaking the public property are some impacts of vandalism on the public properties and spaces (Karimian Bostani et al., 2017) which is formed as a result of people's behavioral patterns (Giusti et al., 2020). Citizens' behaviors can reinforce vandalism (Zhou et al., 2018). Richardson and Shackleton (2014) points to the destruction of street trees, which residents' impatience, misconduct, and logging are the most important causes of destruction. Much of urban vandalism is rooted in social behavior (Pavlova et al., 2018). These behaviors are manifested in different ways: economic, physical, cultural and environmental (Gomes et al., 2017). Wu et al (2020) showed that tourists can also have destructive effects on public spaces in the city, the most important of which are the destruction of green spaces and parks. As bhati and pearce (2016) emphasize the role of tourism in the destruction of the environment and space. Therefore, vandalism can affect the beauty of the city in different ways. Cities are undergoing many changes as a result of development. Some of these changes are the result of human actions and behaviors (Zavadskas et al., 2019). Citizens have an important role to play in managing property and urban spaces (Webster, 2007). Mushtaha and Hamid (2016) showed that there is a relationship between vandalism and perception factors invoked by the design of public spaces in housing areas. The process of destruction of property and spaces in the city of Chenaran is the main reason and factor in investigating this issue; Because not paying attention and identifying the roots of the problem, can add new challenges in the future. One of the most important problems of the study was the lack of available and analyzable data; because the city of Chenaran did not have a proper information system. Corona and cost constraints have also been effective. Despite these problems and limitations, after available theoretical studies, interviews

and questionnaires were conducted and then analyzes were performed. Vandalism or intentional destruction of public property and belongings is one of the social harms that always causes great damage to society. In communities with a well-organized data system, findings show that different levels of society suffer extensively from these actions, and each year millions of dollars are spent on fixing or replacing objects damaged by vandals (Daghagheleh and Kalhor, 2010; Sturman, 1978). In this regard, the present study intends to investigate the social risks of vandalism and its effects on urban beauty (facades, furniture and urban spaces) in the Chenaran City. Since both the statistics provided by the municipality of this city and the appearance of this city portray the high level of vandalistic behaviors and effects and about 15% of the municipal budget is spent annually on repairing or replacing objects and places damaged from vandalism, which is equal to approximately two thirds of municipal development (Management and Planning Organization of Khorasan Razavi Province, 2019).

Theoretical Foundations

Vandalism

In most definitions offered by experts, vandalism has some points in common: Intentional deed to destroy or damage something that belongs to others (Ceccato and Haining, 2005). Deliberate destruction of the environment without any gaining any benefits (Fuellgrabe, 1980). Feelings of abuse and discrimination play an important role in turning people away, especially adolescents and since vandalism is the most accessible and least punishable method of revenge, people who are exposed to injustice and unkindness are most likely to turn to it (Daghagheleh and Kalhor, 2010). The deviant person embarks on perverting as a result of connections he has with the transgressors. Hamzeh *et al* (2020) also point to the impact of social behaviors and individual motivations on the destruction and occurrence of sabotage and consider sabotage as the result of reinforcing social misconduct. According to Goldstein (2007), who considers the individual-environmental approach as an interactionist view of understanding and predicting human behavior, vandalism is defined by varying degrees of individual-environmental comprehensiveness. In addition to all the economic, social, cultural and political consequences, vandalism

destroys the image of cities and distorts the beauty of cities.

Anthropological effects of vandalism

The anthropological effects of vandalism manifest themselves in the form of various behaviors and patterns. The most important of these behaviors are the destruction of city furniture, reduction of city beauties, financial losses (Ikejemba and Schuur, 2018), destruction of precious works of art, reduction of public services, destruction of citizens' psyche, growth of public distrust (Vorobyeva *et al.* 2015), noted the growth of abnormal behaviors, aggression and disorder (Hosseini *et al.*, 1398) in the peace of citizens. These behaviors ultimately form a single destructive pattern that affects the development of the city and its sustainability. Urban vandalism can be urban furniture and equipment or the artificial urban environment itself, including walls, streets and bridges, terminals, stadiums, hospitals and schools, and even green spaces such as parks and gardens. Another distinguishing feature is the cultural and political aspects of some of the vandalism that take place in cities and may sometimes become part of urban identity; Such as graphic maps, which are now recognized as urban symbols in many parts of the world (Heron, 2003). Due to financial constraints and lack of legal ways to access such facilities, vandalistic behaviors, including the destruction of property and property that fuel the city, as well as destructive behaviors due to cuts and lack of connection with the urban community (Donnermeyer and Phillips, 1982). These behaviors often reflect the young people's desire to express anger and dissatisfaction with abuses, coercion, discrimination, authority, threats to individual freedoms, inequality and injustice. Dominant structures, organizations and institutions of dominant society. In most studies, vandalism is a feeling of abnormality, feelings of abuse, disruption of relationships and family and educational conditions, and the experience of violence in childhood, which affects a person's life satisfaction and reciprocally reinforces a sense of revenge and ultimately a tendency to violence and vandalism. (Alavi *et al.*, 2014).

The beauty of the city

Numerous definitions of urban beauty, or in other words, creating a sense of urban beauty

in the minds of citizens and urban experts have been presented, the most comprehensive of which according to Sternberg (2000) is the pleasure of visual environment in the field of urban design that creates safety, vitality, flexibility, reminiscence, familiarity of space, readability, etc. in the viewer's mind. The main elements of the beauty of the city are: 1- Urban views 2- Urban furniture 3- Urban spaces. Urban view is a collection of all the views in the city, including the view of buildings, the view of city balconies, the view of sidewalks and the margins of squares (Gordon, 1998). According to Sternberg (2000), some of the characteristics of beautiful and desirable views of the city from the citizens' point of view are: safety, vitality, flexibility, reminiscence, familiarity of space and readability. Urban furniture means devices that are installed in open spaces in the city which are available for public use (Shurcheh, 2016). The term urban furniture encompasses a wide range of devices, including: objects, devices, symbols, sub-structures, spaces and elements that are installed on the street and in the entire open space of the city and are used for general purposes (Long, 2008). Mosaddad and Hashemi (2010) believe that urban furniture is a reflection of urban culture, which can be used to make chairs and benches, bus stops, trash cans, billboards and bulletins and urban symbols pointed out and

highlighted. Urban space is, in fact, nothing but the everyday life of citizens, which is consciously and unconsciously perceived every day on the way from home to work. Also, urban space is an organized and orderly structure that has become a physical context for human activities and has the ability to carry social relations and cultural goals (Pakzad, 2013). According to Zucker (1970), urban space is a structured, well-organized, orderly structure; and is based on certain rules, which is the relationship between the body shape of enclosing and unified buildings. In the most popular category, Long (2008) named different types of urban spaces as follows: 1- Public spaces, 2- Private spaces, 3- Semi-public-semi-private spaces. Public territory was defined in terms of the possibility of public access. According to Zucker (1970), the public domain is made up of places and connections that are accessible to all, such as squares, streets, and parks. Spots that only certain people have the right to use them are called private spaces. Long (2008) indicated that Semi-public-semi-private spaces are mostly related to apartments and these spaces have both private and public aspects of ownership. The conceptual model of research is shown in Fig. 1.

The purpose of this study is to investigate the effects of vandalism on the beauty of Chenaran City and also to identify Examples, types and reasons for

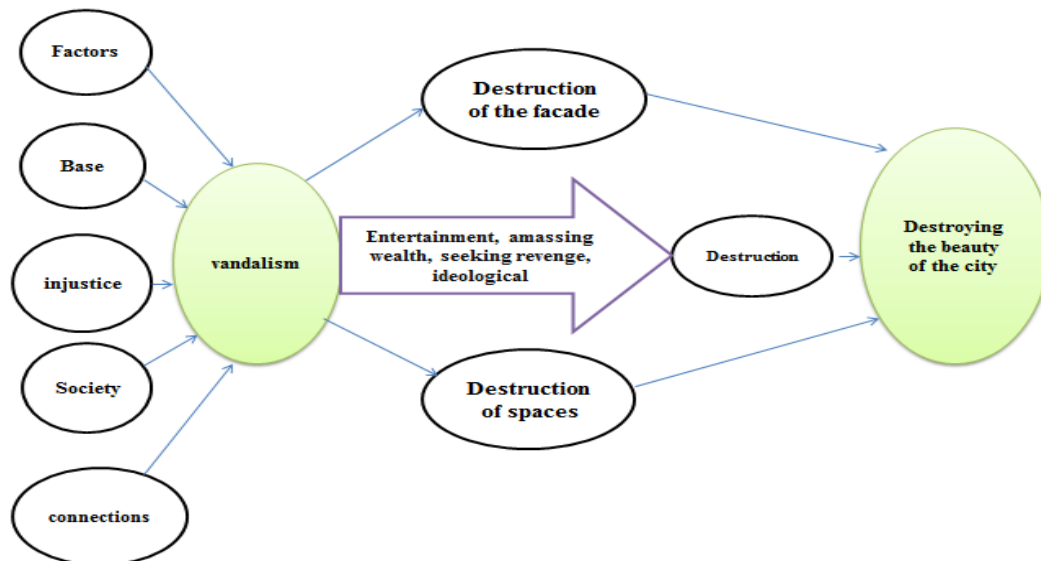


Fig. 1: Conceptual model of research

vandalism. The reason for choosing this issue was the importance of the destruction in this city and the decline of the beauty of the city, which can be well seen over the past few years. The current study have been carried out in Chenaran City in 2021.

MATERIALS AND METHODS

Analytical framework

This research is an applied research in terms of purpose and is quantitative-qualitative in terms of implementation according to the type of subject. The data related to the field part of the research were collected first by using semi-structured interviews with geography and urban planning specialists and sociologists and then by distributing a questionnaire among the citizens of Chenaran. The mechanism of work was as follows: First, through interviews in 4 focus groups of 4 people, which included 16 people, the causes, forms and examples of social risk of vandalism were identified and classified using interview analysis in NVIVO 7 software. The interview questions in the aforementioned section included the following 4 questions: 1. what are the examples of urban vandalism in the city of Chenaran? (20 minutes)

2. What are the types of urban vandalism in Chenaran City? (20 minutes). What are the effects of vandalism on urban beauty in Chenaran? (30 minutes) 4. What are the reasons for urban vandalism in Chenaran? (30 minutes). Then, using this information obtained in the qualitative section, a questionnaire with a Likert scale was prepared and distributed among a sample of 382 citizens of Chenaran City. Pearson correlation coefficient and regression analysis model were used to analyze the quantitative data in SPSS software.

Study area

Chenaran City with an area of 3350 square kilometers is situated in 75 km northwest of Mashhad and in the north of Khorasan Razavi province, located at longitude of 29, 58 to 39, 59 and latitude of 16 and 36 to 37 and 52. Chenaran City is the center of Chenaran County and one of the cities of Khorasan Razavi province, which is located 50 km northwest of Mashhad (Fig. 2). The city is located between the Binalood Mountains in northeastern Iran and in Khorasan Razavi province. According to the general population and housing census in 2016, the population of this city was 53879 people (in 15609 households)

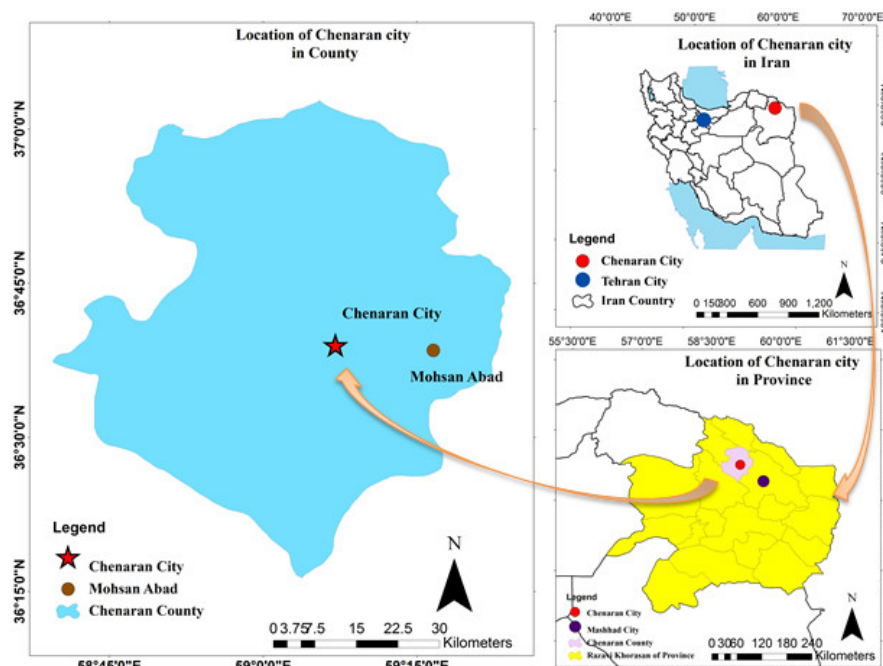


Fig. 2: Geographical location of Chenaran City in Iran

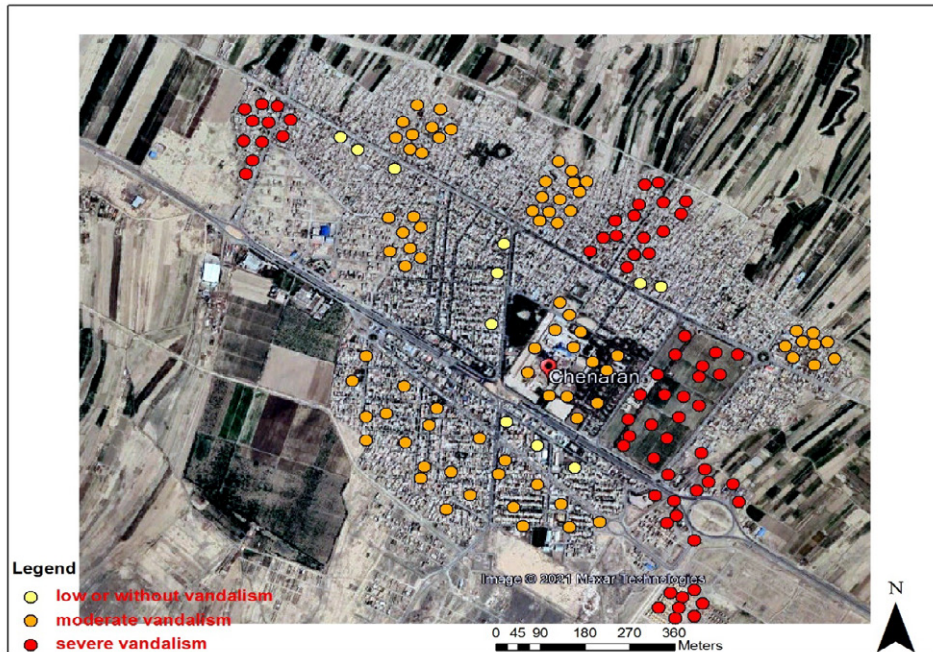


Fig. 3: Distribution of vandalism in urban areas (neighborhoods) of Chenaran City
(Chenaran Municipality, 2020)

(Management and Planning Organization, 2019).

Fig. 3 shows the distribution of vandalism in areas (neighborhoods) of Chenaran City. Red points are as severe vandalism, yellow points as moderate vandalism and other areas as low or approximately without vandalism.

RESULTS AND DISCUSSION

Qualitative findings

Johnson *et al.* (2007) states that qualitative research emphasizes words more than numbers. Qualitative software provides the entire research process electronically to the researcher.

A) Summarizing and analyzing the general content of the interview of the four focus groups for the first question (What are the examples of urban vandalism in the city of Chenaran?) The result showed that the two forms of writing and destruction are the most

important examples (forms) of vandalism in Chenaran City (Table 1). Research (Sturman, 1978) also well presents and confirms the form or destructive factor as an important factor.

