

Adaption and Satisfaction Level of Housing Environments During Coronavirus Curfew in Jordan



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ABSTRACT

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The global epidemic, evidenced the design gap formed in architecture where COVID-19 changed the way people live, induced designers to see how the epidemic affects people's daily habits in the built environment in the long-term life within a new framework and vision of redesigning houses with the below perspective. This paper aims to discuss the design gap in pre-epidemic house design and how COVID-19 affects the relative parameters, focusing lost and unused spaces. Hence the suggestion stems from the need for providing solutions to the various crises that occur in the world, in order to contribute to a new urban life. The impact on houses that reflects the way of live in the community focusing on the mid-size apartments redesigning and creating new single spaces that combine several services for people needs during the pandemic COVID-19 lockdowns or self-isolation. This research is based on data collected during coronavirus curfew to analyze the satisfaction and adaptation of the housing environments design at psychological and physical levels in Jordan. Mixed-methodological approach is used for gathering information as well as getting a deeper understanding regarding the quality of housing environment from two perspectives: dwellers' and housing designers' perspective. The used methods are questionnaire that executed by using an online survey application and focus group executed via online meeting because of the COVID-19 lockdown. The data analysis showed that the architects' role in both academic and professional fields should collaborate to raise awareness regarding the importance of creating high quality environments beside giving value to aesthetics. As well, focusing on humanistic aspects through adopting design approach derived from adaptability and flexibility to meet the dwellers' needs in different situations such as a COVID-19 lockdown.

1. INTRODUCTION

The first architectural form was housing building, people built houses to get sheltered, but having a building to live in is not adequate if the quality of housing is not considered for increasing the standard of living. The poor-quality of housing causes negative impacts on both mental and physical health. Housing quality refers to physical and psychological attributes, the house design is one of the main factors that influence the housing quality.

This research focusses on exploring the various meanings and interpretation of housing quality, especially during pandemics and lockdowns generally. Attentions are paid to understand the impact of housing quality (included the physical aspects such as the internal and external features of dwellings and the physiological aspects) at the Jordanian houses during coronavirus curfew. The Jordanian people, as in the rest of the world, forced by defense law to stay indoors for long time for preventing the spread of coronavirus, in other words, their entire daily activities did not extend beyond the walls of their Houses. As well, this is the first time that the Jordanian people have gone through this experience, so that raise the need of studying the impact of housing environments on the dwellers' satisfaction and adaption. With the design of their houses by obtaining a comprehensive understanding of the dwellers needs to provide housing designers with diverse

knowledge about housing demand from design and psychological perspectives.

During lockdowns the home and its redesign became more important than ever before as spending a lot of time at home leaves people looking at their homes in a different way with the house becoming a focus not only for regular duties and leisure, but also for full-time work, exercise, and education.

Corona pandemic sheds light on the design gap that formed our habits, so the housing design will also change under this influence [1], where the dwellers need more privacy as well as lack various services and spaces that they used to spend outside the house. Thus, the quality of housing environment should be considered for increasing the standard of living. Housing quality refers to physical attributes, so the poor-quality of housing causes negative impact on both mental and physical health [2].

The research for a set of issues related to the importance of redesigning different mid-size apartments, were lockdown effects and impacts are amplified. Home improvement during the epidemic and how to make changes according to lacks in terms of needs and how to use wasted spaces in the house, highlights the importance of carrying out this study to determine the most problems that individuals faced in terms of health, mental and service due to the Corona pandemic (COVID-19).

In light of these elements, designing Jordanian homes must

follow a review of many of the characteristics as homes are distinguished by the particular internal distribution, usually designed depending on the basic service needs of the home, the indifference to the entertainment side, and the absence of design of free spaces. These gaps evidenced by the Corona pandemic (COVID-19), with social consequences. The home isolation spaces from the rest of the home puts in serious discussion the way of current design [3].

Before Corona pandemic (COVID-19) the urban texture of many Jordanian cities, suffers a low ratio of public, semipublic and green spaces at quantitative qualitative level. The urban texture in Jordan is characterized by a high ratio between the number of users of relative internal and external spaces producing a high level of crowding [4], producing negative effects on users during the Corona pandemic (COVID-19), caused from the reduced mobility in private and semipublic spaces.

