Evaluation of the sustainability of the urban development sector in Iraq

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Abstract

Aim: Sustainability is now considered an important consideration of the urban development sector in terms of reducing undesirable impacts on human life and environment. This has led to the development of best-practice patterns and integrated elements of urban planning and design and the implementation of sustainable technology scenarios. Furthermore, urban development projects to promote unique solutions for various urban fields, as well as access to the potential inherent in urban development projects, whether existing, planned, or under construction, have been identified as extremely important. Identifying local urban challenges to existing development projects by investigating stakeholder perceptions can help determine the actual situation and offer an accurate view of the size of the challenges faced by such projects. Furthermore, measuring such projects’ quality, performance, and applicability in different urban environments, particularly in developing economies, such as Iraq is necessary.

Methods: A national survey was conducted to identify and investigate crucial challenges faced by the urban development sector in Iraq. Several important statistical tests were then applied to investigate the relationships between the identified items and the demographic characteristics of respondents, as well as to evaluate the sustainability of study indicators in terms of availability, public acceptance, and quality from stakeholders’ perspective in Iraqi cities.

Results: The survey achieved a response rate of 59.4% (n = 1,496) across all Iraqi regions. An 18-item scale related to the main topic was thus presented, with stakeholder's perceptions on each item evaluated on a 6-point Likert scale. Public awareness of the importance of sustainability was reflected in the fact that about 42% of the respondents were highly concerned with urban development, and well informed about sustainability issues. This offers an optimistic take on people's interest in sustainable urban projects in Iraq. About 71% of the participant were prepared to pay extra fees to live in a sustainable city in the future. However, the “Use of renewable energy” (mean = 1.77) was ranked lowest, based on it being generally “not available” for use.

Conclusion: the urban development sector in Iraq faces numerous challenges, both in terms of service quality and availability. This reflects an urgent need for the immediate development of sustainable practice in urban development projects.

Keywords: Iraqi urban projects, sustainable development, stakeholder perspectives.

1. Introduction

Sustainable urban development concepts have grown to become intuitively understandable and increasingly substantial parameters in modern urban planning and design in many countries and regions of the world; these aim to stimulate social and economic growth while minimising undesirable impacts affecting both humans and the natural environment [1], [2], [3] by achieving a balance among environmental, economic and social factors and encouraging local involvement in both the urban design process and decision making in order to achieve various goals [4]. The increasing importance of
sustainability is an indication of its acceptance as one of the most effective solutions to tackle urban development challenges [5], [6]. It represents the best practice patterns of urban development projects, as well as demonstrating the potential inherent in developing sustainable cities and implementing sustainable technology scenarios. Furthermore, urban development projects can promote creative and unique solutions for various urban issues, including infrastructure, construction, transport, roads, housing, and land use [7], to benefit people living within the urban environments to be constructed, regenerated, or rehabilitated [8] and in order to promote environmental and social well-being and economic, cultural, and amenity resource access for both present and future generations [9].

Recently, many specialists and academics have shown increased interest in urban development issues in the Middle East, and this has promoted discussion and analysis of existing urban challenges from a regional perspective within the international experience of practice [10], including within Iraq. Iraqi cities also have suffered from sharp deterioration, and vandalism of the quality of national urban environment both due to direct damages and a lack of maintenance, as well as a decades-long absence of planning due to successive wars and UN sanctions; these issues have caused the accumulation of multiple urban problems that have negatively affected both the quantity and quality of local urban development projects as provided to citizens, with unresolved issues with respect to energy, water supply, waste recycling, infrastructure, and similar important features [3], [11]. Several publications, including the Iraq National Development Plans from 2010 to 2018, have identified the qualitative and quantitative problems and challenges faced by Iraqi urban development projects, which include housing deficits, electricity deficits, shortages of drinking water, a lack of waste recycling, inadequate urban services, and a lack of alternative energy sources [11], [12]. The rehabilitation and rebuilding of new development projects is thus fundamental for all Iraqi cities and regions in order to fill the growing demand for improved standards of living in Iraq. Public participation is also a focal part of the sustainable development strategies required to achieve progress on basic issues such as making economic, social and environmental improvements, in order to add new perceptions, approaches, and knowledge around existing local urban conditions, which might not be widely known outside of the area, to plans at the earliest possible stage [13].