B) Summarizing and analyzing the general content of the interview of the four focus groups for the second question (what are the types of urban vandalism in the city of Chenaran?). By answering this question, it becomes clear that recreational vandalism, property gain, Ideological and vengeful are the most important types of vandalism in Chenaran (Table 2). Studies (Yilmaz and Olgun, 2015; Sternberg, 2000) emphasize the importance of different types of urban sabotage and consider urban design as an influential factor in creating this issue. Also in the presented division, recreational and ideological vandalism are mentioned.

Table 1: Instances of vandalism (extracted from the content analysis of focus group interviews)

Row	Instance
1	Text (written)
2	Destruction

Table 2: Types of vandalism (extracted from the content analysis of focus group interviews)

Row	Case	Fig. 4
1	Recreational vandalism	A
2	Acquisitive vandalism	B
3	Ideological vandalism	C
4	Avengers vandalism	D



Fig. 4: Types of vandalism (A,B,C,D)

Table 3: The effects of vandalism on the beauty of Chenaran City (extracted from the content analysis of focus group interviews)

Title	Instance
Destruction of urban views	Writing or destroying sidewalks
	Write or destroy squares
	Destroying fountains
Demolition of urban furniture	Writing or destroying public tables and benches
	Writing or destroying kiosks
	Breaking or plundering street and park lamps
	Breaking boards and posters
	Engraving or breaking trees, destroying grass, flowers and ornamental plants
	Destroy or write on the shelters of taxi and bus stations
Destruction of urban spaces	Destroying or writing on public library properties or plundering them
	Destroying or writing on cinema properties
	Destroying or writing on the properties of mosques and holy shrines or plundering them
	Destroying or writing on shops' properties or plundering them
	Demolition or writing on the properties of private buildings and apartments or plundering them

C) Summarizing and analyzing the general content of the interview of the four focus groups for the third question (What are the effects of vandalism on urban beauty in the city of Chenaran?) Showed destruction of urban landscapes, urban furniture and urban spaces are among the works of vandalism in Chenaran (Table 3). The results of the study (Ghanbari *et al.*, 2017) refer to the effects of vandalism on aspects of urban hospitality, sidewalks, green spaces and parks. Research (Ceccato and Haining, 2005) also emphasizes the destruction of streets and green spaces. Also Hamzeh *et al* (2020) pointed to the impact of social behaviors and individual motivations on destruction. All of this researches well covers and supports the results of this part of the research.

D) Summarizing and analyzing the general content of the interview of the four focus groups for the fourth question (What are the reasons for the existence of urban vandalism in the city of Chenaran?).

The most important reasons for vandalism in Chenaran City are individual factors, Feeling of abuse and discrimination, Communication and

companionship with vandals and inadequate social communication (Table 4), which should be examined with proper tests for more certainty.

Quantitative inferential findings

Regarding the data in Table 5, because the significance level of Pearson coefficient tests are less than the standard level of (0.05), Therefore, all the variables including Socio-economic base, Feelings of abuse and discrimination, Companionship and communication, The degree of socialization and Individual factors affect vandalism. However, socio-economic status, sociability and individual factors have a strong but inverse effect on vandalism. Now, in order to use regression analysis in this research, in the Table 5, the determinants of socio-economic status variables, individual factors, feelings of injustice and discrimination, communication and companionship, and the degree of socialization are shared on the urban vandalism variable. The highest relationship was related to the variables of feelings of abuse and discrimination with a value of 0.76

Table 4: Reasons for vandalism (extracted from content analysis of focus group interviews)

Row	Reasons	
1	Individual factors	Discharge of emotions and inner energies Enjoying these behaviors and achieving a kind of peace of mind Showing insider
2	Feeling of abuse and discrimination	Feeling of injustice and discrimination Feeling powerless and humiliated
3	Social factors	Feeling hated by the general trend of society chaos and weakness of laws Non-internalization of values Lack of belonging to public places
4	Communication and companionship with vandals	Friendship or connection with vicious people Weak social solidarity Existence of the necessary opportunities to commit sabotage

Table 5: One-by-one correlation test of independent variables with dependent variables

Independent variable	Dependent variable	Test	The correlation coefficient	Significance level
Socio-economic base	vandalism	Pearson	-0.73	0.09
Feelings of abuse and discrimination	vandalism	Pearson	0.76	0.007
Companionship and communication	vandalism	Pearson	0.68	0.012
The degree of socialization	vandalism	Pearson	-0.66	0.014
Individual factors	vandalism	Pearson	-0.61	0.017

and then meetings and communication with 0.68. The results of the research [Ramezani and Servati \(2017\)](#) also refer to socio-economic factors such as economic status, characteristics of citizens and the type of communication in public spaces. The research of [Sojasi Qeidari et al \(2020\)](#) refers to the relationship of local community with various characteristics such as empathy and communication.

The correlation of all independent variables with the dependent variable is indicated by the symbol (R) as resultant. As can be seen in [Table 6](#), this value is calculated to be 0.794, which is in fact the resultant of 5 effective variables of socio-economic status, individual factors, feelings of abuse and discrimination, communication and companionship, and the degree of socialization on the variable of urban vandalism which is obtained by regression method. In fact, the analysis is based on squares (R), that is R² or coefficient of determination, the value of which in this research has been acquired 0.630. This value indicates that in the present study, 63% of the changes in vandalism rate are due to the relationship between a linear combination of independent

variables and the remaining 37% or Coefficient of Non-Determination are derived from other factors which have not been considered in the research. Research results ([Ramezani and Servati, 2017](#); [Mosaddad and Hashemi, 2010](#); [Johnson et al, 2007](#)) also emphasize these variables and consider various physical and socio-economic factors as independent variables in the dependent variable. Therefore, paying attention to these types of relationships and influences can help urban vandalism.

In [Table 7](#), the F test also shows R² statistically significant at a very high level (000). This means that the regression of Y (dependent variable) with X (independent variables) is statistically significant.

Additionally, in [Table 8](#), the predictive power of each of the independent variables is investigated according to the order in which they are included in the regression equation. The highest prediction or impact was related to the variable of feelings of abuse and discrimination with a value of 0.168 and then the variable of meetings and communication with 0.161. The research results of [Johnson et al.\(2007\)](#); [Pakzad \(2013\)](#); [Yilmaz and Olgun \(2015\)](#) overlap with

Table 6: Explanatory model of regression

Standard estimation error	Modified correlation coefficient	Squared correlation coefficient (The coefficient of determination)	The correlation coefficient (Result of independent variables with dependent variables)
0.603	0.794	0.630	0.794

Table 7: Regression analysis of variance

Title	Summary of squares	Degree of freedom	Average square	F test	Level of significance
Regression	32.150	5	3.931	11.831	0.000
Remainder	84.051	284	0.411	***	***
Total	117.389	293	***	***	***

Table 8: Input phases and output results of variables in regression analysis

Input stage	Effective variables	The correlation coefficient	The squares of the correlation coefficient
1	Individual factors	-0.145	0.021
2	The degree of socialization	-0.154	0.024
3	Companionship and communication	0.161	0.026
4	Socio-economic base	-0.166	0.027
5	Feelings of abuse and discrimination	0.168	0.028
-	Total	0.794	0.630

the results of this part of the research. The variables of communication, discrimination, characteristics of citizens, economic status and individual characteristics are recognized as independent variables and their important role in urban vandalism is emphasized.

This research showed that vandalism occurs in different ways and can affect the body and form of the city. In other words, it creates a kind of incomprehensible form and content in the city. The result of this research is consistent with the results of research [Sternberg \(2000\)](#) on the importance of design and points to the role of design in the management of vandalism. Also, the research of [Ghanbari et al \(2017\)](#); [Ceccato and Haining \(2005\)](#) overlapped with the part of the research that emphasizes the effects of vandalism on urban furniture, sidewalks and green spaces. Also, research [Johnson et al \(2007\)](#) ; [Webster \(2007\)](#) ; [Bahti and Pearce \(2016\)](#) ; [Richardson and Shackleton \(2014\)](#), support the results of research on the importance of economic base variables, discrimination and communication. Therefore, the role of these variables in vandalism cannot be mentioned. In addition, individual and social characteristics are also influential in urban vandalism and can exacerbate the issue that research [Pavlova et al \(2018\)](#) and [Gomes et al \(2017\)](#) well support this part of the research. Therefore, it should be noted that vandalism is influenced by various variables that affect it, and these variables are exacerbated as a result of social behaviors. The result of this action is the decline of the beauty of the city.

CONCLUSION

Vandalism or deliberate destruction of public property and belongings is one of the social Hazards that always causes great damages to the facades, furniture and urban spaces and distorts the beauty of the city. Intentional deed to destroy or damage something that belongs to others, is called vandalism. In other words, deliberate destruction of the environment without any benefit. The present study investigated the dangers of vandalism and its effects on urban beauty in the city of Chenaran. This research has been done in two ways Qualitative and quantitative method. The result showed that socio-economic status, degree of socialization, feelings of injustice and discrimination, association with vandals and individual factors affect vandalism. These factors can affect the beauty of the city and create different

social, physical, economic and environmental consequences. According to the results, the prime examples of vandalism included destructive vandalism and written vandalism. In the present study, it was realized that the written form of vandalism could also be taken into account which rather distorts the beauty of the environment than its destruction. One of the most important recreational vandalism is to target park or street lamp glass bubbles for pleasure. Also, removing traffic signs, car logos, signs and public telephones are the most important property vandalism. The graffiti, slogans and the destruction of property with the intention of revenge were known as the most important ideological vandalism and revenge. The effects of vandalism on the beauty of City have also included the destruction of facades, furniture and urban spaces. Vandalism has reduced the quality of life in the city by destroying facades, furniture and urban spaces. By growing aggression and violence in cities, not only reduces the workload and public use of recreational places, but also is influential in increasing the feeling of fear and unrest and abnormality all around the city. Economic losses are one of the most important and obvious damages of vandalism that every year a large part of the budget of City is to spend on repairing and rebuilding destroyed equipment. In addition spending money economically, citizens are deprived of public facilities for a long time so that public facilities can be repaired and rebuilt and consequently citizens can use them again after a while. This lost time from the use of public facilities leads to dissatisfaction and distrust of the people of the urban management and social capital in the studied city. Also, the results showed that socio-economic status, degree of socialization, feelings of injustice and discrimination, association with vandals and individual factors, affect vandalism. Feelings of injustice was the most influential among the mentioned variables. According to the results of the investigation, it is suggested that the damaged equipment be reconstructed, repaired and fixed as soon as possible after informing the relevant authorities; Because according to the theory of broken windows, if there is a proper and organized environment, vandalism is less likely to occur in it, and conversely, if the environment is damaged or ruined, like a house whose windows are broken, people are encouraged to break the rest of the windows. Besides, rising the number of social counseling centers in

the neighborhoods and schools for counseling and psychotherapy of vandals can be effective and beneficial. Countering vandalism requires special measures such as increasing participation and social responsibility, advertising and raising the awareness of the public through the media, internalization of citizenship culture and education, which mostly target the efficiency of the functions of municipal society. It is suggested that future researches study the anthropological aspects of vandalism and its effects in a more comprehensive way.

AUTHOR CONTRIBUTIONS

S. Arefpour, performed the literature review, experimental design, analyzed and interpreted the data, prepared the manuscript text, and manuscript Edition M.R. Anvari performed the experiments and literature review, compiled the data and manuscript preparation. G.R. Miri helped in the literature review and manuscript preparation.

ACKNOWLEDGEMENT

The authors are extremely grateful to the experts and scientific elites in the field of interview, as well as the citizens of Chenaran city for completing the questionnaire.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

According to the authors of the present study, there wasn't any conflicts of interest.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the

material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

REFERENCES

- Alavi, A.; Hosseini, M.; Ebrahimi, M., (2014). Investigating the effect of urban environment quality on vandalistic behaviors (Case Study: Mashhad). *J. Pol. Geo.*, 2(8): 51-76 **(26 pages)**. (In Persian)
- Bakhtiyari, A., (2017). Preventing vandal behaviors by emphasizing on environmental design methods (Case study: Mashhad metropolitan). *Int. J. Sci. Eng. Res.*, 8(5): 683-701 **(19 Pages)**.
- Bhati, A.; Pearce, P., (2016). Vandalism and tourism settings: An integrative review. *Tour. Manage.*, 57(4): 91-105 **(15 pages)**.
- Ceccato, V.; Haining, R., (2005). Assessing the geography of vandalism: Evidence from a Swedish City. *Urban. Stud.*, 42(9): 1637-1656 **(20 pages)**.
- Chapman, D., (2015). Creation of neighborhoods and places in man-made environment. Translated by Sh. Faryadi and M. Tabibian. University of Tehran press **(318 pages)**. (In Persian)
- Daghagheleh, A.; Kalhor, S., (2010). Urban injuries in Tehran. Tehran. Sociologists' publication **(282 pages)**. (In Persian)
- Donnermeyer, J.; Phillips, G., (1982). Vandalism and Its Impact on the Rural Victim - The Case of the United States. Paper presented at the International Colloquium on Vandalism, Paris, France, and October 27-29. United States of America **(41 pages)**.
- Farinella, D.; Saitta, P., (2019). The endless reconstruction and modern disasters. Palgrave. Macmillan, Cham publication **(290 pages)**.
- Fuellgrabe, U., (1980). Psychological analysis of vandalism. *Sch. Der. Poliei. Fuehrun.* 2(1): 148-161 **(14 pages)**.
- Ghanbary, A.; Tahooni, M.; ghaderi, N., (2017). Investigating the influential factors of vandalism in urban furniture of Tabriz. *Geo. Urban Plann. Res.*, 4(4): 569-586 **(18 pages)**. (In Persian)
- Giusti, C.; Colombini, M.; Tenorio, A.; Nasa, J.; Striova, J.; Salvadori, B., (2020). Graphic vandalism: Multi-analytical evaluation of laser and chemical methods for the removal of spray paints. *J. Cult. Heritage.* 44(3): 260-274 **(15 pages)**.
- Goldstein, A.P., (2007). The psychology of vandalism. Springer Press **(308 pages)**.
- Gomes, V.; Dionisio, A.; Pozo-Antonio, S., (2017). Conservation strategies against graffiti vandalism on cultural heritage stones: Protective coatings and cleaning methods. *Prog. Org. Coat.*, 113(4):90-109 **(20 pages)**.
- Gordon, K., (1998). Selected urban landscape. Translated by M.Tabibian. University of Tehran Publishing Institute **(206 pages)**. (In Persian)
- Hamzah, H.; Othman, N.; Hussain, N.H.M., (2020). Setting the