The study seeks to adopt a new approach in redesigning Jordanian apartments to create suitable and healthy spaces, and to focus on the person needs in providing a multi-use place in terms of reducing the spread of diseases and viruses.

2. Literature REVIEW

Housing environment includes several attributes which are physical, psychological, and social. The physical and psychological attributes are mostly touched in this study, since the social life is closed down because of coronavirus curfew, consequently people spent the weekdays and weekends indoors. The physical attributes include tangible and perceivable features at the housing environments [5, 6]. While the psychological attributes relate to the feelings. In other words, the environments impact the perceivers' (dwellers) feelings and that relate to the individual differences such as background, occupation and so on [7]. The poor-quality of housing has directly and indirectly negative impact on mental, physical, and socio-emotional health because the dwellers and the housing environments are connected to each other [8, 9].

Physical health and mental and emotional well-being beside social coherence should be articulated more forcefully in housing design. Accordingly, providing healthy housing environments is a very important issue to meet the psychological needs of the dwellers the same as physical needs, [10]. Thus, housing flexibility can offer better, adaptable, customizable, affordable and accessible domestic setting in every aspect that brings comfort to the [dweller's] physical, mental and socio-emotional health, as well as flexible housing meets the dwellers' needs throughout time.

Design Flexibility facilitates the control of customizing, adapting and changing the space with indoor setting as per owners changing needs to offer a greater extent of choices rather than moving to a new place. Housing flexibility is changing the living environment in consonance with the dwellers' needs throughout the time recognizing the environment's prospective development, design and the social scenarios in relation to the future needs of the dwellers. Furthermore, overcrowding in houses is a poor-quality housing because it makes the lack of privacy that cause anxiety and stress, in other words, it impacts the dwellers' health negatively. As well, the number of rooms impacts the dwellers' health where increasing the number of rooms has a positive impact [11].

Studies and perceptions have shown that dependence on the

house and its services will continue even after the epidemic subsides. Therefore, we will need to adapt it for entertainment and more activities and services that have moved house. Based on studies, research and trends of scientists and designers, and current concepts that arose during the epidemic period, we have studied and compiled a dataset on how the design must change to adapt to the new individual's needs after COVID-19. This proposal can transform divided and disassembled spaces into rooms that fit the current lifestyles, and turn them into more comfortable and interesting houses. The results of which have led to the new dependence on the house that will continue even after the epidemic recedes because houses have taken a major role in our daily life and thus will need a new type of activities and services and current trends.

We searched for a set of examples that used methods and solutions to change the design of the house for the better after COVID-19 where works focused on the integration of the social and service areas of the original plans. The organization of the ground apartments characterized by many small modifications making it possible to transform the spacious apartment more suitable for the contemporary needs of the new residents. Because the population's adaptation to future trends through thoughtful plans can greatly improve the quality of life for the better [12].

3. BACKGROUND

The Jordanian houses are distinguished by the presence of large living room that brings the whole family together. Families are classified generally into large and extended families, which shows the need for the design of the living rooms to be large in addition to the traditional design characteristic that exists in most houses (the guest room) and could be used with adequate modification for the quarantine period.

Houses in Jordan generally have a particular internal distribution of bedrooms and living rooms. The presence of bedrooms on the west side of the house, which negatively affects the distribution of the rest of the house, living rooms which are often the center of the house, and the bedrooms in addition to the living room are the most used during the house quarantine period, according to the questionnaire.

3.1 Physical aspects in houses during COVID-19

Individuals' needs could be different, but the house needs are common, that the architect must consider in his design because the design purpose is to provide comfort to individuals and community. Any family needs a set of different spaces with different functions, such as personal, recreational, spaces for studies, and for a sense of isolation spaces, and we cannot exclude the importance of providing a method of waste disposal, in addition to the great importance of providing comfort. Managing pollution and wastes, especially after the Corona pandemic (COVID-19), highlighted important new aspects of the design. A set of common problems was noticed after the Corona pandemic such as:

- Shared services such as bathrooms, which are common services among most individuals, so they were factored to reduce any viruses or bacteria, and the biggest problem was that they were far from the entrance to the house, where individuals lose the opportunity to sterilize and wash before entering the house.