New urban development in Iraq aims to achieve sustainability, as this plays a major role in improving residents’ quality of life and the quality and performance of urban projects, and responses to this approach thus require assessment. This study thus aimed to identify the views and perceptions of stakeholders as a fundamental step towards determining public awareness, toward the adoption of sustainability as an approach to urban development. It also sought to identify the priorities and major problems of urban development projects for Iraqi cities. Stakeholder perceptions were identified using 18 indicators, developed from a review of previous studies, with a national survey conducted across all Iraqi cities. This survey had a response rate of 59.4% (N = 1496) from 18 Iraqi cities, with stakeholder perceptions assessed using a 6-stage Likert scale.

2. Methodology

A national questionnaire survey was conducted to identify public awareness of and attitudes toward sustainable development and to determine the major problems with current urban development projects for Iraqi cities. Statistical analysis of stakeholder’s perceptions was thus the main approach used in the study. Surveys are the most common technique for collecting data to determine an accurate estimate of variable prevalence [1], [14], [15]. The methodology followed by the study was thus as follows:

2.1 Questionnaire preparation

The questionnaire was prepared in four stages:

2.1.1 The main indicators used in the questionnaire were established based on a review of previous literatures and industry guidelines, and major Iraqi urban development challenges were identified. The questionnaire was then distributed in the period between November 2018 and March 2020.

2.1.2 Alongside field visits by the researcher to several Iraqi cities, people from other cities and regions were contacted by phone, mobile, and social media. Interviews were thus conducted with a wide range
of stakeholders including members of the public, experts, and government leaders, in order to explore their evaluations of the urban development projects in their cities and regions.

2.1.3 By integrating the result of stages 1 and 2, a draft online questionnaire was developed, and a pilot study was conducted online to evaluate the inclusiveness and clarity of the survey questions. The pilot study was distributed to 20 participants including urban planners and designers, university professors, architects, engineers in different fields, and members of the public. All participants were asked to identify any ambiguous and unclear questions, to assess their level of understanding of the content, and to note any important items that respondents might wish to add. The results of the pilot survey were then used to inform the final version.

2.1.4 An online survey technique was adopted, which was characterised by rapid and economic completions as compared with traditional methods of surveying respondents [14], [16]. A snowball sampling technique, which is considered academically to be universally applicable and appropriate for large scale questionnaires was adopted in order to access respondents from all possible cities and regions of Iraq [15]. The questionnaire was hosted and distributed on the Survey Monkey platform.

2.2 Stakeholder involvement
The comprehensive questionnaire was distributed to a variety of stakeholders of both genders, including various members of the public and specialists in related domains, as well as some government leaders. All 18 Iraqi provinces were included in the questionnaire, with recruitment performed based on population ratios, in order to highlight local urban projects and review the current situation most widely in terms of public awareness of and attitudes towards sustainable urban development. The only requisite for respondents to the questionnaire was to be above 18 years old. All the respondents were informed in writing that participation was voluntary, and the researcher also highlighted a commitment to preserve data confidentiality and respondent privacy.

2.3 Sampling
To ensure the distribution of the questionnaire across all Iraqi cities, a snowball sampling technique was used; this is generally considered a suitable and economic technique for large-scale surveys [15], [17]. The questionnaire was thus first distributed to a group of specific participants, who in turn forwarded it to others, and so forth, until the required number of participants was achieved [18]. The SurveyMonkey platform was used to host the questionnaire, and links were distributed to all Iraqi cities using various means including email, text messages, and social media. The distribution process for this study was been started and repeated several times from November 2018 until the end of March 2020. Statistical data analyses were then conducted in SPSS for selected urban indicators, such as scale frequency, mean, response percentage, and mode. Standard deviations (SD) were extracted, and internal consistency and reliability assessed using Cronbach’s alpha (α) [19]. The latter indicated a significant average correlation between the survey indicators, supporting the internal consistency of questionnaire items and ensuing internal reliability [3], [20]. The value of α in this study ranged between 0.879 and 0.920, indicating that the correlation between the items of the questionnaire fell well within the reliability scale, offering very acceptable reliability [21]. The average Cronbach’s alpha coefficient (α) for all questionnaire items was 0.920, indicating high internal consistency of a type described as the “gold standard” by some references [22]. Principal Component Analysis (PCA) was implemented to identify the underlying structure of questionnaire items with regard to highly correlated variables. PCA was implemented for all 18 items, causing three main groups to be defined: environmental; local services and housing; and land use and local facilities.
Finally, the Kaiser-Meyer-Olkin (KMO) process and Bartlett’s test of sphericity were utilised to identify significant correlations between questionnaire items. KMO was implemented to evaluate sampling adequacy, and the calculated value of KMO was 0.945, with most studies suggesting that values of KMO between 0.8 and 0.9 are great or high values [15], [17].
3. Results and analysis