- criteria for urban tree vandalism assessment. *Plann. Malaysia.*, 18(4): 12-32 **(21 Pages)**.
- Heron, E., (2003). Vandalism in a South African township: an exploratory study of criminal damage to the built environment in Manenberg, Western Cape. a thesis submitted to the faculty of engineering and the built environment University of Cape Town, Master of Philosophy **(223 pages)**.
- Hosseini, M.R.; Navabakhsh, M.; Rahimi, Z., (2019). Sociological study of the effect of lifestyle on aggression and urban vandalism of adolescents and youth in Lorestan province. *Sociol. Cult. Stud.*, 2(32): 1-27 **(27 pages)**. (In Persian)
- Ikeiemba, E.; Schuur, P., (2018). Analyzing the impact of theft and vandalism in relation to the sustainability of renewable energy development projects in Sub-Saharan Africa. *J. Sustain.*, 10(3): 1-17 (17 pages).
- Johnson, R.B.; Onwuegbuzie, A.J.; Turner, L.A., (2007). Toward a definition of mixed methods research. *J. Mix. Method. Res.*, 1(2): 112-133 **(22 pages)**.
- Karimian Bostani, M.; Sadeghi, M.; Aghai, A., (2017). The impact of the juvenile vandalism in the public urban space. The case of Parsabad's City in Iran. *J. Espacio Abierto*, 26(4): 49-61 **(13pages)**.
- Long, J., (2008). City design and architecture. Translated by S.H. Bahreini. University of Tehran press **(536 pages)**.
- Management and Planning Organization of Khorasan Razavi Province, (2019). Socio-economic and cultural report of the cities of Khorasan Razavi province. Mashhad **(400 pages)**. (In Persian)
- Mosaddad, S.H.; Hashemi, M., (2010). A review of criteria for designing and manufacturing urban furniture. *J. Manzar*, (2) 7: 72-73 **(2 pages)**. (In Persian)
- Mushtaha, E.; Hamid, F., (2016). The effect on vandalism of perception factors related to housing design, case of UAE Cities. *J. Asian. Archit. Build. Eng.*, 15(2): 247-254 **(8 pages)**.
- Pakzad, J., (2013). Phenomenology of residential buildings and the evolution of expectations from it. *J. Beaut. Art.*, 14(14): 51-62 **(12 pages)**. (In Persian)
- Parliamentary Research Center, (1983). Law on definitions and criteria of country divisions. Tehran. Publication of parliamentary research **(14 pages)**. (In Persian)
- Pavlova, N.; Pavlov, Y.; Zlokazov, K., (2018). Visual perception of urban vandalism. *Int. J. Psychophysiol.*, 131: 121-140 **(20 pages)**.
- Ramezani, A.; Servati, H.R., (2017). Typology and prevalence of vandalistic behaviors of citizens of district one of Hamedan and its effects on urban furniture, *J. Soc. Sci. Letter.*, 26(1): 28-38 **(11 pages)**. (In Persian)
- Richardson, E.; Shackleton, C., (2014). The extent and perceptions of vandalism as a cause of street tree damage in small towns in the Eastern Cape, South Africa. *Urban. Forest. Urban. Green.*, 13(3): 425-432 **(8 pages)**.
- Sojasi qeidari, H.; kheirabad, H.; mahmood, H.; Hajipou. M., (2020). Vandalism and sense of local belonging in rural areas of Birjand. *Iran. J. Soc. Prob. Iran.*, 1(11): 89-122 **(34 pages)**. (In Persian)
- Sternberg, E., (2000). An integrative theory of urban design. *J. Am. Plann. Assoc.*, 66(3): 265-278 **(14 pages)**.
- Sturman, A., (1978). Measuring vandalism in a city suburb (from tacking vandalism, 1978 by R V G Clarek-See NCJ-53090). United Kingdom. Majesty's Stationery Office **(10 pages)**.
- Vorobyeva, I.V.; Kruzhkova, O.V.; Krivoshechkova, M.S., (2015). The genesis of vandalism: from childhood to adolescence. *Psychol. Russia*, 8(1): p.139.
- Webster, C., (2007). Property rights, public space and urban design. *Town. Plann. Rev.*, 78(1): 81-101 **(21 pages)**.
- Wu, J.H.; Lin, H.W.; Liu, W.Y., (2020). Tourists' environmental vandalism and cognitive dissonance in a National Forest Park. *J. Urban. Forest. Urban. Green.*, 55(2): 46-57 **(12 pages)**.
- Yilmaz, T.; Olgun, R., (2015). Investigation of the differences between factors affecting vandalism in urban green areas. *Indoor. Built. Environ.*, 25(4): 618-625 **(8 pages)**.
- Zavadskas, E.; Bausys, R.; Mazonaviciute, I., (2019). Safety evaluation methodology of urban public parks by multi-criteria decision making. *Landscape. Urban. Plann.*, 189(2): 372-381 **(10 pages)**.
- Zucker, P., (1970). Town and square, from the agora to the village green. Mghil USA. MIT Press **(287 pages)**.
- Zhou, X.; Ma, J.; Dong, X., (2018). Empowering supervision and service sabotage: A moderated mediation model based on conservation of resources theory. *Tourism Manage.*, 64: 170-187 **(18 pages)**.

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Arefpour, S.; Anvari, M.R.; Miri, Gh.R. (2022). An investigation into vandalism and its effects on urban beauty. *Int. J. Hum. Capital Urban Manage.*, 7(3): 405-416.

DOI: 10.22034/IJHCUM.2022.03.09

url: http://www.ijhcum.net/article_252192.html



International Journal of Human Capital in Urban Management
(IJHCUM)

Homepage: <http://www.ijhcum.net/>

CASE STUDY

Direct and indirect analysis of contamination levels in lakes of two adjacent areas

J. Figueroa Jiménez^{1,*}, N. Guerrero Del Castillo¹, J.C. Musa Wasil¹, K. Malavé Llamas², C. Morales Agrinzoni³

¹ Ana G Méndez University, Virtual Campus, San Juan, Puerto Rico

² Ana G Méndez University, Carolina Campus, Carolina, Puerto Rico

³ Ana G Méndez University, Cupey Campus, San Juan, Puerto Rico

ARTICLE INFO

Article History:

Received 25 October 2021

Revised 14 February 2022

Accepted 29 May 2022

Keywords:

Chlorophyll-a

Secchi Disk

Total Phosphorus

Trophic Status

ABSTRACT

BACKGROUND AND OBJECTIVES: In the state of Florida there are more than 2.5 million acres of fresh water available; rivers, streams, springs, artificial canals, wetlands, and lakes. Polk and Osceola Counties are under a class III classification, which means that are considered recreational waters, and people can carry out fishing and/or swimming activities within the facility. Some of the problems these lakes face is eutrophication due to pollutants such as phosphorous, nitrogen, and growth of cyanobacteria, impacting directly the quality and public health. The aim of this analysis is evaluating the effect of the presence of Total phosphorus and Total nitrogen in the water quality, and an indirect analysis of cyanobacteria by the evaluation of Secchi Disk and Chlorophyll-a analysis, in order to identify statistically differences between two counties in Florida state, to contribute with a possible improvements and ecological buffer plan to be used to reduce pollution in the lakes of the state of Florida.

METHODS: Based on this premise, it is intended to analyze secondary data on the quality of the water in the lakes of Polk and Osceola counties by evaluating the trophic status in each lake, and statistically evaluated using ANOVA, histograms and pareto analysis.

FINDINGS: Results obtained determined that lakes from Osceola County are more contaminated than lakes from Polk County since it has three lakes in eutrophic status vs two lakes in eutrophic conditions at Polk County (from 52-69 for Osceola County and 42-59 for Polk County). Similar pattern is observed when evaluating histograms and pareto plots for each parameter between the counties. ANOVA test showed that $F > F_{critical}$ and $p-value < \alpha$, demonstrating that there is difference between both counties.

CONCLUSION: After the analysis was completed, it is recommended an evaluation by zone and improve water quality. It has been demonstrated that there is a need of new alternatives for the conservation and preservation of lakes in the state of Florida. Buffer zones are an alternative that can be very beneficial to conservation of lakes functioning also as a natural home for the flora and fauna. For the zone studied, it is recommended the use of Riparian buffers. These systems are known to improve and maintain water quality; at the same time protecting and improving fish and wildlife habitat.

DOI: [10.22034/IJHCUM.2022.03.10](https://doi.org/10.22034/IJHCUM.2022.03.10)



NUMBER OF REFERENCES

31



NUMBER OF FIGURES

8



NUMBER OF TABLES

3

*Corresponding Author:

Email: janelisf@yahoo.com

Phone: +7873428556

ORCID: [0000-0002-0883-6211](https://orcid.org/0000-0002-0883-6211)

Note: Discussion period for this manuscript open until October 1, 2022 on IJHCUM website at the "Show Article."

INTRODUCTION

Lakes are one of the most important water resources and have been used as a source of water supply for human consumption and represent approximately 0.3% of the total sources of surface water bodies (Vasistha and Ganguly, 2020). For example, the Great Lakes serve as the domestic water supply for 24 million Americans. Many people in the United States rely on man-made reservoirs and lakes as their source of drinking water (Toccalino and Hopple, 2010). Lakes moderate temperatures and affect the climate of the surrounding land (National Research Council, 1992). Depending on their use lakes are classified into three groups: recreational waters which are used for fishing and swimming activities are placed in Class III whereas water used for culturing shellfish are categorized as Class II and Class I waters can be used for drinking and swimming and fishing (Florida Department of Environmental Protection, (FDEP), 2021). Eutrophication is one of the problems that lakes face, which is the process of physical, chemical, and biological changes associated with the enrichment of nutrients, organic matter, and silt from a lake (United States Geological Survey (USGS), 2021). It is considered as the main cause of the degradation of lake ecosystems causing problems such as algal blooms due to excess phosphorus and nitrogen. Other problems are the presence of bacteria harmful to human health, sedimentation, oxygen depletion, change of species, changes in water levels, and growth of aquatic plants. Human activities can accelerate eutrophication by increasing the rate at which nutrients enter the water. All these problems intervene with the water quality of the lakes and in many cases are caused by anthropogenic activities (USGS, 2021). Pollutants such as phosphorus cause excessive algae growth and are among the largest contributors to water quality problems in Florida along with Nitrogen. Nitrogen and Phosphorus are essential nutrients for animals and plants to grow and are naturally found on aquatic ecosystems (Vanni, 2002) however, excess of these nutrients can cause overstimulation of the growth of algae and aquatic plants. These nutrients cause algal blooms and can be harmful to humans and animals thus becoming one of America's most widespread, costly, and challenging environmental problems (EPA, 2017). Too much Nitrogen as Nitrate can be harmful to humans and livestock. Nitrate can enter the water directly because

of runoff from nitrate-containing fertilizers. Nitrate can cause problems to marine life and human health, producing diseases such as colorectal cancer, thyroid disease, and neural tube defects (Ward et al, 2018). On the other hand, cyanobacteria are quite common in Florida's waters and are one of the biggest causes of pollution. For some people, blue-green algae can cause rashes, stomach cramps, nausea, diarrhea, and vomiting (Florida Health, 2019). People who are very sensitive to odors may have respiratory irritation. Also, high exposures to toxins can affect the liver and nervous system. An example of pollution in lakes is the presence of cyanobacteria. Cyanobacteria can produce neurotoxins that affect the nervous system, hepatotoxins that affect the liver, and dermatotoxins that affect the skin (EPA, 2019). Exposure to contaminated lake water can cause many diseases such as gastrointestinal was experienced by more than 403,000 residents of the Metropolitan area of Milwaukee, Wisconsin, and illness from *Cryptosporidium parvum* parasites (Pandey, 2014). Although in developed countries there are more regulations and laws for the protection of bodies of water, pollution has not stopped being a problem (Rogers and Hall, 2003). Effective water governance (Vol. 7). Stockholm: Global water partnership. In the state of Florida there are more than 2.5 million acres of freshwater available; rivers, streams, springs, artificial canals, wetlands, and lakes. As described in an article published in Schiffer (1998), seeing the state from the air will give the impression that there is more water than land. The lakes are among the most valuable natural resources of central Florida and its economy. It has more naturally formed lakes (7,800) than other states in the southeastern United States, where many lakes are created by building dams across streams. Thirty-five of these lakes are in 4 counties, including Polk County and Osceola Count. In both counties, all lakes are class III (FDEP, 2021). Trophic states of Florida lakes range from oligotrophic to hypereutrophic, due in part to deposits of phosphatic materials in some soils (Griffith et al., 1997; Bachmann et al., 2012a). At least 70% of Florida lakes have no surface inlet or outlet (Bachmann et al., 2012a). The lakes are warm all year, and only some northern Florida lakes experience rare instances of overnight freezing of the lake surface (Bachmann et al., 2012a). Considering that lakes can be the water supply for communities and cities, the

conservation of lakes is necessary. The quality of the water must be constantly monitored, and the input of nutrients must be restricted to avoid the excessive growth of algae. It is also important to create solid water management plans and design projects for the conservation of lakes such as buffers zones. In addition, they can cause skin irritation, swelling of the lips, irritation of the eyes, sore throat, sneezing, runny nose, and fatigue after swimming in affected lakes. Many diseases are related to consumption or contact with contaminated water. For example, "Waterborne infections cause diarrhea and kill nearly a million people each year. Most are children under the age of five. Therefore, evidence is needed on the exposure and health effects of contaminant mixtures in drinking water" (Levallois and Villanueva, 2019). Water quality is paramount for public health and point source pollution has been a problem in the past because some lakes were once recipients of sewage effluents or other organic materials such as waste from citrus processing, although those point sources have been largely controlled (Bachmann *et al.* 2012a). It is not clear, due to insufficient information and documentation, the overall impact of nonpoint source nutrient enrichment on Florida lakes (Bachmann *et al.*, 2012c). Even when the state of Florida has been aggressive in nonpoint control activities (Bachmann *et al.*, 2012a) currently the state faces an environmental problem in terms of its water resources. Over ten years period over 20 million dollars has been spent collecting and analyzing data related to concentrations and impacts of nitrogen and phosphorus pollution in Florida. However, they have not been able to stop water quality degradation from nitrogen and phosphorus over-enrichment and it's still a significant problem (EPA, 2017). Several groups of toxic cyanobacteria have been found in Florida waters. The Microcystis, Anabaena, and Cylindrospermopsis groups and their associated toxins occur in Florida freshwater systems, including those used for drinking water. The presence of cyanobacteria has affected many aquatic systems in Florida including lakes (Tonnessen, 2019). Some of the health effects produced by the accidental ingestion of water contaminated with cyanobacteria are nausea, vomiting, and, in severe cases, acute liver failure (FFWCC, 2019). Understanding the environmental and socio-economic importance that lakes have for the state of Florida, their conservation

is imperative. Invasive aquatic species, pollution, coastal and watershed development, and storm water problems threaten the health and water quality of Florida's lakes. Water contains many nutrients and minerals and is essential for human life, nonetheless, urbanization and agricultural alteration of formerly natural watersheds has resulted in unsustainable nutrient over-enrichment with water quality decline, harmful, algal bloom, habitat loss, and loss of fisheries being well-reported symptoms of ecosystem decline and collapse (National Research Council, 1992). In recent years, strict regulations and control have increased rapidly in monitoring the surface water bodies due to their deterioration (Vasistha and Ganguly, 2020). As stated by the Osceola Lakes Management Plan (2015), the Florida Department of Environmental Protection measurements establishes that there are 47 impairments listed for Osceola County water bodies, 18 for mercury and the rest for low dissolved oxygen, high fecal coliform levels, and nutrient impairments. The Osceola Lakes Management Plan also informs that Lakes Kissimmee and Cypress in Osceola County are included on the federal list of impaired and threatened waters 303 (d) list. On the other hand, in the county of Polk, there are 67 lakes included in the 303 (d) list. Among these lakes is Lake Ariana. As reported by the EPA (2017), once a body of water has been added to the list of impaired waters, it is not removed until the state determines the total maximum daily loads (TMDL) and the EPA approved it. It is necessary to establish measures for the protection of lakes and the reduction of anthropogenic activities that affect not only the water quality of the lakes but also public health. According to a publication from Michigan State University (2019) the United States is not protecting its lakes. In fact, it is explained that, in 2010, the Convention on Biodiversity (CBD) declared the need to protect at least 17% of the world's fresh water by 2020 to avoid the rapid decline in freshwater biodiversity and services ecosystems. Let's consider that in 2010 the US Environmental Protection Agency had to set numeric nutrient criteria for Total Phosphorus (TP), Total Nitrogen (TN), and Chlorophyll a (Chl-a) for lakes in the State of Florida after the state did not establish them on its own (Bachmann *et al.*, 2012b). "Several of Florida's 30 benchmark lakes (lakes with minimal human impact and meeting designated uses) were eutrophic, and there was no