- Balconies and outdoor open spaces do not provide sufficient and adequate ventilation and lighting for the needs of individuals, especially (stone hours for individuals infected with the Coronavirus).
- The lack of enough spaces for individuals to do the work tasks they used to spend outside and spend it at the house, even the lack of quiet places for children to do housework.
- One entrance leads to the house immediately, and this leads to direct communication with the outside, and there is no direct way to dispose of waste or sterilize it before entering the house and lack of storage space to store food during a pandemic.

3.2 Mental health psychological aspects during lockdown periods

People who were isolated during times of epidemics were more likely to have acute stress disorder, adjustment disorder, and sadness. People were experiencing dramatic changes in routine and altered social life. The severe lack of social contact had an effect on mental health, increased stress, and severe violence. On all family members, children were the most vulnerable to social tension during house isolation due to school closures in cases of health emergencies, and the proportions of children who were exposed to psychological pressure during quarantine were very high, and the effect of quarantine in houses resulted in lack of movement and activities due to lack of The presence of appropriate places, which caused many physical problems for families, and the economic changes had a great impact on whole families, which resulted in an unhealthy family environment (physically and mentally) that can be summarized:

- Lack of spaces for different activities for individuals, green spaces and healthy ventilation leads to mental and physical health problems.
- The narrowing of spaces in the house apartments has a severe negative impact and works to cause health problems and increase the exile pressures on individuals, as green spaces empty the accumulated energies during the quarantine of individuals.
- The absence of recreational spaces, which resulted in an increase in the rates of obesity and physical diseases.
- The lack of social life during the quarantine has led to high consequences for individuals, which led to the human need for an alternative that maintains continuity with life and the poverty of houses to different spaces and their narrowness did not help families to succeed in that.

3.3 The social impact of the housing spatial distribution during lockdown periods

According to what happened in the Corona pandemic and the house isolation that individuals practiced for the first time and spent this time at the house for the first time. Negative health conditions that individuals witnessed were associated with social isolation, which caused depression and unavailability of the necessary spaces to meet the needs,

business and practices that required the individual to do in his house. A social miscommunication during the pandemic was relieved, at the level of external and domestic environment.

4. METHODOLOGY

Research methods generally are how to build a scientific analysis based on “how” to produce a systematic knowledge that explains how do you “know” things [13]? Generally based on a theoretical knowledge and experimental one.

In our case seen the novelty of the argumentations and the highlighted need of recent information we based our methods on mixed-methods approach (quantitative and qualitative) [14], is used for understanding the impact of the attributes of housing environment on the dwellers’ satisfaction and adaptation with their houses design during the long-stay at house during coronavirus curfew in Jordan. As well, offering more information about housing environments preferences/satisfaction from two aspects: Design and psychology. Two methods are used for gathering information from two perspectives: dwellers’ perspective and housing designers’ perspectives which are questionnaire and focus group.

4.1 Questionnaire

The questionnaire is used to understand the dwellers’ experience of interacting with the housing environment during the curfew whether designedly and psychologically. This method helped in collecting information quickly and easily by using an online survey application where the responses are gathered and analyzed through this application. The questionnaire includes different types of question; multiple choice, scaling, close-ended and open-ended questions. The collected information was classified in tables, pie-charts, bar-charts, and percentages and looking for common themes as well as different responses.

4.1.1 Respondents

The respondents addressed in the questionnaire have an architectural background and are divided as follow: 38 students, 27 professional architects and 14 academic architects, as well 21 respondents from other fields. They are 75 females and 25 males; their ages are between 19-40 years.

The respondents live in two types of houses: 58 respondents live in apartments, while 42 respondents live in a single - detached house. The areas of their houses are the following: 30 respondents live in house its area less than 150 m², 49 respondents live in house its area in between 150-240 m², and 21 respondents live in house its area more than 240 m².

The studied sample of this study includes 100 houses, in relation to the respondents’ number, whether apartments or single-detached houses: 60 houses have gardens, while 40 houses do not have gardens. As well, 78 houses have balcony, while 22 houses do not have balcony (see Table 1).