3.1 Demographic characteristics of participants.

The demographic characteristics of the respondents are summarised in Figure 1. Among all respondents, 798 (57.8%) were male and 582 (42.2%) were female. Nine groups of participants were identified by age, with the highest rate of participation (17.2%) among the age group between 31 and 35 years old, followed by those aged 36 to 40 years, who accounted for 15.8%. Those groups aged 25 to 30 and 41 to 45 achieved 13.3% each, while age categories 46 to 50, 51 to 55, and 56 to 60 accounted for 11.7%, 8.4%, and 7.4% of responses, respectively. The age groups 18 to 25 and above 61, at either end of the population range, achieved 7.0% and 5.8% of responses, respectively.

The study was developed to take into account the impressions of a wide range of people with diverse professional backgrounds; however, almost a third of the respondents (675, 31.5%) were government employees, who get access to the internet for free [23], with 30.3% non-governmental employees representing the second highest percentage. Other positions, in descending order were self-employed (10.9%) and others (11.2%), which includes categories such as unemployed persons, full-time parents, and students.

Respondents with different levels of qualifications were sought to determine the survey outputs in a more objective manner [24]. Overall, 543 of the participants, more than one-third (39.9%) of respondents, were post-graduate degrees holders, with 414 (30%) holding under-graduate degrees. There were also 217 (15.7%) secondary school graduates, 121 (8.8%) with primary school certificates, and 85 (6.2%) respondents without any academic qualifications.

The questionnaire was distributed across all Iraqi cities in order to gather a wide range of stakeholder’s perceptions for all regions, based on population ratios [25]. Participation was higher than expected, with the highest response rate in Baghdad (the country’s capital), which holds 21.35% of the total population; the participation rate there was 338 (26.2%), much higher than the lowest (1.6%) response rate seen in Maysan, which holds just 2.92% of the population. Karbala came second at 260 (20.1%) responses, while Nainawa and Babil achieved 87 (6.7%) and 60 (6%) responses, respectively. Wasit, Thi-qar, and Al-Muthana accounted for 31 (2.4%), 27 (2.1%), and 22 (1.7%) responses, respectively. It was also noteworthy that 831 (64.3%) of the respondents lived in urban areas, with 287 (22.2%) of the participants coming from suburban areas; thus, only 174 (4.6%) respondents came from rural areas. Good diversity of different occupations, qualifications, and locations ensured that a wide range of respondents was represented in this study, however.
3.2 Descriptive analysis
Based on a review of previous literature on urban development projects in Iraq, key urban indicators were identified. The aim of the questionnaire was to assess public awareness of and attitudes towards sustainable development, as well as to identify the major problems, in terms of qualitative and quantitative markers, faced by urban projects in all 18 Iraqi cities by querying stakeholder perceptions. Issues addressed by existing urban project in Iraq were organised as shown in Figure 2, which presents the percentage of responses for each item on the 6-point Likert scale used to measure participants' perceptions of the quality or availability of these things in urban projects in the Iraqi context. Mean, mode and standard deviations (SD) of responses were also computed for all items. The items are shown organised in a descending order based on the mean response score; thus, the item “Drinking water”, was ranked as least bad in terms of quality (mean = 3.70, mode = 4, SD = 1.246), followed by “Educational facilities” (mean = 3.68, mode = 4, SD = 1.133), “Health facilities” (mean = 3.65, mode = 4, SD = 1.139), “Recreational facilities” (mean = 3.09, mode = 3, SD = 1.277), “Electricity availability” (mean = 3.08, mode = 3, SD = 1.170), “Roads and streets quality” (mean = 3.06, mode = 3, SD = 1.170), “Existing housing quality” (mean = 2.99, mode = 3, SD = 1.160), then “Infrastructure services” (mean = 2.91, mode = 2, SD = 1.180). The item “Use of renewable energy” (mean = 1.77, mode = 1, SD = 1.243) was ranked last in the list, while “Designated activity areas for the elderly and disabled” (mean = 1.84, mode = 1, SD = 1.252) had the second lowest mean score, followed by “Waste separation and recycling availability” (mean = 1.98, mode = 1, SD = 1.361). The last three items were classified generally in the “not available” category, as they are currently in use in urban projects in Iraq.