significant difference between the mean concentrations of TP and TN in these lakes versus all remaining Florida lakes” (Bachmann *et al.* 2012b). By law, Florida waters are owned by the citizens of Florida. Public access to Florida’s bodies of water is an important and highly protected right. The only way a lake can be considered private is if all the land around the lake is privately owned and there is no access to the water from any public area (Blackmar, 2006). Most of Florida’s great lakes have public boat ramps that have been protected for many years. There are laws at the federal and state level for the conservation of bodies of water and to ensure public health (Borisova *et al.*, 2021). Under section 303 (d) of the CWA, authorized states, territories, and tribes, collectively referred to in the law as “states,” must develop lists of impaired waters, which are those that do not meet established quality standards (National Research Council, 2001). Assessing the TMDL approach to water quality management. National Academies Press.. The law requires states to establish priority classifications for the waters on the charts and to develop Total maximum daily loads (TMDL). A TMDL includes a calculation of the maximum amount of a contaminant that can be present in a body of water and still meet water quality standards. Additionally, as part of the CWA, states are required to establish water quality standards (WQS) for waters within the state by establishing water quality criteria to protect the body of water and adopting requirements to protect and maintain healthy waters. In addition, the Department of Environmental Protection has a series of regulations for the management of water resources. Such is the case of the rule Standards of surface water quality. This regulation establishes the minimum criteria necessary to protect the designated uses of a body of water, the surface water classification, and lists Florida’s specially protected waters. EPA determined under Clean Water Act (CWA) section 303(c)(4)(B) that new or revised Water Quality Standards (WQS) in the form of numeric water quality criteria is necessary to protect the designated uses from nitrogen/phosphorus pollution that Florida has set for its Class I and Class III waters (EPA, 2010). Counties also have their own management plans for the lakes. Polk County is managed by the Southwest Florida Water Management District and Osceola is managed by the South Florida Water Management District. Districts

administer flood protection programs and conduct technical research on water resources to develop water management plans for water scarcity in times of drought and acquire and manage land for water management purposes. Delegated regulatory programs include water use management, aquifer recharge, well construction, and surface water management (Southwest Florida Water Management District, 2018). The natural diversity of lakes in Florida will make individual lakes suited for different uses (Griffith *et al.*, 1997; Bachmann *et al.*, 2012). In Osceola and Polk counties the lakes are used mainly for recreation (swimming or water sports) and fishing. This contamination is often caused by improperly treated wastewater, manure, and fertilizers. The quality of water in lakes has a direct impact on the environmental situation and public health. Based on this premise, an evaluation between the two counties will be performed to see if there is a difference between them, and the contamination can be granted to activities from a county specifically. Given the urgent need that exists to protect lakes and ensure the well-being of public health, it is important to implement new forms of conservation and protection. With this information, a possible remediation plan can be performed to improve the water quality in the area. The Null hypothesis will be that there is no difference between each county, therefore a global plan to improve water quality can be implemented. Conversely, if there is a difference, an evaluation by zone must be performed to create a mitigation plan specific for each area. Using secondary, public access data, it is intended to analyze the water quality using the parameters Total phosphorus, Total nitrogen, and an indirect analysis of cyanobacteria by the evaluation of Secchi Disk and Chlorophyll-a analysis in three lakes in Polk count and three lakes in Osceola County to evaluate the quality of these with respect to their class III water body classification. In addition, possible improvements that can be established or added to the Florida state water bodies’ management plan will be identified. It is also expected to identify what type of buffer zone can be used to reduce pollution in the lakes of the state of Florida. The general objectives of this comparative study are: 1) Analyze secondary public access data on water quality using the parameters of total phosphorus, total nitrogen, secchi disk, and chlorophyll-a for cyanobacteria analysis in two lakes in Polk and Osceola counties to

evaluate the quality of these with respect to their classification as a class III water body; 2) Identify if there is a difference between the results obtained statistically to create improvements that can be made to the Florida state water body management plan; 3) Identify what type of ecological buffer/plants can be used to reduce pollution in the lakes of the state of Florida. This study has been carried out in three lakes in Osceola County and three lakes in Polk County in the state of Florida. In Osceola County the following lakes were evaluated: Kissimmee, Alligator, and Tohopekaliga Lakes. In Polk County the following lakes were evaluated: Blue, Ariana, and Cypress Lakes. The analysis of all these parameters has not been constant, so the period to be evaluated will consist of approximately 8 years that ranges from 2008 to 2015, averaging the results in a yearly basis. Since the analysis of cyanobacteria is only carried out when there is a proliferation of these that represents an environmental and health problem, the average results of each year for Secchi Disk and Chlorophyll-a were evaluated as an indirect analysis for this parameter. The information used to analyze these problems were secondary data and it is available in the public domain. This research was completed in the city of Winter Haven, Florida in 2020.

MATERIALS AND METHODS

The study area

The study deals with three lakes in Osceola and three lakes in Polk counties in the state of Florida. In Osceola County the following lakes were evaluated: Kissimmee, Alligator, and Tohopekaliga Lakes. In Polk County, the following lakes were evaluated: Blue, Ariana, and Cypress Lakes. The subtropical climate of Florida influences lake biology; warm lakes have prolonged growing seasons with a greater probability of long-lasting algal blooms (Bachmann *et al.*, 2012b). In addition, Florida has a different and limnologically important geological history. Florida lakes have deposits of phosphorus-containing minerals that underlie several areas of the state (Bachmann *et al.*, 2012b). These deposits are not distributed uniformly across the state and are related to differences in the TP content of the various orders of soils found in the state.

Study period

The analysis of all these parameters has not been

constant, so the period to be evaluated will consist of a period of approximately 8 years that ranges from 2008 to 2015, averaging the results yearly. As with the majority of studies, the design of the current study is subject to this limitation. However, there is relevance of the data even though it is old because it can be used for reviewing, historical documentation, and comparisons on future analysis and researches. For the analysis of cyanobacteria, since this test is only carried out when there is a proliferation of these that represents an environmental and health problem, the average results of each year for Secchi Disk and Chlorophyll-a were evaluated as an indirect analysis for this parameter. The information used to analyze these problems was secondary data and it is available in the public domain.

Description of the sample

Secondary public access data provided by state environmental agencies were analyzed for this study. For the lakes in Polk County and Osceola County secondary data was analyzed and for Lakes Kissimmee, Jackson and Marian, in Osceola County, are included in the federal list of impaired and threatened waters known as the 303 (d) list. Lake Ariana, Cypress, and Blue Lakes from Polk County were included in the analysis.

Experimental design

In this study, no experimental tests were carried out and no equipment and/or experts are required for the study area. The data used is secondary and publicly accessible.

Statistical analysis

A comparative analysis of the following variables was carried out using independent samples; total phosphorus, total nitrogen, secchi disk, and chlorophyll-a; the last two parameters were used for cyanobacteria analysis. These variables were measured and compared between different lakes in Polk and Osceola counties in the state of Florida by evaluating and identifying their concentrations and confirming which county has the highest presence of these contaminants. ANOVA test was used to determine the difference in the quality of water between Osceola and Polk counties, and Pareto and Histograms charts were used to evaluate the frequency where these parameters are with or

without specification parameters and how the accumulative behaves per interval. In addition, the analysis was able to evaluate which county meets the parameters established at the federal level by the EPA and with the parameters established at the state level.

RESULTS AND DISCUSSION

In the current study water quality parameters using Total phosphorus, Total nitrogen, and analysis of cyanobacteria through Secchi disk were carried out to determine whether these are in compliance with standards set by USEPA for the state of Florida.

General Evaluation

The obtained results of Total Nitrogen (TN) for Osceola County lakes are discussed in (Table 1).

According to the data, sampling is not consistent for all lakes in Osceola and Polk counties. Therefore, average results were evaluated for all lakes. Two lakes conformed to the state specification for total nitrogen: Lake Alligator and Tohopekaliga for Osceola County and Cypress Lake for Polk County.

These lakes, even though the results are within the specification, these values are increasing every year. Lake Kissimmee and Lake Blue had high results for TN, especially Blue Lake that triplicated the results during 2009-2011. Lake Ariana results oscillate in and out of specification with a spike in 2011 and then started to decrease by 2012 and increase again by 2013. According to Florida rule 62-302.531 effective on February 17, 2016 the state parameters are as follow: Chlorophyll a = 20 µg/L, Total Phosphorus = 0.03mg/L or 30 µg/L, Total Nitrogen = 1.05mg/L or 1050 µg/L and Secchi Disk = 2.4 m. Secchi Disk average results showed that for Kissimmee (from 2010-2012) and Cypress Lake (from 2009-2013) results conformed to the specification. The lakes had more transparency than the rest of the lakes evaluated. Osceola County had more visibility than Polk County lakes. Lake Blue had the lowest results which mean that there is barely visibility (Table 1). Chlorophyll-a average results do not have the same number of samples for all lakes. Lake Alligator and Lake Tohopekaliga are missing a significant number of samples considering the years and data used for analysis. For Osceola

Table 1: Osceola and Polka Counties TN, TP, Chl-a, and SD Average Result for each year

County	Lake	Test Analyzed	Year (Y)							
			2008	2009	2010	2011	2012	2013	2014	2015
Osceola	Kissimmee	TN ≤1050 µg/L	1521	1404	1103	1204	1228	1222	1231	1173
	Alligator		532	1035	1028	704	903	794	644	778
	Tohopekaliga		701	943	838	762	1063	734	733	895
	Blue		2655	3720	2543	3165	2370	2693	2315	2223
Polk	Ariana	SD ≥ 2.4 m	1019	1108	1550	1599	1165	1285	1344	1323
	Cypress		817	712	618	717	774	7079	824	828
	Kissimmee		1.2	1.9	2.7	2.7	2.5	2.3	2	1.8
Osceola	Alligator	SD ≥ 2.4 m	2	1.1	1.1	1.2	1.2	1.6	2.2	1.5
	Tohopekaliga		0.9	0.9	1.1	1.4	0.8	1	-	0.5
	Blue		0.4	0.3	0.5	0.3	0.6	0.4	0.4	0.4
Polk	Ariana	Chl-a ≤ 20 µg/L	0.9	1	0.8	0.7	0.8	0.8	0.7	0.8
	Cypress		2	2.8	4.5	4.4	2.8	2.8	2.3	3.7
	Kissimmee		33	21	16	22	27	24	28	26
Osceola	Alligator	TP ≤160 µg/L	9	-	-	25	-	-	-	44
	Tohopekaliga		9	6	8	4	5	2	-	5
	Blue		80	133	65	78	52	64	56	65
Polk	Ariana	TP ≤160 µg/L	25	21	31	44	27	26	28	31
	Cypress		6	5	3	4	7	7	7	3
	Kissimmee		53	42	42	47	54	46	49	48
Osceola	Alligator	TP ≤160 µg/L	12	23	21	17	19	16	13	18
	Tohopekaliga		23	23	22	18	25	16	16	22
	Blue		72	92	62	63	56	69	53	54
Polk	Ariana	TP ≤160 µg/L	23	23	31	28	23	26	25	24
	Cypress		10	12	7	7	10	10	9	14

County, Lakes Kissimmee and Alligator are above the established parameters. Lakes Ariana and Blue do not meet the state criteria. Even though Cypress Lake and Tohopekaliga lakes are in compliance with the parameters, the results lowered in 2010 - 2011 and then start increasing after this period. The Total Phosphorus (TP) results can be observed in. For this specific parameter, Lake Blue in Polk County was consistently out of the acceptable parameters. Lake Ariana showed a spike in TP by 2010 but the remaining years are within specification parameter but with the results close enough to have keep an eye on it since it is in a critical state. For Alligator Lake, Tohopekaliga Lake, and Cypress Lake, results oscillate. These values increase up to 2010 and then start decreasing. By 2012 there was another spike and right after, the total phosphorus results start decreasing. Per USEPA, any lake with an alkalinity >20 mg/L as CaCO₃ is out of compliance if the water has an average chlorophyll concentration >20 µg/L, which would classify the lake as eutrophic by the USEPA's definition. For Florida lakes with an alkalinity ≤20 mg/L, the lake must meet oligotrophic criteria, with an average chlorophyll concentration no greater than 6 µg/L, to be in compliance. According to Bachmann et al. 2012b, when applying these criteria, 44% of Florida's lakes are considered impaired. Lakes from Osceola County are more contaminated that lakes from Polk County since it has three lakes in eutrophic status. In contrast, Polk County has two lakes in eutrophic conditions

and one in mesotrophic conditions. Lake Blue is almost under hypereutrophic condition. TSI (Chl-a) and TSI (SD) are under hypereutrophic condition and TSI (TP) is under eutrophic condition (Table 2). Since this lake has the worst-case scenario, the data obtained was evaluated against the correlations table from Carlson and Simpson (1996). As per this evaluation, $TSI(SD)=TSI(Chl-a)>TSI(TP)$. Therefore, phosphorus limits algal biomass ($TN/TP>33:1$). For this lake, TN/TP results are between 37 to 50, results higher than 33:1. After evaluating these results, the same analysis was performed for the remaining lakes (Table 3). Results showed that all lakes had the same correlation at some point during the period of analysis. For macrocystis, a provisional Tolerable Daily Intake (TDI) and guidance values have been established. The suggested drinking water guidance value, per the World Health Organization (WHO), is 1 µg L⁻¹, and a recreational guidance value of 20 µg L⁻¹ for activities in direct contact with water, and 100 µg L⁻¹ for activities having indirect contact with water (Bigham Stephens et al., 2009).

Comparison of results

Histograms and Pareto plots were compared for each parameter between the counties (Figs. 1-8). For TN (Fig 1 and 2), most of the results are in the first interval (618, 1652] with a 42.86%. This interval contains results below 1050 µg/L but also contains data that is above the specification.