Table 1. Targeted users and their inhabitation’s typologies

Home surface (mq)			Home type			User profession			Users age		User gender		
Less 150	150-240	More 240	Apartment	Single-detached house	With balcony	With garden	Academic architects	Professional architects	Other fields	Under 40	Over 40	Male	Female
30	49	21	58	42	40	60	14	27	59	55	35	25	75

4.1.2 Questionnaire results

As shown in Table 2 the analysis of data highlighted the following findings:

- 40 dwellers stated that there is wasted space in their houses, mostly house's layout is linear and has a large corridor that runs along the house. This design style produces a smaller number of rooms, bad space distribution, and the tiny spaces in comparison with the corridor.
- 55 dwellers noticed orientation cause lack of sunlight and bad ventilation, so that impacts the dwellers negatively whether physically or psychologically.
- 62 dwellers stated that not having outdoor spaces (22 houses do not contain balcony and 40 houses don't contain garden) is a negative thing while the other houses that contain outdoor space considered positive attributes to have. The criticism was that gardens are not well-designed, its spaces are not exploited properly, don't include playground spaces for children, and low privacy fence. The balconies are tiny and mostly have poor orientation, in other words, lacking sunlight and wind.
- 55 dwellers realized more details of their houses after curfew than before the curfew, that goes more in line with house body personality where half of the dwellers prefer to stay under house regardless of the house design.
- 50 dwellers heard the necessity to add other spaces that meet their needs such as: playground, a glass room with a view, a space for family activities, a space for studying, working, a space for children, a space for playing sport, and extra rooms to fit the number of the family members, the dwellers stated.
- 10 dwellers tend to make some changes in the design of their houses such as: making the openings bigger, making the kitchens bigger, exploiting roof floors, merging their houses with the outdoor space, redistributing spaces, increasing privacy.
- 75 dwellers stressed the necessity of removing guest room and its services or at least minimize its size as much as possible. That's consistent with architects' suggestion as a design criterion.

As we notice from Table 2 evidence the low ratio of the users' satisfaction related to their homes, many deficiencies were evidenced in the majority of cases. The dwellers who felt the adaptation during the curfew is not easy because of some issues relates to the surrounding context, such as noise that relates to proximity to the main roads (high traffic), low privacy because of proximity of buildings, and the absence of parks close to their houses. On the other hand, the dwellers who adapt to the curfew easily that because their houses contain spacious indoor spaces, and architectural layout corresponds with the distribution of spaces, gardens, balconies, sunlight, wind (natural ventilation), a space with a view,

privacy, well-designed interiors, and spaces for children, as well as they stated psychological dimension which is family inclusion.

4.2 Focus group

Focus group A focus group is held with 12 architects from professional and academic fields via online meetings, to debate different questions to get deep insight about the housing design style in Jordan in relation to the dwellers' need (design and psychology) during the curfew. This method is used to get an insight how coronavirus crisis might impact approach and strategies of designing housing environments by taking into consideration both design and psychological aspects.

4.2.1 Focus group results

An open discussion among the architects showed the following findings:

- Importance of modification for housing design criteria as raised during the open discussion among the architects regarding how coronavirus could change housing design tendency in Jordan.
- Housing design criteria that should be taken into consideration are:
 - 1- Adding interior spaces for studying, working, entertainment, and group interaction, garden, and balcony. All these places should fit the number of family members.
 - 2- Eliminate or minimize area of guest room and its services and exploit this space in other daily activities instead of doing wedding parties in it.
 - 3- Studying psychological factors.
 - 4- Minimizing the built area in favor of outdoor areas such as gardens, balcony, and terraces.
 - 5- The living room should not be at the center of the building where no sunlight or wind come in in contrast to the guest room which is occupied occasionally.
 - 6- Making the bedrooms bigger where the children can do different activities within their room such as drawing, sport, and so on.
- The design style will not be affected directly but our future design vision will be wider where the design tends towards temporary structure techniques and flexible design.
- Five architects stated it is a temporary situation and it is just a medical challenge, so no need to change our lifestyle and our design style. In addition, the biggest and most important development will be in healthcare buildings that housing buildings, especially insolation departments at hospitals.
- They raised some planning issues that should be considered in the future such as making the streets wider and considering pedestrian paths.