![Figure 1: Demographic factors for respondents](image-url)
3.3 Internal Consistency and Reliability

As shown in Table 1, all values for internal reliability estimates were higher than 0.8, suggesting that the questionnaire indicators (items) had similar attributes [3], [26]. The internal consistency and reliability, represented by the value of the Cronbach’s α of the overall scale at 0.954, suggested a very high level of overall reliability [17], [22]. Table 1 highlights that two of the 18 items had dual loadings for two questionnaire factors. The item “Educational facilities quality” had loadings of 0.62 and 0.592 on the “local services and housing” and “land use and local facilities” factors respectively, while “Health facilities quality” had loadings of 0.524 and 0.641 on “local services and housing” and “land use and local facilities”, respectively. To allow further investigation, the Cronbach’s α if items were omitted was examined for each item, and the level of decrease, if any, noted. As the mean score for educational facilities was 3.68 out of 5.00, while health facilities scored 3.65, they were ranked as important factors by all respondents. Considering this, the 2-factor solution was retained along with the original loadings of the items.

Table 1: Rotated Component Matrix of questionnaire items

| Urban Challenge Items                          | Component |
|-----------------------------------------------|-----------|
| Use of renewable energy                       | Environmental |
| Reclamation of desertified and contaminated lands | 0.843 |
| Designated activities areas for the elderly and disabled | 0.788 |
| Shaded streets and protected open spaces      | 0.786 |
| Waste separation and recycling availability  | 0.709 |
| Drinking water quality                        | 0.630 |

Figure 2: Analysis of urban development challenge indicators
Conservation of green spaces and forest 0.627  
Drinking water quality - 0.771  
Electricity availability - 0.674  
Educational facilities quality - 0.621 0.592  
Roads and streets quality - 0.597  
Availability of housing - 0.590  
Evaluation of Existing housing quality - 0.569  
Infrastructure services quality - 0.555  
Evaluation of existing housing quality - - 0.788  
Public amenities - - 0.708  
Designated activities play area for children - - 0.657  
Health facilities quality - 0.524 0.641  
Homogenous spatial grouping of activities - - 0.598  
Cronbach’s Alpha coefficient (0.954) 0.920 0.893 0.879  
Percentage of explained variance (69.072) 27.402 21.279 20.392

3.4 Personal information and perceptions about urban projects
To facilitate data analysis and interpretation, participants were regrouped and the variables re-categorised based on the three resulting groups. The distribution of the data was not normal, so non-parametric tests implemented on the 18 indicators as reported in Table 2. A Mann-Whitney U-test was carried out on “gender”, while a Kruskal-Wallis test was carried out on “age”, “occupation”, “qualifications”, “residency”, and “type of living area”. The results showed underlying reasons for many significant differences among the respondents’ perceptions. In terms of the type of living area, age group and qualifications, all items showed significant effects, except “Shaded streets and protected open spaces”, “Designated activity play areas for children”, and “Health facilities quality”, while gender had a significant effect on the perception of all items except “Designated activity play areas for children” and “Health facilities quality”. Similarly, residency created differences in the perception of all factors except “Shaded streets and protected open spaces” and “Homogenous spatial grouping of activities”. Occupation had a significant effect on the perception of ten items in total, indicating that it affected responses less than other factors. All responses to items of urban development projects had a high level of significance, with p < 0.05.