Table 2: Trophic status for lakes of Osceola and Polk counties

Lake	Trophic status for TP	Trophic state Chl-a	Trophic state for SD	Average	Lake Status
Lake Kissimmee	61	62	49	57	eutrophic
Lake Blue	63	72	72	69	eutrophic
Lake Tohopekaliga	48	48	60	52	eutrophic
Lake Alligator	46	62	54	54	eutrophic
Lake Cypress	37	46	44	42	Mesotrophic
Lake Arianna	51	63	63	59	eutrophic

Table 3: Correlation between TN/TP

TN/TP	2008	2009	2010	2011	2012	2013	2014	2015
Kissimmee	28	34	26	26	23	26	25	24
Alligator	44	45	50	41	47	49	51	42
Tohopekaliga	30	41	38	42	43	45	46	42
Blue	37	40	41	50	43	39	43	41
Ariana	44	49	50	57	50	49	55	55
Cypress	84	61	86	104	76	80	89	58

Contamination levels in lakes of two adjacent areas

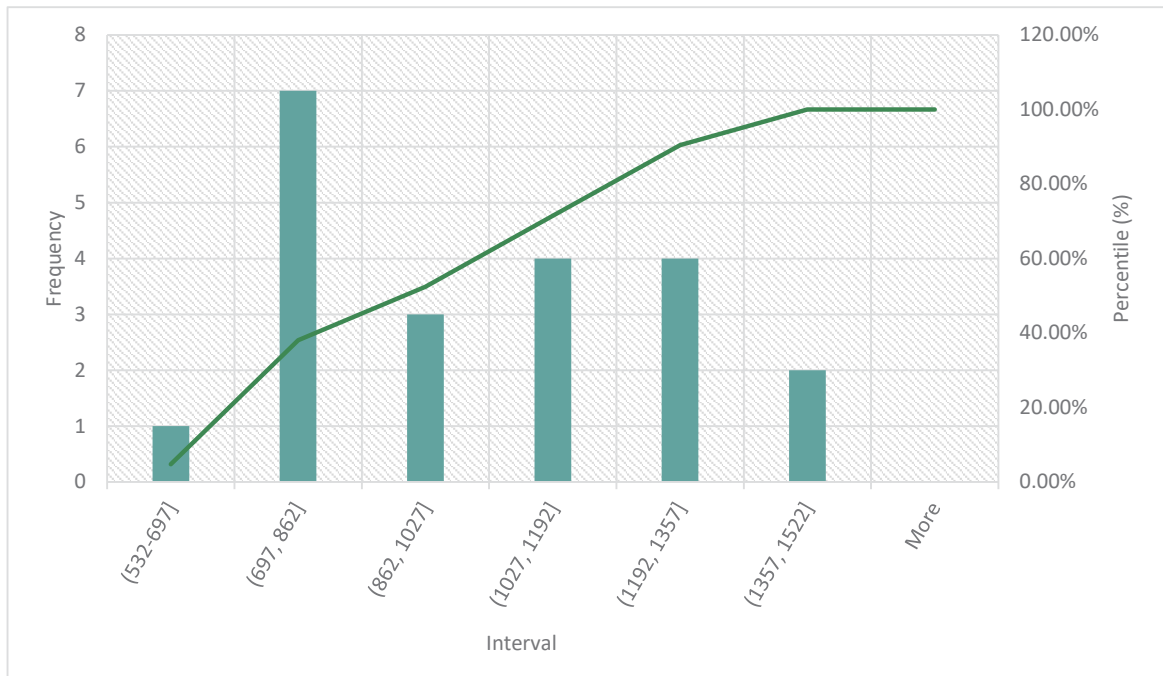


Fig. 1: Histogram and Pareto Graphic for TN Osceola County

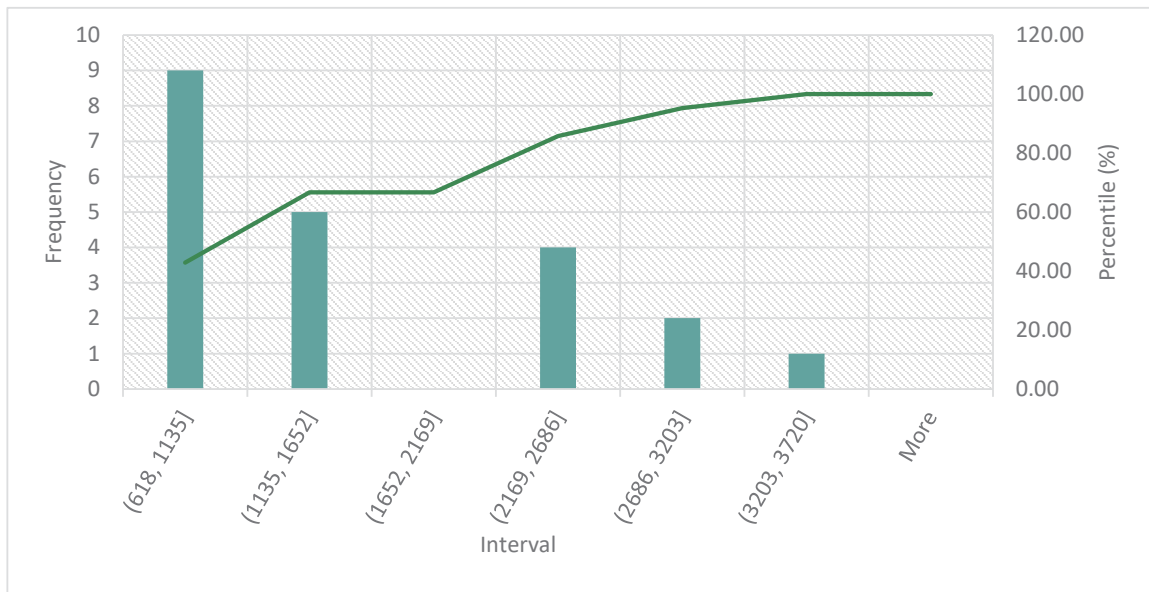


Fig. 2: Histogram and Pareto Graphic for TN Polk County

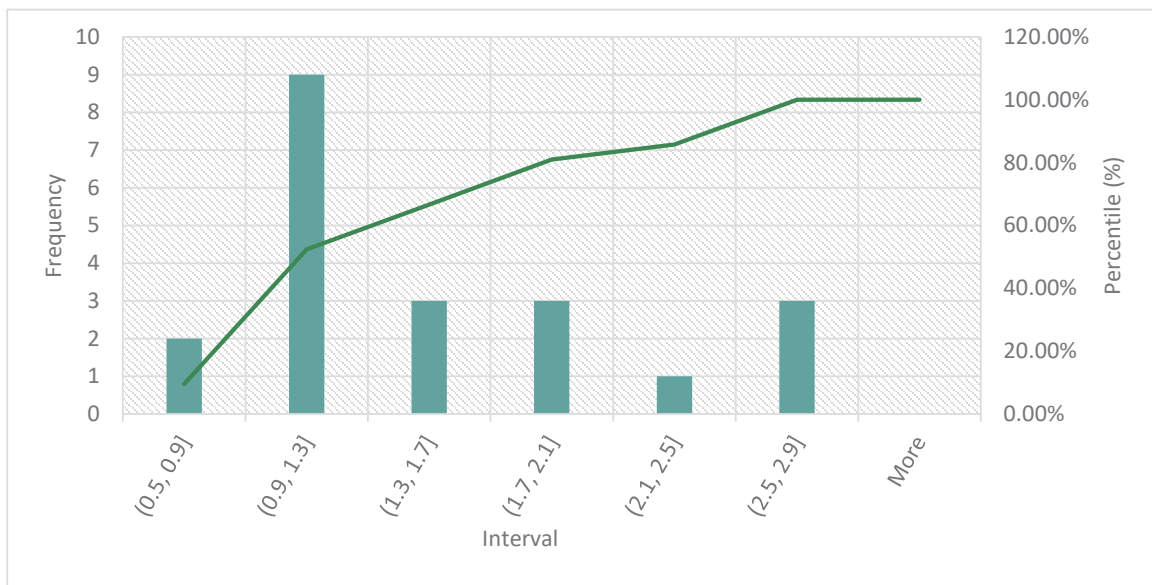


Fig. 3: Histogram and Pareto Graphic for Secchi Disk in Osceola County

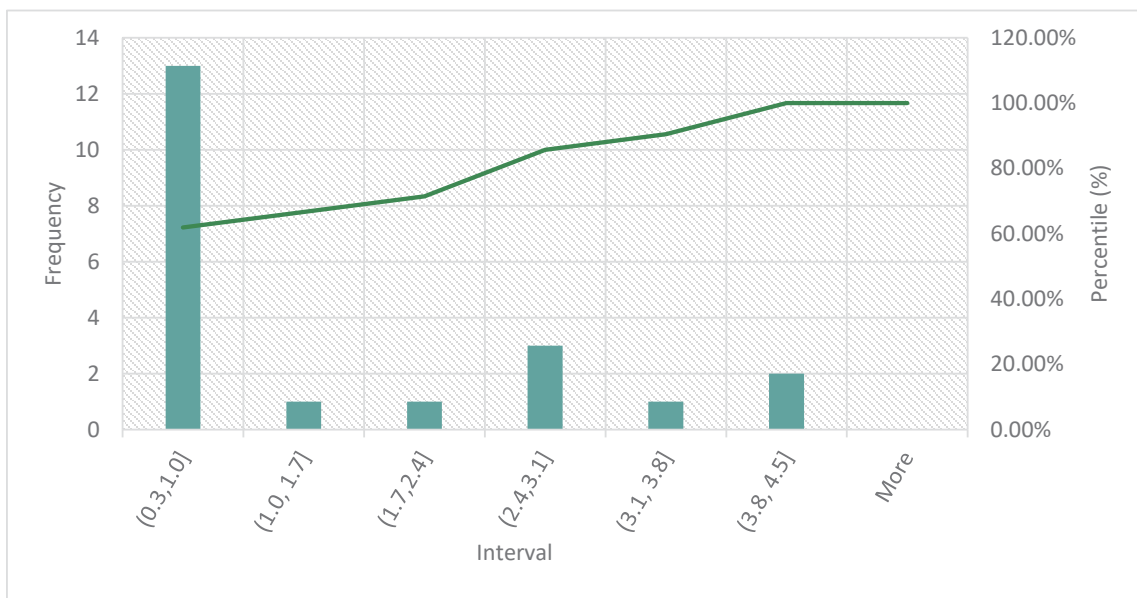


Fig. 4: Histogram and Pareto Graphic for Secchi Disk in Polk County

Therefore, 57.14% of the values evaluated are out-of-specification and are contributing to the lake's eutrophic status. For Osceola County, the second interval (697, 862] contains most of the data and contains results that are within specification. In this

case, 52.83% of the results are within specification. After the interval (1027, 1192], results are out of specification. Therefore, more than 28.57% of the results obtained are out of specification. Results for Secchi disk (Fig 3 and 4), the interval that contains