Table 2. Targeted users level of satisfaction of their inhabitation's typologies during the lockdown

	Wasted bad organized	Bad orientation	Lack of outdoor spaces	Lack of details	Necessity to add other spaces	To make hard changes
Home layout	40					
Sun light and ventilation		55				
balcony and garden			62			
Bad personal and gathering spaces				55		
Personal cure, study and work spaces					55	
Modifying openings and Furniture's						10

- Finally, the architects during the discussion stressed the importance of changing the traditional thinking and practices to apply these design criteria such as the owner's control on design of her/his house, stockholders are the decision makers, in other words, money talks not the experts. Therefore, coronavirus crisis should be that starting point for convincing customers and stakeholders.

5. DISCUSSIONS OF FINDINGS

The respondents to the questionnaire criticized several issues that affected the quality of housing environments during the curfew negatively such as layout, lighting, ventilation, privacy, and interior spaces. Also, from their point view, these issues should be modified to get physical and psychological comfort within housing environments, the dwellers "seek coziness, privacy, and intimacy, bioclimatic comfort, safety, hygiene and good conditions for psychological and physical regeneration" [10]. However, some architects during the discussion stressed that coronavirus curfew is a non-permanent circumstance it merely has temporary changes in our lifestyle where we get back to the normal life as it was before coronavirus crisis. As well, the architects stated that it is a medical challenge where the Ministry of Health should take actions to limit the spread of coronavirus by raising awareness of how to deal with surrounding people and context to be not influenced, and to terminate it by inventing a serum. Therefore, no need to change our lifestyle and our housing design style. The architects emphasized that the future vision tends towards temporary structure techniques and flexible design, in which the housing design will not be affected directly, but the most important development will be in healthy building design. While, the issues which are mentioned by the dwellers are included in three main aspects: indoor environment (layout, lighting, ventilation, and interior spaces), outdoor environment (garden and balcony), and context (orientation and proximity).

5.1 Indoor environment

The issues that relate to the layout of their houses are there is wasted space in their houses and mostly that relates to the linear layout, so this type of layouts usually has a large corridor that runs along the house. Having a big corridor create a smaller number of rooms, bad space distribution, and the tiny spaces in comparison with the corridor size. When the architects organize a space program of a building, they have to consider some design criteria that correlate with the dwellers' experience and different recourses, then figure out the suitable criteria to use in relation to rational criteria for architectural. Having rooms less than the number of the family members leads to less privacy and difficulties to do activities such as working, studying, and so on. Also, the tiny space has the same impact besides having bad ventilation and lighting. Houses that do not contain a big corridor still have wasted space because of having big, squared spaces that do not correspond to its intended function. Another issue stated by the dwellers is poor orientation of houses has negative impact physically and psychologically because of lacking daily sunlight and wind. The best orientation lets the dwellers get maximum benefit of the wind and the sunlight, thus getting physical and psychological comfort. In other words, providing the dwellers with sustainable houses for healthy house [15].

Regarding the interior spaces, the dwellers and the architects agreed on the importance of modifying some housing design criteria such as the following: first, adding other spaces besides the basic spaces to meet the needs for long staying time at the house such as the current crisis, coronavirus curfew. The proposed spaces are playgrounds, a glass room with a view, a space for family activities, a space for studying/working, a space for children, and a space for playing sports, as well as they stressed the number of rooms should be proportional to the number of family members [16]. These proposed functions might facilitate the dwellers long stay at their houses that confirmed by the dwellers' responses in regard to the adaptation to the curfew in Jordan. The dwellers who adapt easily their houses contain the followings: spacious indoor spaces, the architectural layout corresponds with the distribution of spaces, gardens, balconies, a space with a view, privacy, well-designed interiors, spaces for children, and their houses get daily sunlight and wind, as well as they mentioned another factor that has a psychological dimension which is family inclusion. Secondly, the dwellers showed a strong desire to make some changes in the design of their houses such as: making the openings bigger, making the kitchens bigger, exploiting roof floors, merging their houses with the outdoor space, redistributing spaces, increasing privacy. Thirdly, the dwellers and the architects agreed, so strongly about the necessity to eliminate the guest room and its services or at least minimize its size as much as possible. They preferred to exploit this space in daily activities instead of used it occasionally, one of the suggestions was to combine the guest room with the living room so they will be able to use this space, whether for everyday activities, especially for big families, or for occasions such as wedding parties as they mentioned. All that goes in line with having a flexible design so they will be able to change the design of their houses easily and the cost will be less than normal renovation. Finally, other criteria should be taking into consideration during the design process such as studying psychological factors in relation to the users' needs, not positioning the living room at the center of the building where no sunlight or wind come in and making the bedrooms bigger where everyone can do different activities within the room such as drawing, sport, and so on [17].