Table 2: Nonparametric test results

| Components                                      | p-value*             |
|------------------------------------------------|----------------------|
|                                                 | Gender² | Age group² | Occupation² | Qualification² | Residency² | Type of living area² |
| Environmental                                   |          |            |             |                |            |                      |
| Using renewable energy                          | 0.000*   | 0.000*     | 0.000*      | 0.000*         | 0.000*     | 0.000*               |
| Reclamation of desertified and contaminated lands| 0.000*   | 0.000*     | 0.000*      | 0.000*         | 0.000*     | 0.000*               |
| Activities areas for elderly and disabled       | 0.000*   | 0.000*     | 0.000*      | 0.000*         | 0.000*     | 0.000*               |
| Shaded streets and protected open spaces        | 0.001*   | 0.029*     | 0.039*      | 0.024*         | 0.226      | 0.264                |
| Waste separation and recycling availability     | 0.000*   | 0.000*     | 0.394       | 0.000*         | 0.000*     | 0.000*               |
| Conservation of green spaces and forest         | 0.000*   | 0.000*     | 0.000*      | 0.000*         | 0.000*     | 0.000*               |
| Local services and Housing                      |          |            |             |                |            |                      |
| Drinking water quality                          | 0.000*   | 0.000*     | 0.000*      | 0.000*         | 0.000*     | 0.000*               |
| Electricity availability                        | 0.000*   | 0.000*     | 0.134       | 0.000*         | 0.000*     | 0.000*               |
| Educational facilities quality                  | 0.001*   | 0.000*     | 0.009*      | 0.000*         | 0.017*     | 0.000*               |
| Roads and streets quality                       | 0.000*   | 0.000*     | 0.000*      | 0.000*         | 0.000*     | 0.000*               |

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Taking them aware is respondents were informed through various means such as advertisements, internet, social media, TV.

In this study, some questions were designed to assess public awareness of sustainability issues, as well people’s preferences with regard to live in sustainable cities. The results reflect a positive state of public awareness among the Iraqi people with regard to the sustainability of urban development, as well as their willingness to pay extra to live in sustainable cities in the future. In terms of the concept of a sustainable city, the questionnaire presented addresses the importance of the public awareness toward urban sustainability, and about 38% of the respondents claimed that they were extremely concerned and well informed about sustainability issues, while about 51% of the respondents were very interested or moderately interested in such issues. Respondents were informed through various means such as the internet, social media, TV programmes, newspapers, books, personal experience, friends and advertisements, with some respondents specialising in topics related to urban sustainability.

| Land use and Local facilities | Availability of housing | Evaluation of Existing housing quality | Infrastructure services quality |
|------------------------------|-------------------------|---------------------------------------|--------------------------------|
| Recreational facilities quality | 0.917 0.001* 0.637 | 0.000* 0.000* 0.000* | 0.000* 0.000* 0.000* |
| Public amenities | 0.003* 0.019* 0.667 | 0.000* 0.011* 0.000* | 0.000* 0.000* 0.000* |
| Designated activities play area for children | 0.735 0.245 0.151 | 0.003* 0.000* 0.004* | 0.000* 0.000* 0.000* |
| Health facilities | 0.094 0.0010* 0.520 | 0.174 0.000* 0.032* | 0.000* 0.000* 0.000* |
| Homogenous spatial grouping of activities | 0.019* 0.002* 0.545 | 0.000* 0.096 0.000* | 0.000* 0.000* 0.000* |

Notes: * p < 0.05, † Mann-Whitney U-test, ‡ Kruskal-Wallis test

4. Discussion

The priority issues arising from the stakeholder’s perceptions of urban development in Iraq were as follows:

4.1 Increased public awareness of urban sustainability

Globally, public awareness of urban sustainability grown as people realise this is critical to promoting sustainable development and improving capacity to address environmental, social, and economic development issues. This can provide the underpinning to change people’s attitudes and to enable them to identify both positive aspects supporting and obstacles to implementing sustainable development. It also helps develop concern for the environment and increases motivation to improve or maintain environmental quality. In addition to developing the substantial skills and experience needed to tackle environmental challenges, it encourages people to adopt the appropriate motives and commitments to make informed decisions and take responsible action [23], [27] in a local context. It is thus crucial for achieving ecological and social awareness, ethical values and attitudes, and behaviour and skills consistent with sustainable urban development, as well as for increasing effective public involvement in decision-making [15], [28]. A public awareness campaign to improve mass mobilisation through extensive explanation of sustainable development and its aims, including the importance, objectives, ambitions, and limitations of projects is thus required. This could also give hope and signal governmental intent to the public, rebuilding confidence and legitimacy with citizens. It could further permit the government to re-establish a robust inclusive interaction with citizens, making them aware the benefits they will be receiving as well as providing them with the means to monitor the fairness and transparency of the rebuilding process [3], [29].

Despite growing public awareness toward environmental sustainability issues, a lack of adequate knowledge offers a fundamental obstacle to achieving sustainable development at both global and local levels [7], [30]. Effective sustainability awareness campaigns and civic education programmes are thus required for both professionals and the general public to inform them about the direct and indirect causes and impacts of urban development challenges, including international and local issues, immediate and long-term issues, and global perspectives in this field. In addition to using various standard means of communication, media and social networking should be utilised to encourage shifts in existing paradigms and ways of thinking to achieve a sustainable urban future, especially in developing communities [4].

In this study, some questions were designed to assess public awareness of sustainability issues, as well people’s preferences with regard to live in sustainable cities. The results reflect a positive state of public awareness among the Iraqi people with regard to the sustainability of urban development, as well as their willingness to pay extra to live in sustainable cities in the future. In terms of the concept of a sustainable city, the questionnaire presented addresses the importance of the public awareness toward urban sustainability, and about 38% of the respondents claimed that they were extremely concerned and well informed about sustainability issues, while about 51% of the respondents were very interested or moderately interested in such issues. Respondents were informed through various means such as the internet, social media, TV programmes, newspapers, books, personal experience, friends and advertisements, with some respondents specialising in topics related to urban sustainability.
The majority of the respondents (78%) were prepared to pay extra money to live in a sustainable city, with only 7% of the respondents rejecting the principle of paying to achieve this. This clearly highlights public desire to achieve urban sustainability. Another positive indication was that half the respondents (52%) strongly agreed that Iraqi cities have been developed in unsustainable ways; while 25% only slightly agreed, just 8% of the respondents totally disagreed with this perspective.

Finally, about 71% of respondents agreed that the community is extremely or very influential in achieving a sustainable city, and a further 13% of the respondents thought the community was moderately influential. Just 4% of the respondents believed that the community is not an influential factor in achieving sustainability in urban projects.

These figures are encouraging indices for Iraqi authorities addressing the challenges of the unsustainable current reality of urban development in Iraq, and they should spur them to achieve sustainable urban design projects that address current and existing local urban challenges in addition to striving to meet the people’s needs and ambitions while respecting their culture. Raising public awareness can clearly promote a culture of sustainability and thus help create sustainable cities for the future.

4.2 Public assessment of existing urban development projects

Several local and global studies have examined the collapse of basic infrastructure and social public services provided to the population in the majority of Iraqi cities, in addition to the absence of tools for sustainable urban planning and design and the lack of use of renewable energy, despite the latter being considered an essential part of modern urban development plans [11], [29], [31], [32], [33].

In Iraq, the current pressing need is to fully understand and absorb the local circumstances on the ground, in order to address urban problems and to fulfil residents’ needs, as indicated by the results of the questionnaire. These results coincide with the results of other urban development studies of Iraq. The 18 of the survey items were ranked on a 5-point Likert scale, ranging from 1 to 5 (1 = Unimportant; 2 = Of little importance; 3 = Moderately important; 4 = Important and 5 = Very important). The most significant urban development projects were included in the questionnaire, and stakeholder evaluation was mainly based on assessing the quality of the urban projects or their availability.