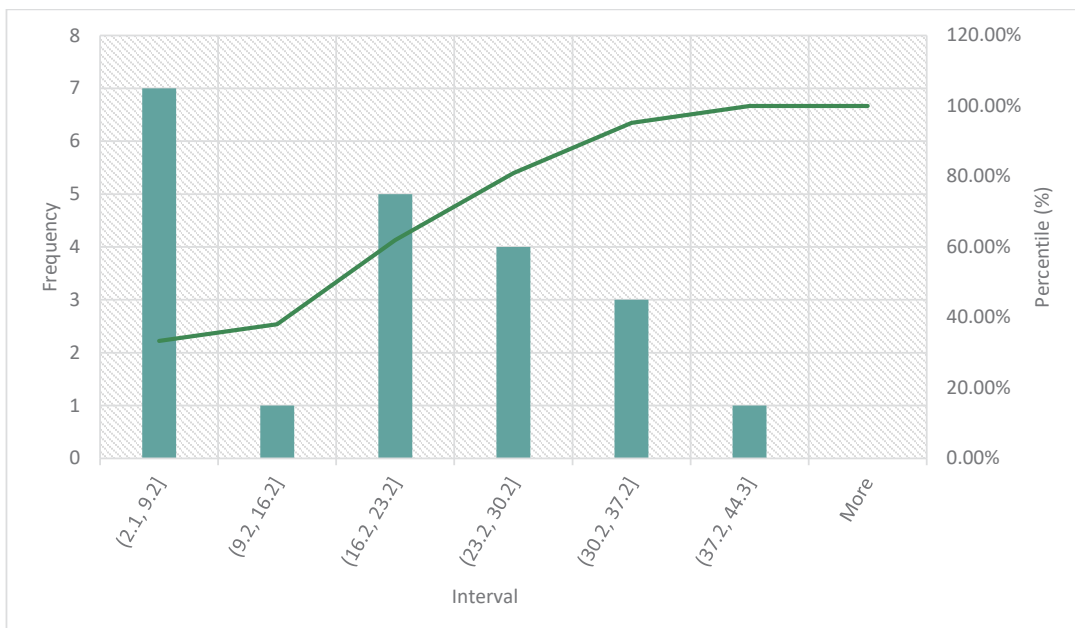


Fig. 5: Histogram and Pareto Graphic for Chlorophyll-a in Osceola County

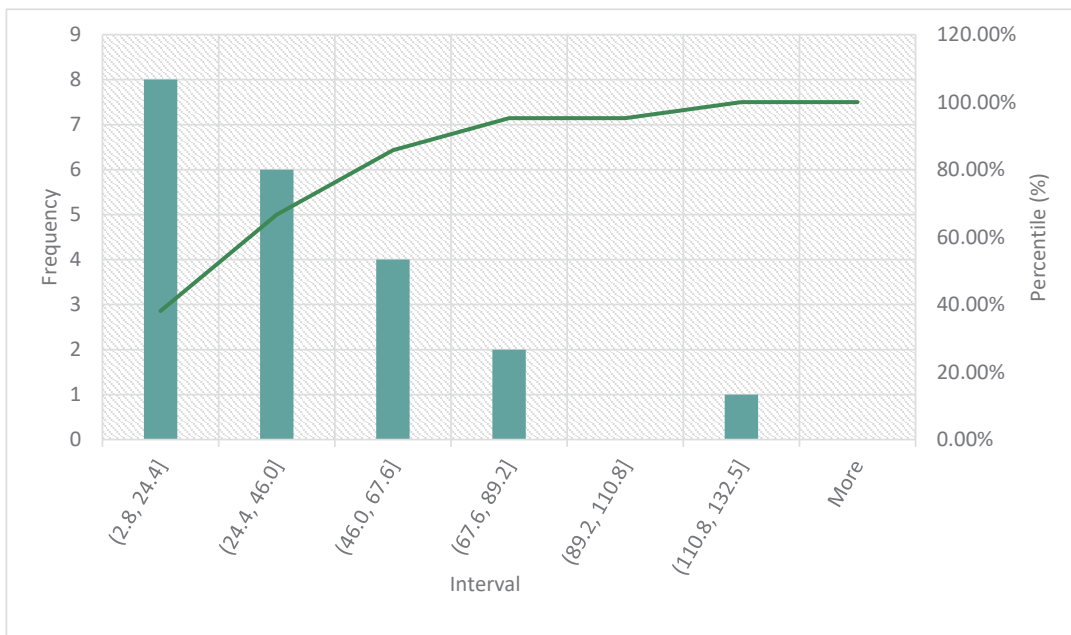


Fig. 6: Histogram and Pareto Graphic for Chlorophyll-a in Polk County

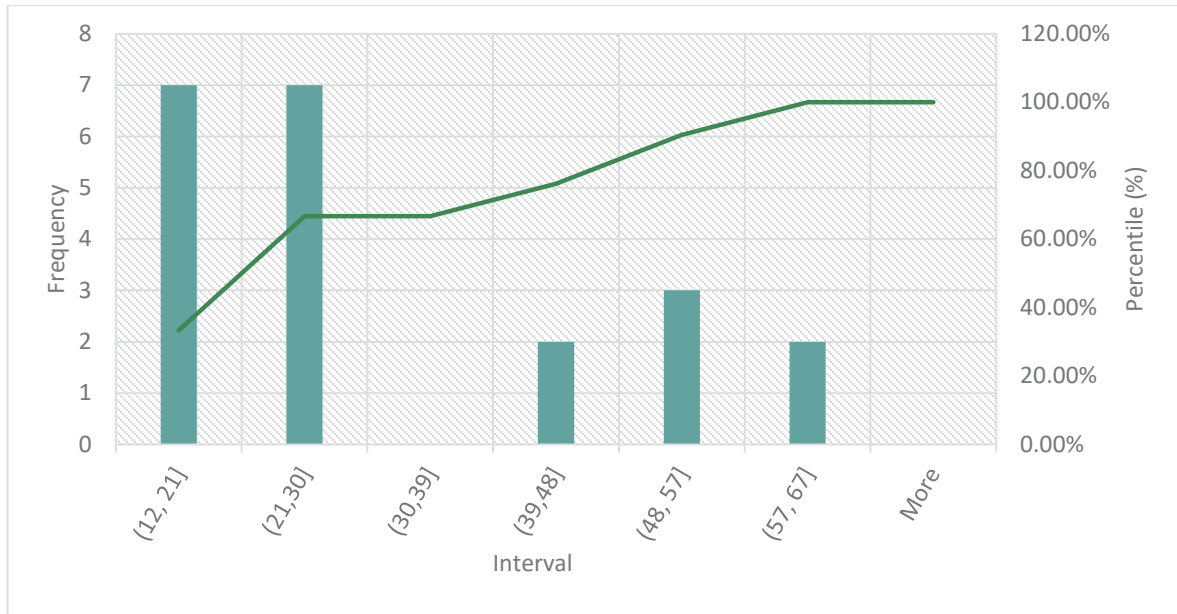


Fig. 7: Histogram and Pareto Graphic for TP in Osceola County

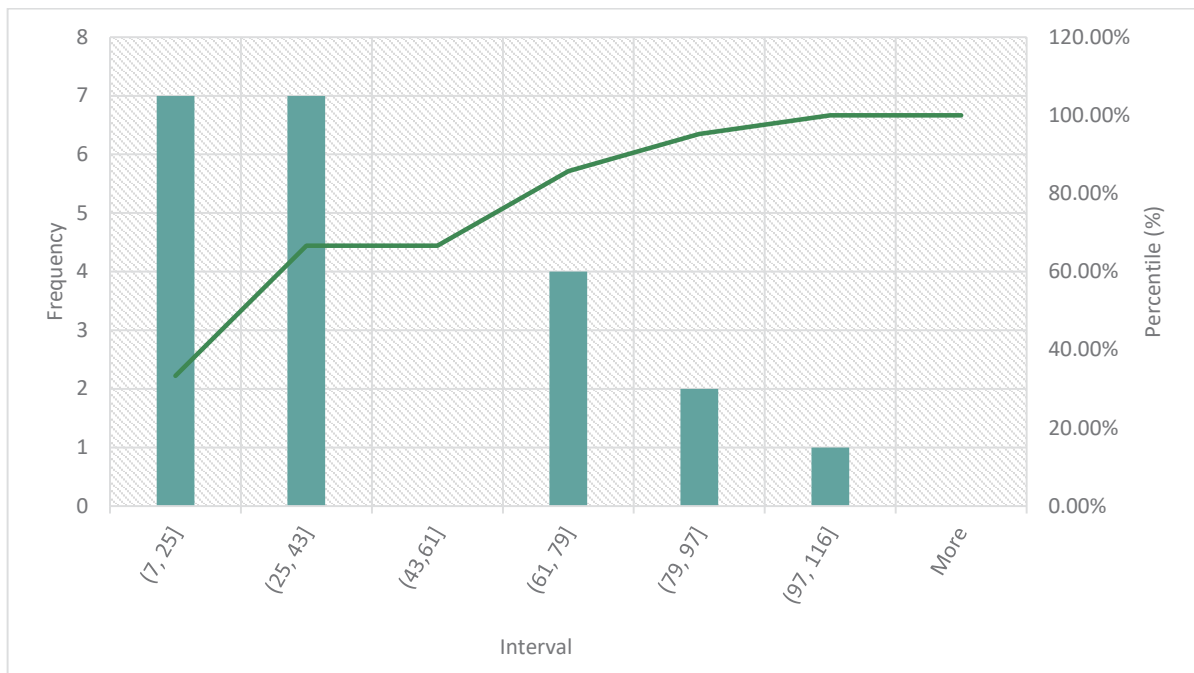


Fig. 8: Histogram and Pareto Graphic for TP in Polk County

Table 4: ANOVA: Two-Factor with Replication used to compare Osceola and Polk counties (n=168)

	Osceola			Polk			
SUMMARY	Kissimmee	Alligator	Tohopekaliga	Blue	Ariana	Cypress	Total
<i>Total Nitrogen</i>							
Count	7	7	7	7	7	7	42
Sum	8855.8125	5773.833	5934.840253	19367.5	9047.917	5244.752	54224.66
Average	1265.116071	824.8333	847.8343219	2766.786	1292.56	749.2503	1291.063
Variance	21142.09113	32551.71	16584.68168	264866.1	47781.1	5285.398	549511.6
<i>Secchi Disk</i>							
Count	7	7	7	7	7	7	42
Sum	15.07958333	9.784775	6.595905238	2.974967	5.8125	22.95878	63.20652
Average	2.15422619	1.397825	0.942272177	0.424995	0.830357	3.279826	1.504917
Variance	0.292006217	0.100929	0.079926213	0.012708	0.006138	0.881361	1.143582
<i>Chlorophyll-a</i>							
Count	7	7	7	7	7	7	42
Sum	169.2375	180.1	40.41740741	536.1975	205.0083	33.79282	1164.754
Average	24.17678571	25.72857	5.773915344	76.59964	29.2869	4.827546	27.73223
Variance	27.14893436	154.6224	5.924184813	695.9034	52.31287	2.727893	720.221
<i>Total Phosphorus</i>							
Count	7	7	7	7	7	7	42
Sum	333.0208333	127.1319	148.5	467.75	178.2658	69.44643	1324.115
Average	47.57440476	18.16171	21.21428571	66.82143	25.46655	9.920918	31.52655
Variance	24.59604415	12.16739	8.689484127	163.3065	9.352243	5.920525	424.0597
Total Count	28	28	28	28	28	28	
Sum	9373.150417	6090.85	6130.353566	20374.42	9437.003	5370.95	
Average	334.755372	217.5304	218.9411988	727.6579	337.0358	191.8197	
Variance	304187.052	134843.5	140465.2021	1497289	326369.2	108595.4	
ANOVA							
Source of Variation	SS	df	MS	F	P-value	F crit	
Sample	50893520.74	3	16964506.91	1045.645	1.68E-97	2.667443	
Columns	5653238.808	5	1130647.762	69.68999	1.01E-36	2.277044	
Interaction	14587449.53	15	972496.6352	59.94199	4.09E-54	1.736359	
Within	2336250.592	144	16223.96245				
Total	73470459.67	167					

If $F > F\text{-crit}$ and the value of $p < \alpha$ then the null hypothesis (H_0) alpha is rejected = 0.05

most of the results is the first (0.3, 1.0] for Polk County with 61.90% of the results and 71.43% of the results are out of specification; 28.57% of the results evaluated confirmed with the specification. For Osceola County, the second interval (0.9, 1.3] has most of the results and not more than 85.71% of the results are out of specification; only 14.29% are with the expected parameter. Chlorophyll-a results (Fig 5 and 6) for Osceola County has most of the results in the first interval (2.1, 9.2] with 33.33%. At the third interval (16.2, 23.2], the results contained are with and without specification. Therefore, less than 61.90% of the results conform to the specification parameters and 38.10% are out of specification. For Polk County, the first interval (2.8, 24.4) has most

of the results with less than 38.10% of the results conforming to the parameters and 61.90% of the results out of specification. Total phosphorus results (Fig 7 and 8) for Osceola County are more prominent at the first interval (12, 21] and second interval (21, 30] with 33.33% and 66.67% of the results conforming to the specification. Conversely, 33.33% of the results analyzed are out of specification. During the evaluation of the data of Polk County, the first (7, 25] and second (25, 43] have the same amount of data. Since the second interval contains results above specification, is correct to conclude that less than 66.67% of the results conform to specification and 33.33% do not. ANOVA analysis was performed to evaluate if there were differences between both

counties. After evaluating the data, results showed that the results for F are higher than for F critical. Also, the p-value calculated showed results higher than the alpha value (0.05). This means that there is a difference between the activities conducted between the counties (Table 4).

CONCLUSION

In the state of Florida there are more than 2.5 million acres of freshwater available; rivers, streams, springs, artificial canals, wetlands, and lakes. Polk and Osceola Counties are under a class III classification. This means that are considered recreational waters, and people can carry out fishing and/or swimming activities within the facility. Some of the problems these lakes faces are eutrophication due to pollutants such as phosphorous, nitrogen, and the growth of cyanobacteria. The general objectives of this comparative study were to analyze secondary public access data on water quality using the parameters of total phosphorus, total nitrogen, secchi disk and chlorophyll-a for cyanobacteria analysis in two lakes in Polk and Osceola counties to evaluate the quality of these with respect to their classification as a class III water body. The analysis showed that the null hypothesis is rejected, and the alternate hypothesis is accepted. There was a difference between the counties and an evaluation by zone should be performed. Also, the data analysis shows that Osceola County has a major index of nutrient contamination vs Polk County. Nevertheless, the difference among the lakes is not substantial. A particular situation for Osceola County is the lack of samples for *chlorophyll-a*. These results are not enough to utilize to predict cyanobacteria presence in these lakes. Florida does not have a specific agency to monitor freshwater harmful algal bloom. Considering this, chlorophyll-a should be performed consistently across the board. However, TSI for these lakes reveals the high possibility of algae bloom and cyanobacteria presence. Both counties are facing high nutrient issues and lack of sampling in these areas specifically. As mentioned before, it is important to understand that when it comes to the numeric nutrient criteria issue that the state is facing, and a major factor making Florida lakes different from others in the United States, is the presence of vast deposits of phosphorus-containing minerals that underlie several areas of the state

Also, these deposits are not uniformly distributed across the state but are related to differences in the TP content of the various orders of soils found in Florida.

Limitations

The data is not consistent and equal for all the lakes evaluated. Lake's monitoring does not appear to be robust enough. For example, in several lakes, the amount of sample and data was not the same and there were periods of no data at all. This means that there is no constant, centralized monitoring for all lakes. In addition, the geology and limnology of the state of Florida make the presence of nutrients such as phosphorus, naturally excessive. Another limitation within this statistical analysis is that in order to consider the parameters of the state, the alkalinity of the waters must be considered.

It is also stated in this publication that Secchi disk depth has been dropped as an indicator in FDEP's recent TSI calculations (1996 Water Quality Assessment for The State of Florida Section 305(b) Main Report). Another interesting point presented in the water atlas publication, "TSI is often misinterpreted and misused from its original purpose, which is to describe the level of biological productivity. It is not meant to rate a lake's water quality". In other words, high TSI values can be a good depending on the type of activity that will be performed at the lake. Fishing, which is a major activity that has a huge impact on Florida's economy, will require a lake with lower TSI.

Recommendation

After the analysis of secondary data for Polk and Osceola counties, it has been demonstrated that there is a need for new alternatives for the conservation and preservation of lakes in the state of Florida. Buffer zones are one of the alternatives that can be very beneficial to the conservation of lakes, and it is also a natural alternative. The use of buffer zones can help provide a vegetative filter for runoff approaching a waterway, acting to trap particulates and absorb flows to minimize the entry of contaminants into lakes. Buffers can trap fertilizers, pesticides, pathogens, and heavy metals, and they help trap snow and cut down on blowing soil in areas with strong winds. In addition, they protect livestock and wildlife from harsh weather.

Buffer zones help stabilize a stream and reduce its water temperature. Buffers also offer a setback distance for agricultural chemical use from water sources. They also help to reduce flooding, conserve energy and biodiversity. One of the most important benefits of the buffer zones is improving water quality removing sediments, pesticides, pathogens, and other contaminants. There are different financial incentives available through USDA conservation programs when buffer zones are installed. One of the alternatives is the Riparian buffer. Riparian buffers can improve or maintain water quality, and to protect or improve fish and wildlife habitat. Using a diversity of trees, shrubs, grasses, and forbs will provide shade, organic matter, and eventually woody debris to the water body. In general, wider riparian buffers provide better wildlife cover and fish habitat. Maintenance needs will vary by design.

AUTHOR CONTRIBUTIONS

J. Figueroa Jimenez performed the literature review, experimental design, analyzed and interpreted the data, prepared the text, N. Guerrero Del Castillo give support with statistical analysis, and the thesis committee of Ana G. Méndez University: J. Musa, K. Malavé and C. Morales mentored, gave recommendations, and review the final thesis report.

ACKNOWLEDGEMENT

This study was performed as the final thesis for the grade of Master of Science in Environmental Affairs for Ana G. Méndez University. The author thanks the thesis committee, reviewers, and family for helping during the investigation, review, and presentation of this project.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

OPEN ACCESS

This article is licensed under a Creative Commons Attribution 4.0 International License, which

permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit:

<http://creativecommons.org/licenses/by/4.0/>

PUBLISHER'S NOTE

Tehran Urban Planning and Research Center remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

ABBREVIATIONS

<i>Chl-a</i>	Chlorophyll-a
<i>CBD</i>	Control on Biodiversity
<i>CWA</i>	Clean Water Act
<i>EPA</i>	Environmental Protection Agency
<i>FDEP</i>	Florida Department of Environmental Protection
<i>FIG.</i>	Figure
<i>FWC</i>	Florida Fish and Wildlife Conservation Commission
<i>N</i>	Nitrogen
$\mu\text{g/L}$	Microgram per liter
mg/L	Milligrams per liter
<i>P</i>	Phosphorus
<i>SD</i>	Secchi Disk
<i>SWFWMD</i>	Southwest Florida Water Management District
<i>TMDL</i>	Total maximum daily load
<i>TN</i>	Total Nitrogen
<i>TP</i>	Total phosphorous
<i>UF/IFAS</i>	University of Florida/ Institute of Food and Agricultural Sciences

USDA United States Department of Agriculture
USGS United States Geological Survey

REFERENCES

- Bachmann, R.; Stephens, D.; Hoyer, M.; Canfield, D., (2012a). Phosphorus, nitrogen, and the designated uses of Florida lakes. *Lake Reservoir Manage.*, 28(1): 46-58 **(13 Pages)**.
- Bachmann, R.; Bigham, D.; Hoyer, M.; Canfield Jr.; D., (2012b). Factors determining the distributions of total phosphorus, total nitrogen, and chlorophyll a in Florida lakes. *Lake Reservoir Manage.*, 28(1): 10-26 **(17 pages)**.
- Bachmann, R.; Stephens, D.; Hoyer, M.; Canfield, D., (2012c). A strategy for establishing numeric nutrient criteria for Florida lakes. *Lake Reservoir Manage.*, 28(1): 84-91 **(8 Pages)**.
- Blackmar, E., (2006). Appropriating 'the commons': the tragedy of property rights discourse. *Polit. Public space*, 91.
- Bigham, D.L., Hoyer, M.V. and Canfield Jr, D.E., (2009). Survey of toxic algal (microcystin) distribution in Florida lakes. *Lake Reservoir Manage.*, 25(3): 264-275 (12 pages).
- Borisova, T., Olexa, M.T. and Caracciolo, J., 2021. 2021 Handbook of Florida Water Regulation: Florida Water Resources Policy: FE1043, rev. 6/2021. *EDIS*, 2021(3):7-7 **(1 page)**.
- Environmental Protection Agency (2010). Water Quality Standards for the State of Florida's Lakes and Flowing Waters; Final Rule. *Federal Register*, 75(233): **(47 Pages)**.
- EPA, (2017). Nutrient Pollution. Environmental Protection Agency. The issue **(1 Page)**.
- EPA, (2021). Lakes Presenting Risk for Exposure to Harmful Algal Toxins. Environmental Protection Agency **(1 Page)**.
- FFWCC, (2019). Cyanobacteria (Blue Green-Algae). Florida Fish and Wildlife Conservation Commission **(1 Page)**.
- Griffith G.E.; Canfield DE Jr.; Horsburgh C.A.; Omernik, J.M., (1997). *Lake Regions of Florida*. Corvallis (OR): US Environmental Protection Agency; National Health and Environmental Effects Research Laboratory; EPA/R-97/127 **(13 Pages)**.
- Levallois, P., Villanueva, C.M., (2019). Drinking water quality and human health: an editorial. *Int. J. Environ. Res. Public Health*, 16(4): 631.
- Michigan State University, (2019). U.S. protected areas do not meet international conservation targets for lakes. Michigan State University green graphic, College of Agriculture & Natural Resources. Department of Fisheries and Wildlife.
- National Research Council, (1992). "4Lakes". Restoration of aquatic ecosystems: science, technology, and public policy. Washington, DC: The National Academic Press **(94 Pages)**.
- National Research Council, (2001). Assessing the TMDL approach to water quality management. National Academies Press.
- Norris, V.O.L., (1993). The use of buffer zones to protect water quality: a review. *Water Resour. Manage.*, 7: 257-272 **(16 Pages)**.
- Osceola County Lakes Management Plan, (2015). Lake Management plan Report, (74 pages).
- Pandey, P.K.; Kass, P.H.; Soupir, M.L.; Biswas, S.; Singh, V.P., (2014). Contamination of water resources by pathogenic bacteria. *AMB Express*, 4(1): 1-16 (16 Pages).
- Rogers, P.; Hall, A.W., (2003). Effective water governance, 7: Stockholm: Global water partnership.
- Schiffer, D.M., 1998. Hydrology of central Florida lakes: A primer 1137. US Government Printing Office.
- Shapiro, H., (2015). The importance of streamside buffers in conservation. *Triangle land conservancy* **(1 Page)**.
- Southwest Florida Water Management District, (2018). Florida's Water Management District **(1 Page)**.
- Stephens, D.; Hoyer, M.; Canfield, D., (2009). Survey of toxic algal (microcystin) distribution in Florida lakes. *Lake Reservoir Manage.* **(12 Pages)**.
- Tonnessen, D., (2019). UF Health researchers to map hotspots in Florida to see if algal blooms pose health risks to humans. University of Florida, UF Health, College of Medicine, Department of Health Outcomes of Policy, Emerging Pathogens **(3 Pages)**.
- Toccalino, P.; Hopple, J.A., (2010). The Quality of Our Nation's Waters: Quality of Water from Public-supply Wells in the United States, 1993-2007: Overview of Major Findings 1346: US Geological Survey.
- USGS, (2018). Nitrogen and water. Water Science School. United States Geological Survey **(1 Page)**.
- USGS, (2018b). Bacteria and E. coli in water. Water Science School. United States Geological Survey **(1 Page)**.
- USGS, (2018c). Phosphorus and water. Water Science School. USGS, (2018). **(1 Page)**.
- Vasistha, P.; Ganguly, R., (2020). Water quality assessment of natural lakes and its importance: An overview, *Materials Today: Proceedings* **(9 Pages)**.
- Vanni, M.J., (2002). Nutrient cycling by animals in freshwater ecosystems. *Ann. Rev. Ecol. Syst.*, 33(1): 341-370 (30 pages).
- Ward, M.H.; Jones, R.R.; Brender, J.D.; de Kok, T.M.; Weyer, P.J.; Nolan, B.T.; Villanueva, C.M.; Van Breda, S.G., (2018). Drinking water Nitrate and human health: An Updated Review. *Int. J. Environ. Res. Public Health*, 15 (7): 1557 **(31 Pages)**.