5.2 Outdoor environment

The outdoor spaces: Garden and balcony are considered by both the dwellers and the architects as a positive attribute aid in adaption to the curfew. While the existing gardens at 60 houses are not well-designed, its spaces are not exploited properly, do not include playground spaces for children, and have low privacy fence. The balconies at 40 houses are tiny and mostly have poor orientation, in other words, lack of sunlight and wind.

Other issues are stated by the dwellers that should be taken into consideration at urban scale: annoyance from noise, low privacy, and lack of green space. All these issues are caused because of the proximity of building to main roads and proximity of buildings themselves to each other. The proximity to the main road which has high traffic all day long create a noisy context, thus that make negative influence on the dwellers' satisfaction with neighborhood and the quality of life. The proximity of building diminish privacy and make it difficult to get, where windows and entrances will be opposite to each other. Furthermore, this proximity of buildings has another negative impact on dwellers' quality of life which is

the opportunity for obtaining direct sunlight and natural ventilation become lower. Finally, lacking green spaces, especially at the context of apartment building, reduce the environmental quality of neighborhoods. While, providing neighborhood with green space “can promote mental and physical health and reduce morbidity and mortality in urban residents by providing psychological relaxation and stress alleviation, stimulating social cohesion, supporting physical activity, and reducing exposure to air pollutants, noise and excessive heat [18].

6. PERSPECTIVES; PRACTICAL IMPACTS OF THE RESEARCH

COVID-19 crisis evidenced aspects that must be taken in consideration by designers. The architectural design acquires more importance because there are new parameters to be satisfied; the home as workspace, study and personal cure. This research focused on this aspect introducing new definition of spaces of any home. Designers in past did not paid attentions on the level of privacy in the home’s internal spaces and in its internal circulation. This fact influenced, negatively, prices of houses that do offer these performances and we noticed increasing demand and prices of homes that offer a differenced level privacy and circulation.

This research introduces a new concept of private space that designers should take in consideration to satisfy users’ new needs as evidenced from recent research which shows that current COVID-19 pandemic changed every human life in all countries. Statistics demonstrated that the major transmissions of COVID-19 avenue in the internal of buildings, especially in crowded and poorly environments. Innovative changes of designing the indoor and outdoor spaces contributes positively the impact on occupants in even the most densely populated spaces [19].

The practical impacts of this research, among steering architects and designers to introduce its results in the shared architectural design values, should be considered as achievement opening a valid debate on this issue.

7. CONCLUSIONS

It is not the first crisis that the world face and it will not be the last, so the architects’ role in both fields: academic and professional should be activated in raising awareness regarding the importance of having high quality environments than giving value to aesthetics and stop boasting about building and owning mega houses which is a cultural behavior.

The dwellers’ needs in different situations should be taken into consideration by designers for creating high quality environments that provide the dwellers with physical and psychological comfort through adopting design approach which is derived from adaptability and flexibility that focus on humanistic aspects.

Crisis that the world face influences the architects’ role in both fields; academic and professional should be activated in raising awareness regarding the importance of having high quality environments than giving value to aesthetics and stop boasting about building and owning mega houses which is a cultural behavior. Several design criteria should be modified to meet the dwellers’ needs in different situations and taking into consideration several aspects of design among the

adoption of suitable design criteria that take into consideration health aspects: physical and psychological comfort.

These design criteria as discussed include quantitative elements as: the number of rooms should fit the number of family members for having personal privacy and healthy environment, enough outdoor space (garden and balcony), and qualitative elements as reviving the use of guest room and its services to be suitable in case emergency among a flexible design approach.

Efforts of this research are to evidence that there are new elements governing the home design as consequence of the last epidemic crisis. The nature of these elements (not physical) sometimes are not included in common parameters of design because do not belong yet to the commune conscious of designers. Negative effects of this hand grove is represented in the houses weakness shown during the lockdown period to respond and satisfy user’s needs. A new type of complexity is introduced in this research valorizing the awareness of users and designers among strategies based adaptability, flexibility, and new preventive measures to deal with the current and potential future pandemics, focusing on humanistic aspects [20].

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