Figure 3 presents these projects in detail:
5. Conclusion

There is now broad agreement that sustainability is needed to stimulate urban development projects while helping to reduce undesirable impacts on humans and the environment currently and in the future. It also helps develop unique solutions for various urban issues such as infrastructure, construction, transport, roads, housing, and land use, facilitating essential decision making and displaying the potential inherent in developing cities projects in sustainable ways.

This study utilised a national questionnaire survey to review and identify the urban challenges of existing projects according to the stakeholders' perceptions in order to assess the existing situation, including determining the size of the challenges by measuring their quality, performance, and availability in various urban environments in Iraq. Such urban projects suffer from many problems, both in terms of quality of services provided and projects available at the urban level in the Iraqi context. The 18-item questionnaire reflected urgent urban development projects, which were assessed on a 6-point Likert scale. Descriptive analysis and principal component analysis (PCA) were then conducted on the collected data, with non-parametric tests used to identify any important differences in stakeholder perceptions of the PCA items based on local factors.

PCA was used to distribute the dimensional structure of the questionnaire items for three components, with high levels of internal consistency and reliability (Cronbach’s α). Projects in the various groups can thus be considered adequately related. The three groupings were environmental; local services and housing; and land use and local facilities. The results highlighted that public awareness of urban sustainability was about 42%, which offers a generally positive picture of people's interest in urban development sustainability issues, as well as their willingness to pay extra to live in sustainable cities in the future. In terms of stakeholder assessment of current urban development projects, the item “Drinking
water”, was ranked as least bad in terms of quality (mean = 3.70), followed by “Educational facilities” (mean = 3.68). However, the item “Use of renewable energy” (mean = 1.77) was ranked lowest, being not generally available for use in current urban projects.

The survey results reflect an urgent need to develop sustainability in urban development projects in Iraq, and it must be considered an essential step to implement sustainable practice in urban development projects in all Iraqi cities in the future. Effective sustainability awareness campaigns and civic education programmes are required for both professionals and the general public in order to rebuild human capital, and to allow the community to maintain contact with the direct and indirect causes and impacts of urban development challenges, including international and local and immediate and long-term issues, as well as global perspectives in this field. The use of various means of communication, including traditional media and social networking is required to encourage shifts in existing paradigms and ways of thinking in order to develop a sustainable future, especially in developing communities.

References
[1] Chogueill, C. L. Developing sustainable neighbourhoods. Habitat International 32(1), (2008), pp. 41-48.
[2] Ameen, R.F.M. & Mourshed, M. Urban environmental challenges in developing countries—stakeholder perspective. Habitat International 64 (2017): 1. (2017).
[3] Ameen, R. F. M. & Alyasari, H. I. & Altawel, M. D. Stakeholders’ perceptions of social and economic challenges in adopting sustainable urban development in post-war countries. IOP Conference Series Materials Science and Engineering 671:012127. (2020).
[4] Wang, N., Yao, S., Wu, C.-C. and Jiang, D. Critical factors for sustainable project management in public projects. In: Technology, Innovation and Management for Sustainable Growth South Africa. International Association for Management of Technology (IAMOT). (2015).
[5] Nghia, N. C. Management Research about Solutions for the Eradication of Global Poverty: A Literature Review. Journal of Sustainable Development 3(1), (2010), p. 17.
[6] Ameen, R. F. M., Li, H., & Mourshed, M. Sustainability assessment methods of urban design: a review. Paper presented at: the 21st International Workshop: Intelligent Computing in Engineering (ISBN: 978-0-9930807-0-8), Cardiff, UK. (2014).
[7] Ameen, R.F.M. & Mourshed, M., & Li, H. A critical review of environmental assessment tools for sustainable urban design. Environmental Impact Assessment Review, 55, 110-125. (2015).
[8] ECDC. Toward Sustainable Urban Development: A Strategic Approach. The European Community's Development Co-operation. (2002).
[9] Mitich, M. S. Sustainable approaches to a reform of coal mining industry in Serbia. Journal of Sustainable Development 3(1), (2010), pp. 61-68.
[10] Saleh, M. A. E. Planning issues in the Middle East, an introduction. Habitat International 28(4), (2004), pp. 501-503.
[11] CSO. The Iraq National Development Plan (2013-2017) Iraq: Central Statistical Organization-Republic of Iraq. (2013).
[12] TCPP. National Development Plan 2010-2014. Baghdad- Iraq: Technical Committee for Plan Preparation- Iraqi Ministry of Planning. (2010).
[13] DETR. Public Participation in Making local environmental Decision. London, UK: Department of the Environment, Transport and the Regions. (2000).
[14] Huang, H.-M. Do print and Web surveys provide the same results? Computers in Human Behavior, 22 (3), 334-350. (2006).
[15] Ameen, R. F. M. A framework for the sustainability assessment of urban design and development in Iraqi cities. PhD Thesis submitted to the Cardiff University, UK. (2017).
[16] Stanton, J. M. An empirical assessment of data collection using the internet. Personal Psychology 51(3), (1998), pp. 101-107.
[17] Ameen, R.F.M. & Mourshed, M. Environmental, Social and Economic Challenges for Urban Development: Stakeholder's Perception in a Developing Economy. Paper presented at: the 16th
International Conference on Computing in Civil and Building Engineering 2016, ICCCBE2016At: Osaka, Japan Volume: Proceedings, ISBN: 978-4-9907371-2-2. (2016).