COPYRIGHTS

©2022 The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers.



HOW TO CITE THIS ARTICLE

Figueroa Jimenez, J.; Guerrero Del Castillo, N.; Musa Wasil, J.C.; Malavé Llamas; K.; Morales Agrinzoni, C., (2022). Direct and indirect analysis of contamination levels in lakes. *Int. J. Hum. Capital Urban Manage.*, 7(3): 417-432.

DOI: [10.22034/IJHCUM.2022.03.10](https://doi.org/10.22034/IJHCUM.2022.03.10)

url: http://www.ijhcum.net/article_252465.html



PUBLICATION ETHICS

The ethical policy of IJHCUM is based on the Committee on Publication Ethics (COPE) guidelines and complies with International Committee of IJHCUM Editorial Board codes of conduct. Readers, authors, reviewers and editors should follow these ethical policies once working with IJHCUM. The ethical policy of IJHCUM is liable to determine which of the typical research papers or articles submitted to the journal should be published in the concerned issue. For information on this matter in publishing and ethical guidelines please visit <http://publicationethics.org>

Duties and Responsibilities of Publishers

1. IJHCUM is committing to ensure that editorial decisions on manuscript submissions are the final.
2. IJHCUM is promising to ensure that the decision on manuscript submissions is only made based on professional judgment and will not be affected by any commercial interests.
3. IJHCUM is committing to maintain the integrity of academic and research records.
4. IJHCUM is monitoring the ethics by Editor-in-Chief, Associate Editors, Editorial Board Members, Reviewers, Authors, and Readers.
5. IJHCUM is always checking the plagiarism and fraudulent data issues involving in the submitted manuscript.
6. IJHCUM is always willing to publish corrections, clarifications and retractions involving its publications as and when needed.

Duties and Responsibilities of Editors

1. The Editors of the journal should have the full authority to reject/accept a manuscript.
2. The Editors of the journal should maintain the confidentiality of submitted manuscripts under review or until they are published.
3. The Editor-in-Chief should take a decision on submitted manuscripts, whether to be published or not with other editors and reviewers
4. The Editors of the journal should preserve the anonymity of reviewers.
5. The Editors of the journal should disclose and try to avoid any conflict of interest.
6. The Editors of the journal should maintain academic integrity and strive to meet the needs of readers and authors.
7. The Editors of the journal should be willing to investigate plagiarism and fraudulent data issues and willing to publish corrections, clarifications, retractions, and apologies when needed.
8. The Editors of the journal should have the limit themselves only to the intellectual content.
9. The Editors of the journal must not disclose any information about submitted manuscripts to anyone other than the corresponding author, reviewers, potential reviewers, other editorial advisers, and the publisher, as appropriate.
10. Unpublished materials disclosed in a submitted paper will not be used by the editor or the members of the editorial board for their own research purposes without the author's explicit written consent.

Duties and Responsibilities of Reviewers

1. The Reviewers of the journal should assist the Editors in taking the decision for publishing the submitted manuscripts.
2. The Reviewers should maintain the confidentiality of manuscripts, which they are invited to review.
3. The Reviewers should provide comments in time that will help editors to make decision on the submitted manuscript to be published or not.
4. The Reviewers are bound to treat the manuscript received for peer reviewing as confidential, and must not use the information obtained through peer review for personal advantage.
5. The Reviewers comments against each invited manuscript should be technical, professional and objective.
6. The Reviewers should not review the manuscripts in which they have found conflicts of interest with any of the authors, companies, or institutions.
7. The Reviewers should disclose and try to avoid any conflict of interest.

Duties and Responsibilities of Authors

1. Manuscripts must be submitted only in English and should be written according to sound grammar and proper terminology.
2. Manuscripts must be submitted with the understanding that they have not been published elsewhere (except in the form of an abstract or as part of a published lecture, review, or thesis) and are not currently under consideration by another journal published by or any other publisher.
3. The submitting (corresponding) author is responsible for ensuring that the manuscript article's publication has been approved by all the other coauthors.
4. In order to sustain the peer review system, authors have an obligation to participate in peer review process to evaluate manuscripts from others.
5. It is also the authors' responsibility to ensure that the manuscripts emanating from a particular institution are submitted with the approval of the necessary institution.
6. It is a condition for submission of a manuscript that the authors permit editing of the paper for readability.
7. Authors are requested to clearly identify who provided financial support for the conduct of research and/or preparation of the manuscript and briefly describe the role of the funder/sponsor in any part of the work.
8. A copy right release and conflict of interest disclosure form must be signed by the corresponding author in case of multiple authorships, prior to the acceptance of the

manuscript, by all authors, for publication to be legally responsible towards the Journal ethics and privacy policy.

9. Under open access license, authors retain ownership of the copyright for their content, but allow anyone to download, reuse, reprint, modify, distribute, and/ or copy the content as long as the original authors and source are cited properly.
10. All authors have agreed to allow the corresponding author to serve as the primary correspondent with the editorial office, to review the edited manuscript and proof.
11. When author(s) discovers a significant error or inaccuracy in his/her own published work, it is the author's obligation to promptly notify the journal editor or publisher to retract or correct the manuscript.
12. All authors must know that that the submitted manuscripts under review or published with IJHCUM are subject to screening using Plagiarism Prevention Software. Plagiarism is a serious violation of publication ethics.

Violation of Publication Ethics

1. **Plagiarism:** Plagiarism is intentionally using someone else's ideas or other original material as if they are one's own. Copying even one sentence from someone else's manuscript, or even one of your own that has previously been published, without proper citation is considered by IJHCUM Journal as plagiarism. All manuscripts under review or published with IJHCUM are subject to screening using plagiarism prevention software. Thus, plagiarism is a serious violation of publication ethics. The development of CrossCheck is a service that helps editors to verify the originality of papers. CrossCheck is powered by the Ithenticate software from iParadigms, known in the academic community as providers of Turnitin. For a searchable list of all journals in the CrossCheck database, please visit: www.ithenticate.com/search
2. **Data Fabrication and Falsification:** Data fabrication and falsification means the researcher did not really carry out the study, but made up data or results and had recorded or reported the fabricated information. Data falsification means the researcher did the experiment, but manipulated, changed, or omitted data or results from the research findings.
3. **Simultaneous Submission:** Simultaneous submission occurs when a manuscript (or substantial sections from a manuscript) is submitted to a journal when it is already under consideration by another journal.
4. **Duplicate Publication:** Duplicate publication occurs when two or more papers, without full cross referencing, share essentially the same hypotheses, data, discussion points, and conclusions.
5. **Redundant Publications:** Redundant publications involve the inappropriate division of study outcomes into several articles, most often consequent to the desire to plump academic vitae.

6. **Improper Author Contribution or Attribution:** All listed authors must have made a significant scientific contribution to the research in the manuscript and approved all its claims. Don't forget to list everyone who made a significant scientific contribution, including students and laboratory technicians.
7. **Citation Manipulation:** Citation Manipulation is including excessive citations, in the submitted manuscript, that do not contribute to the scholarly content of the article and have been included solely for the purpose of increasing citations to a given author's work, or to articles published in a particular journal. This leads to misrepresenting the importance of the specific work and journal in which it appears and is thus a form of scientific misconduct.

Handling Cases of Misconduct

Once IJHCUM confirms a violation against IJHCUM's publication ethics, IJHCUM addresses ethical concerns diligently following an issue-specific standard practice as summarized below.

1. The first action of the journal Editor is to inform the Editorial Office of IJHCUM by supplying copies of the relevant material and a draft letter to the corresponding author asking for an explanation in a nonjudgmental manner.
2. If the author's explanation is unacceptable and it seems that serious unethical conduct has taken place, the matter is referred to the Publication Committee via Editorial Office. After deliberation, the Committee will decide whether the case is sufficiently serious to warrant a ban on future submissions.
3. If the infraction is less severe, the Editor, upon the advice of the Publication Committee, sends the author a letter of reprimand and reminds the author of IJHCUM publication policies; if the manuscript has been published, the Editor may request the author to publish an apology in the journal to correct the record.
4. Notification will be sent to corresponding author and any work by the author responsible for the violation or any work these persons coauthored that is under review by IJHCUM journal will be rejected immediately.
5. The authors are prohibited from serving on IJHCUM editorial board and serving as a reviewer for IJHCUM Journal. IJHCUM reserves the right to take more actions.
6. In extreme cases, notifications will be sent to the affiliations of the authors and the authors are prohibited from submitting their work to IJHCUM for 5 years.
7. In serious cases of fraud that result in retraction of the article, a retraction notice will be published in the journal and will be linked to the article in the online version. The online version will also be marked "retracted" with the retraction date.

GUIDE FOR AUTHORS

International Journal of Human Capital in Urban Management (IJHCUM) is a double blind peer reviewed electronic and print quarterly publication concerned with all aspects of environmental science and management. IJHCUM publishes original research papers, review papers, case reports and short communications, letters to editor and authors' response about letters to editor across the broad field of human capital in urban management and the related fields of urban management. The publication appears at regular intervals time quarterly. The Journal database is fully open access and full text of published articles are available for everyone who can get access to the Journal website free of cost. **The authors never pay any charges for submission, article processing and publication.**

Guide for Authors: More details on guide for authors refer: <http://ijhcum.net/journal/authors.note>

GENERAL

1. Authors should submit their contributions electronically through the IJHCUM website submission system to the Editorial Office.

2. Manuscripts must be submitted only in English and should be written according to sound grammar and proper terminology. Manuscripts should be typed in Times New Roman of 11 pt. font and in MS-Word format in one column with 2.5 cm margin at each side. Manuscript submission must be applied once in order to obtain only one submission ID number. More than one submission for a single manuscript can lose the chance of the manuscript consideration. Manuscript must be accompanied by a covering letter including title and author(s) name.

3. There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions. Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file. There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent.

BEFORE YOU BEGIN

1. **Peer-Review Process:** In order to sustain the peer review system, authors have an obligation to participate in peer review process to evaluate manuscripts from others. When appropriate, authors are obliged to provide retractions and/or corrections of errors to the editors and the Publisher. All papers submitted to IJHCUM journal will be peer reviewed for at least one round. IJHCUM journal adopts a double-blinded review policy: authors are blind to reviewers, but reviewers are not blind to authors. After receiving reviewers' comments, the editorial team member makes a decision. Because reviewers sometimes do not agree with each other, the final decision sent to the author may not exactly reflect recommendations by any of the reviewers. The decision after each round of peer review may include (a) Accept without any further changes, (b) Accept with minor revision, (c) Major changes are necessary for resubmission and (d) Decline without encouraging resubmission.

2. **Post-Publication Evaluation:** In addition to rapid Peer Review Process, the IJHCUM Journal has Post-Publication Evaluation by the scientific community. Post-Publication Evaluation is concentrated to ensure that the quality of published research, review and case report meets certain standards and the conclusions that are presented are justified. The post-publication evaluation includes online comments and citations on published papers. Authors may respond to the comments of the scientific community and may revise their manuscript. The Post-Publication Evaluation is described in such a way; it is allowing authors to publish quickly about Environmental science, management, engineering and technology concepts.

3. **Publication Ethics:** The ethical policy of IJHCUM is based on the Committee on Publication Ethics (COPE) guidelines and complies with International Committee of IJHCUM Editorial Board codes of conduct. Readers, authors, reviewers and editors should follow these ethical policies once working with IJHCUM. The ethical policy of IJHCUM is liable to determine which of the typical research papers or articles submitted to the journal should be published in the concerned issue. The ethical policy insisted the Editor-in-Chief, may confer with other editors or reviewers in making the decision. Visit at: <http://publicationethics.org>

4. **Conflict of Interest:** Authors are requested to evident whether impending conflicts do or do not exist. A copyright transfer agreement is signed by the corresponding author, upon the acceptance of the manuscript, on behalf of all authors, for publication to be legally

responsible towards the journal ethics and privacy policy. Authors will be notified as soon as possible of decisions concerning the suitability of their manuscripts for publication in the journal. The submitted materials may be considered for inclusion but cannot be returned and Editors of the journal reserve the right to accept or reject any article in any stage, if necessary. Conflict of Interest Disclosure form can be found at: <http://ijhcum.net/data/ijhcum/news/Conflict of Interest.doc>

5. **Submission Declaration and Verification:** While submitting a manuscript to IJHCUM, all contributing author(s) must verify that the manuscript represents authentic and valid work and that neither this manuscript nor one with significantly similar content under their authorship has been published or is being considered for publication elsewhere including electronically in the same form, in English or in other language, without the written consent the copy right holder.