[18] Padam, S., Arvind, P. and Rani, A. *House-to-house survey vs. snowball technique for capturing maternal deaths in India: A search for a cost-effective method*. Indian Journal of Medical Research 125(4), (2007), pp. 550-556.

[19] Cronbach, L. J. *Coefficient alpha and the internal structure of tests*. Psychometrika 16 (3), (1951) pp. 297-334.

[20] Webb, N. M., Shavelson, R. J. and Haertel, E. H. *Reliability coefficients and generalizability theory* (2006).

[21] Tavakol, M. and Dennick, R. *Making sense of Cronbach's alpha*. International Journal of Medical Education 2(2011), pp. 53-55.

[22] Ahmad, B. I. and Ahlan, A. R. *Reliability and validity of a questionnaire to evaluate diabetic patients' intention to adopt health information technology: A pilot study*. Journal of Theoretical and Applied Information Technology 77(2), (2015), pp. 253-264.

[23] Ameen, R.F.M. & Moursheed, M. *Urban sustainability assessment framework development: The ranking and weighting of sustainability indicators using analytic hierarchy process*. Sustainable Cities and Society 44 (2019): 356-366.

[24] OPM. Administrative Analysis Grade Evaluation Guide. USA: U.S. Office of Personnel Management (1990).

[25] OCHA. *Iraq City Population* [Online]. United Nation Office for the Coordination of Humanitarian Affairs. Available at: http://www.citypopulation.de/Iraq.html [Accessed], (2014).

[26] Cerny, B. A. and Kaiser, H. F. *A study of a measure of sampling adequacy for factor-analytic correlation matrices*. Multivariate Behavioral Research 12(1), (1977), pp. 43-47.

[27] UNESCO ed. *Tbilisi Declaration. Environmental Education. Tbilisi, Georgia*. UNESCO & U.N. Environment Programme (UNEP), (1977).

[28] Singh, J. P. United Nations Educational, Scientific, and Cultural Organization (UNESCO): *creating norms for a complex world*. Routledge. (2010).

[29] WorldBank. International Bank for Reconstruction and Development Project Appraisal Document on A Proposed Loan in the Amount of US$ 350 Million to the Republic of Iraq for an Emergency Operation for Development. The World Bank Organization, (2015).

[30] Fjellstrom, K. *Module 1e- Raising Public Awareness about Sustainable Urban Transport*. Germany: Gesellschaft für Technische Zusammenarbeit (GTZ), (2002).

[31] UNHSP. *Iraq Reconstruction Plan Shelter and Urban Development*: United Nations Human Settlements Programme (UNHSP). (2003).

[32] UNDP. 2015. United Nations Development Programme in Iraq [Online]. United Nations Development Programme Available at: http://www.iq.undp.org/content/iraq/en/home/countryinfo.html. (2015).

[33] Mohammed Ameen R F and Kadhum Almayyahi S J 2020 Viability of utilizing the global methods for assessing the sustainability of urban design projects in Iraq *Kerbala J. Eng. Sci. 1* 15–25