6. **Authorship:** All contributing authors should qualify for authorship and corresponding author should sign the authorship form while submitting the manuscript. It can be found at: <http://ijhcum.net/data/ijhcum/news/Authorship form.docx>

7. **Changes to Authorship:** After the manuscript is submitted or accepted for publication, the corresponding author is required to send a request to add or remove an author or to rearrange the author names of the submitted/accepted manuscript by sending the change of authorship form to editorial office. No authorship change is allowed after publication of manuscript. More details may be found at: <http://ijhcum.net/data/ijhcum/news/change of authorship form.docx>

8. **Retained Author Rights:** As an author, author or authors' employer or institution retains certain rights. For more information on author rights, found at: <http://ijhcum.net/data/ijhcum/news/retained authors right.docx>

9. **Copy Right:** Journals should make clear the type of copyright under which authors' work will be published. For open access articles the publisher uses an exclusive licensing agreement in which authors retain copyright in their manuscript. More details may be found at: <http://ijhcum.net/data/ijhcum/news/copyright form.doc>

10. **User license Agreement:** IJHCUM provides access to archived material through IJHCUM archives. Manuscripts are the parts of an open archive are made freely available from IJHCUM website after certain period, which begins from the final publication date of the manuscript. All articles published open access will be immediately and permanently free for everyone to read and download. Permitted reuse is defined by Creative Commons user license called **Creative Commons Attribution**. Visit at: ([Creative Commons Attribution 4.0 International \(CC BY 4.0\)](http://creativecommons.org/licenses/by/4.0/))

11. **Plagiarism Prevention and Violation of Publication Ethics:** All manuscripts under review or published with IJHCUM are subject to screening using Plagiarism Prevention Software. Plagiarism is a serious violation of publication ethics. Other violations include duplicate publication, data fabrication and falsification, and improper credit of author contribution. Thus, the Plagiarism or Fraudulent or knowingly inaccurate statements constitute unethical behavior are unacceptable and submitting the same manuscript to more than one journal concurrently constitutes unethical publishing behavior and is unacceptable. The development of CrossCheck is a service that helps editors to verify the originality of papers. CrossCheck is powered by the iThenticate software from iParadigms, known in the academic community as providers of Turnitin. For more details visit at: www.ithenticate.com/search

12. **Handling Cases of Misconduct:** Once IJHCUM confirms a violation against IJHCUM's publication ethics, the following actions will be taken.

- a. The work is rejected / retracted immediately. Notification will be sent to corresponding authors. In extreme cases, notifications will be sent to the affiliations of the authors.
- b. The authors are prohibited from submitting their work to IJHCUM for 5 years.
- c. Any work by the authors responsible for the violation or any work these persons coauthored that is under review by any IJHCUM journal will be rejected immediately.
- d. The authors are prohibited from serving on IJHCUM editorial board. IJHCUM reserves the right to take more actions.

MANUSCRIPT PREPARATION

1. Title Page: The title page should include: the name(s) of the author(s), a concise and informative title, the affiliation(s) and address (es) of the author(s), and e-mail address, telephone and fax numbers of the corresponding author.

2. Manuscript Title: Title of up to 17 words should not contain the name of locations, countries or cities of the research as well as abbreviations. The title should be oriented to Environmental issues while not being obscure or meaningless.

3. Abstract: An abstract of 150 to 250 words that sketches the purpose of the study; basic procedures; main findings its novelty; discussions and the principal conclusions, should not contain any undefined abbreviations or references.

4. Keywords: Provide 5 to 7 keywords which can be used for indexing purposes. Keywords should not repeat the words of the manuscript title or contain abbreviations and shall be written in alphabetical order as separated by semicolon.

5. Introduction: The Introduction should state the purpose of the investigation and identify clearly the gap of knowledge that will be filled in the Literature review study. Date and location of the research carried out throughout the study must be mentioned at the end of this section.

6. Materials and methods: The Materials and Methods section should provide enough information to permit repetition of the experimental work. It should include clear descriptions and explanations of sampling procedures, experimental design, and essential sample characteristics and descriptive statistics, hypothesis tested, exact references to literature describing the tests used in the manuscript, number of data involved in statistical tests, etc.

7. Results and Discussion: The Results section should describe the outcome of the study. Data should be presented as concisely as possible - if appropriate in the form of tables or figures, although very large tables should be avoided. The Discussion should be an interpretation of the results and their significance with reference to work by other authors. Please note that the policy of the Journal with respect to units and symbols is that of SI symbols.

8. Tables: Do not submit tables and graphs as photograph. Place explanatory matters in footnotes, not in the heading. Do not use internal horizontal and vertical rules. Tables should be called out in the text and should have a clear and rational structure and consecutive numerical order. All tables should be numbered 1, 2, 3, etc. Give enough information in subtitles so that each table is understandable without reference to the text. Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

9. Figures: Figures/ illustrations should be in high quality art work, within 200-300 dpi and separately provided in Excel format. Ensure that figures are clear, labeled, and of a size that can be reproduced legibly in the journal. Each figure should have a concise caption describing accurately what the figure depicts. Figure captions begin with the term Fig. Figures should be with the captions placed below in limited numbers. No punctuation is to be placed at the end of the caption.

10. Conclusion: This section should highlight the major, firm discoveries, and state what the added value of the main finding is, without literature references.

11. Acknowledgements: Acknowledgments of people, grants, funds, etc. should be placed in a separate section before the reference list. The names of funding organizations should be written in full. Financial support

affiliation of the study, if exists, must be mentioned in this section. Thereby, the Grant number of financial support must be included.

12. References: All the references should be cited throughout the manuscript text as well as in the Reference section organized in accordance with Harvard system. Groups of references should be listed first alphabetically, then chronologically. The number of references extracted from each journal should not exceed 3 to 5 citations, which is the average acceptable amount. The number of references should not be less than 30 for original paper, less than 100 for review paper. It is substantially recommended to the authors to refer to more recent references rather than old and out of date ones. Volume, issue and pages of the whole references must be specified according to the IJHCUM format.

Citing and listing of Web references: As a minimum, the full URL should be given. Any further information, if known (Author names, dates, reference to a source publication, etc.), should also be given.

Text: All citations in the text should refer to: 1. Single author: the author's name (without initials, unless there is ambiguity) and the year of publication; 2. Two authors: both authors' names and the year of publication; and 3. Three or more authors: first author's name followed by "et al." and the year of publication. Citations may be made directly (or parenthetically). Groups of references should be listed first alphabetically, then chronologically. Examples: "as demonstrated (Allan, 1996a, 1996b, 1999; Allan and Jones, 1995). Kramer *et al.*, (2000) have recently shown ...".

List: References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same Author(s) in the same year must be identified by the letters "a", "b", "c", etc., placed after the year of publication.

Journal article: Nouri J.; Lorestani B.; Yousefi N.; Khorasani N.; Hassani A. H.; Seif, F.; Cheraghi M., (2011). Phytoremediation potential of native plants grown in the vicinity of Ahangaran lead-zinc mine. *Environ. Earth Sci.*, 62(3): 639-644.

Book: Davis, M. L., (2005). *Introduction to Environmental Engineering*, 3rd. Ed. McGraw Hill Inc.

Book chapter: Mettam, G. R.; Adams, L. B., (1999). How to prepare an electronic version of your article, in: Jones, B. S., Smith, R. Z. (Eds.), *Introduction to the electronic age*. E-Publishing Inc., New York.

Conference paper: Brown, J., (2005). Evaluating surveys of transparent governance. In UNDESA, 6th. Global forum on reinventing government: towards participatory and transparent governance. Seoul, Republic of Korea 24-27 May. United Nations: New York.

Dissertation: Trent, J. W., (1975). *Experimental acute renal failure*. Ph.D. Dissertation, University of California. USA.

Online document: Cartwright, J., (2007). Big stars have weather too. IOP Publishing Physics Web. <http://physicsworld.com/cws/article/news/2007/jun/26/big-stars-have-weather-too>

AFTER ACCEPTANCE

1. Online Proof Correction: Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. Use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor-in-Chief. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely the corresponding author responsibility.

2. Offprints: The offprints can be downloading from the IJHCUM website once the final corrected manuscripts are disseminated.

AUTHORS INQUIRIES

Authors can track their submitted article through IJHCUM website on author's login section at: http://ijhcum.net/contacts?_action=login

International Journal of Human Capital in Urban Management (IJHCUM)

Copyright Transfer Agreement

1. Parties of the agreement

Author (s):

Manuscript Title:

Manuscript ID:

(Herewith referred to as the "materials"),

Journal Title: International Journal of Human Capital in Urban Management (IJHCUM)

2. Subject of the agreement

A) Copyright

1- The Author and each co-authors shall transfer and sell to the Publisher for the length of the copyright starting from the moment the present agreement comes into force the exclusive rights to the materials, including the rights to translate, reproduce, transfer, distribute or otherwise use the materials or parts (fragments) contained therein, for publication in scientific, academic, technical or professional journals or other periodicals and in derivative works thereof, worldwide, in English, in print or in electronic editions of such journals, periodicals and derivative works in all media or formats now existing or that may exist in future, as well as the right to license (or give permission to) third parties to use the materials for publication in such journals, periodicals and derivative works worldwide. The transfer under this agreement includes the right to adapt the presentation of the materials for use in conjunction with computer systems and programs, reproduction or publication in machine-readable format and incorporation into retrieval systems.

2- Reproduction, placement, transfer or any other distribution or use of the materials, or any parts of the materials contained therein, in any way permitted under this Agreement, shall be accompanied by reference to the Journal and mentioning of the Publisher, namely: the title of the article, the name of the Author (Co-authors), the name of the Journal, volume/number, copyright of the publisher.

B) Reserved Rights

The Author (Co-authors) or the employer of the Author (Co-authors) of the materials shall retain all proprietary rights (with the exception of the rights transferred to the Publisher under the present Agreement).

C) Author Guarantee

The Author (Co-authors) guarantees that the materials are an original work, submitted only to IJHCUM, and have not been published previously.

In case the materials were written jointly with co-authors, the Author guarantees that he/she has informed them of the terms of this Agreement and obtained their signatures or written permission to singe on their behalf.

The Author guarantees as well that:

The materials do not contain libelous statements.

The materials do not infringe on other persons' rights (including without limitation copyrights, patent rights and the trademark right).

The materials do not contain facts or instructions that can cause damage or injury to third parties and their publication does not cause the disclosure of any secret or confidential information

Author (Corresponding Author):

Correspondence Address:

Phone:

Fax:

Email:

Corresponding Author Name:

Signature

Date

On Behalf of the Publisher:

Human Resource Development,
Navab High Way, Tehran 1346914117
Iran

Phone: (+9821) 6403 8606

Fax: (+9821) 6403 8226

Email: editor@ijhcum.net

ijhcum@gmail.com

Website: www.ijhcum.net

Accepted for publication ☒

Signature

Date

PLEASE NOTE: The accepted manuscript cannot be processed for publication until the publisher has received this signed form. The form MUST be signed by the Corresponding Author and then scanned and sent through the system or email. If the manuscript is not published in the Journal, this release will not take effect.

The sole responsibility for the whole content (s) of the article remains only with the corresponding author. However, Editor would reserve the right to adjust the style to certain standards of uniformity before publication.

CONFLICT OF INTEREST DISCLOSURE FORM

Conflict of Interest is defined as a set of conditions in which professional judgment concerning a primary interest, such as the validity of research, may be influenced by a secondary interest, such as financial gain. A Conflict of Interest Disclosure is an agreement or notification from the authors that they have not been paid for the work, or if they have, stating the source of their payment. The purpose of Conflict of Interest Disclosure form is to provide readers of authors' manuscript with information about authors' interests that could influence how the authors receive the work. The corresponding author (on behalf of all co-authors) should submit a conflict of interest disclosure form and is responsible for the accuracy and completeness of the submitted manuscript. Conflict of Interest Disclosure form can be signed by the corresponding author on behalf of all co-authors and stating that the submitted manuscript is the authors' original work, has not received prior publication and is not under consideration for publication elsewhere, permission has been received to use any material in the manuscript much as tables, figures etc. or no permissions have necessary to publish the authors' work.

1. Name of the corresponding author
2. Affiliation including e-mail and phone number
3. Manuscript Title
4. Do the authors or authors' institution at any time receive payment or services from a third party (government, commercial, private foundation, etc.) for any aspect of the submitted manuscript (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.)?

Are there any relevant conflicts of interest? Yes / No

5. Do the authors have any patents, whether planned, pending or issued, broadly relevant to the work?

Are there any relevant conflicts of interest? Yes / No

6. Are there other relationships or activities that readers could perceive to have influenced, or that give the appearance of potentially influencing, what the authors' information in the submitted manuscript?

Are there any relevant conflicts of interest? Yes / No

7. Are there any aspect of the work covered in this manuscript that has involved either experimental animals or human patients has been conducted with the ethical approval of all relevant bodies or not.

Are there any relevant conflicts of interest? Yes / No

Corresponding Author
Signature

Print Name

Date

AUTHORSHIP FORM

By completing and signing the following statements, the corresponding author acknowledges and accepts the responsibility on behalf of all contributing authors, if any, concerning Authorship Responsibility.

Manuscript title:

Corresponding author:

Affiliation:

Email:

Phone No:

By signing and filling this form, the corresponding author certifies that each author has met all criteria below (A, B, C, and D) and indicates each author general and specific contributions by listing his or her name next to the relevant section.

A. I certify that

- The manuscript is authentic and valid and that neither this manuscript nor one with considerably similar content under my authorship has been published or is being considered for publication elsewhere, except as described in an attachment, nor copies of closely related manuscripts are provided.
- I will provide the data or will contribute fully in providing and obtaining the data on which the manuscript is based for examination by the editors or their assignees, if requested.
- Every author has agreed to allow the corresponding author to serve as the primary correspondent with the editorial office, to review the edited manuscript and proof.

B. Each author has given final approval of the submitted manuscript.

C. Each author has participated sufficiently in the work to take public responsibility for the whole content.

D. Each author qualifies for authorship by listing his or her name on the appropriate line of the categories of contributions listed below. List appropriate author next to each section – each author must be listed in at least 1 field. More than 1 author can be listed in each field.

- conception and design
- acquisition of data
- analysis and interpretation of data
- drafting of the manuscript
- critical revision of the manuscript for important intellectual content
- statistical analysis
- obtaining funding
- administrative, technical, or material support
- supervision
- no additional contributions
- other (specify)

Corresponding Author Signature

Print Name

Date

FINAL CHECKLIST

International Journal of Human Capital in Urban Management (IJHCUM)

Prior to acceptance of the manuscript, the corresponding author is responsible to adjust the whole manuscript according to the following items and then the marked final checklist should be attached along with the covering letter:

- ☐ A covering letter herewith, **not previously published and submitted elsewhere, fully or partially**, must be signed and accompanied by the corresponding author in the time of manuscript submission.
- ☐ All authors have read the **Ethics in publishing, Plagiarism prevention and violation of Publication Ethics and Handling cases of misconduct**.
- ☐ The Manuscript has been **read and approved by all listed authors**.
- ☐ The title page contains the **Title, Author (s) Name, Degree (s), Addresses, Tel., Fax and Email** of author (s) separated from the manuscript body.
- ☐ Not only the corresponding author, but also the whole contributors of the manuscript are advised to be registered at the journal website in order to keep their names in the manuscript biosketches.
- ☐ The abstract words content is not less than **150** and more than **250 words**, which brings upper scores for both; the publication as well as author (s).
- ☐ Key words count should be 5 to 7 words.
- ☐ It is suggested to the authors to define some proper main subjects related to their manuscript topic.
- ☐ Figures / illustrations are **in high quality art work**, with at least 200 dpi to 300 dpi. All graphs preferred to be provided in excel format.
- ☐ All Figures and Tables are cited throughout the text.
- ☐ The references are cited based on the authors surname and year of publication (Harvard System) throughout the text body. Moreover, the list of the references is carefully arranged alphabetically at the end of manuscript.
- ☐ The number of references in the review paper preferred to be not contain less than 100; for original research paper or case report not less than 30 and for short communication 20 references are required.
- ☐ The majority of manuscript references must not be extracted from a single journal. The acceptable average can be indicated at most 4 to 6 references from each journal.
- ☐ A **copy right release and conflict of interest disclosure form** must be signed by the corresponding author in case of multiple authorships, prior to the acceptance of the manuscript, by all authors, for publication to be legally responsible towards the Journal ethics and privacy policy.
- ☐ The manuscript is in structured format with; **Abstract; Key words; Introduction; Materials and Methods; Results and Discussion; Acknowledgements and References**.
- ☐ The author(s) are appealed to provide the source(s) of financial support along with the grand number for the study in the acknowledgements section.
- ☐ Hereby, I accept liability for the scientific integrity of the manuscript contents.

Name:

Corresponding Author Signature:

Date: