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ARTICLE

Common space as a tool for social sustainability

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Abstract
In the contemporary human community relations, great attention is paid to social sustainability due to its ties with the local identity and social culture. That is, the common spaces are considered as the social arena that creates a high opportunity for people to bond and interact. In light of this, this study aims at highlighting the importance of such spaces through a case study of the apartment building in Amman, and its impact on social sustainability. Several issues were addressed in order to develop insight into this relation, namely, social equity, social capital, civic engagement, community stability, place attachment, and safety and security. A mixed-method approach was adopted in this research that entailed spatial analysis of layouts of 65 apartments' building, an on-line survey of 197 residents of apartments' buildings, and face-to-face interviews with 30 architects and developers. The results of this study bring to notice that apartment building in Amman is deficient in indoor common spaces in terms of functionality and that the few indoor common spaces that are found are mainly limited to circulation paths with no hierarchical system. This finding underlines a crucial need for formulation of design guidelines for multi-family housing with the consideration of social sustainability as an integral part in the infrastructure. These design guidelines, once formulated and enacted, will guarantee provision of indoor common space qualitatively as a hub for a wide range of activities.

Keywords Apartment building · Indoor common spaces · Sustainable community · Social infrastructure · Social sustainability

1 Introduction

More than two-thirds of the world population are expected to be living in cities in 2050. At the local level, Jordanian cities are experiencing continuous population growth that led the Jordanian mindset to resort to increased housing production in major cities. Currently, apartment buildings are considered as the most common form of housing in Amman, the capital of Jordan. While villa (i.e., a high-scale, single-family, detached house) forms 5.4% of the houses in the city, and Dar (that is, a typical, single-family, detached house) forms

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41.2% of the houses in this city, apartment buildings constitute 53.4% of the housing types in the city (Department of Statistics (DOS), 2015). The apartment option was not acceptable by the Jordanians when it was first introduced in the 1970s. As a result, housing shifted from low-density housing and horizontal spread to medium-density housing with vertical stretch (Malhis, 2008). This can be explained by rapid urbanization and the continuous increase in the housing costs in Jordan by effect of the growing land and construction costs. In fact, the average housing prices had inflated more than five times, while the average capita income increased by less than the double from 2003 to 2017 in Jordan (Housing and Urban Development Corporation (HUDC), 2004; DOS, 2003, 2017). Based on this, a high percentage of the citizens grew unable to afford a single-family home and shifted to the apartment dwell option.

As a response for modernization, lifestyle of Jordanian's family was shifted from collectivism to individualistic. This can be seen clearly through the transformation of family's typology from extended to nuclear with five members as an average family size along with woman's role in family's income due to her work (DOS, 2017). Such changes facilitate the shift towards multi-family housing within housing crisis in Jordan. So, high attention was given to private spaces (apartment dwell) in terms of design, size, and number of units per building while ignoring the public zone. This action has negatively affected the social relationships among tenants, where the majority of apartments' residents suffer from social isolation (Skjaevland & Gärling, 1997). This issue was advocated by some researchers who emphasized their beliefs of alienation/detachment and sense of anonymity that may lead to the collapse of an individual's social life (Evans & Lepore, 1993; Skjaevland & Gärling, 1997). In other respects, no governmental policy in Jordan has addressed the growing needs for social infrastructure in the housing sector in Jordan. This can be seen in the current codes of buildings which limit the common spaces to circulation zones and only stress provision of two staircases when the building includes more than 16 apartments (GAM, 2011, Article 66). Unfortunately, this lead to noticeable disconnection and disparateness between neighbors, which reflected negatively on trust and social relation. This makes residents to be more independent and appreciate values of individualism. This may highlight the value of common spaces that create an opportunity for social interaction and, thus, have a positive influence on social sustainability. As a result, this article studies the configuration of common space within different typologies of apartment buildings and its impact on social sustainability. In addition, the study develops design guidelines that are aimed at fostering social sustainability based on feedback from stakeholders (residents, architects, and developers).

1.1 Social sustainability

Currently, growing attention is paid to social sustainability, especially in the residential sector. As a result of its importance in social integration for societies and in fostering social structure that leads to improved quality of life. Social sustainability can be described as a social pillar that focuses on social inclusion, social coherence, social cohesion, and social justice (Dempsey et al., 2011; Littig & Griessler, 2005). This was ensured through a conceptual framework based on the following dimensions: (i) equity, which refers to the provision of employment, education, and essential services for access to social networking; (ii) public awareness in order to inspire social patterns; (iii) participation in the decision-making processes to promote civic engagement; and (iv) social cohesion to promote interpersonal trust, and minimize social strife (Murphy, 2012).

Social sustainability is associated with social networks which are usually established through being a member of particular groups and participating in social activities. It is defined using the following five indicators: (i) friendliness and social interaction, ranging from knowing by name 'some/most/all' of the neighbors to friendship; (ii) satisfaction, measured by general satisfaction and feelings of belonging; (iii) safety, measured by the level of comfort and safety within the neighborhood; (iv) physical aspects of neighborhood (e.g., open spaces) and local facilities, including community center, public library, and sport facilities; (v) accessibility that facilitates reasons of mobility for interaction; and (vi) collective group activities that encourage residents to participate in the neighborhood's activities (Abed, 2017; Al-Jokhadar & Jabi, 2020; Bramley et al., 2009). These dimensions were determined by the Housing Associations' Charitable Trust (HACT, 2015) to develop a more comprehensive framework that stresses importance of both people and place, which was achieved by discussing six variables: (i) social equity associated with proximity to key services/facilities; (ii) social capital related to individual's ability to access people, groups, or institutions; (iii) social interaction associated with social ties and the participation in collective activities; (iv) community stability connected with long-term residents who are committed to active involvement in the community; (v) sense of place related to attachment of the community members; and (vi) safety and security of the individuals and the overall community.

Generally, it can be said that social sustainability is a multidisciplinary concept that emphasizes sustenance of social relationships, starting from reducing fearfulness to increasing happiness (Bramley et al., 2009). This concept is demonstrated by social interaction in common spaces that has a potential to achieve social integration by enhancing local morale, and community life, besides reducing stratification (Carmona, 2019). Accordingly, it is necessary to explore public (common) spaces in general, and in the residential sector in specific, since they create opportunities for promotion of the social capital.

1.2 Common spaces

The common spaces of the apartment building are essential places that enable residents to communicate and interact. They can be considered as a private social arena since their use is limited to the residents of the building and are public space for them. In effect, those places act as a buffer zone between the apartment units and their surroundings (Marcus & Sarkissian, 1986). They are semi-public spaces and they can become activity nodes that provide the greatest opportunity to involve people with activities, either actively or passively. Active contact includes playing with others, greeting others, and talking to others while passive contact includes eye contact, nodding, watching events, and listening to others (Behrad & Bahrami, 2015). Hence, the common space plays an important role in bonding residents, and promoting publicness through increasing their presence with each other to enhance relations beyond the formal cycle of companionship.

Common space can be categorized based on a variety of variables as follows:

- Location: the common spaces are classified into indoor common spaces and outdoor common spaces. The indoor common spaces are regarded as an interface between entrance of building and the independent apartment unit. On the basis of the degree of the desired privacy, this sort of space is divided into three areas: space around the entrance of the building, passageway connecting apartments, and the space outward of the front door of the apartment (Park et al., 2019). The outdoor common spaces, on the

other hand, are spaces lying mainly around, and between, buildings. They may include outdoor space (soft and hard scape) and the roof of the building.

- Use of the space: the common space is classified into circulation or transitional space, and public space with diverse functions. The transitional space can be entrance or movement zone with strong connections to the exterior or interior circulation spaces with high compartmentalization and separation from the exterior. Public spaces with diverse functions (or activities) vary broadly in terms of space, hierarchy, enclosure, and area. Usually, they have several features such as information centers, and a multi-purpose hall with access to other facilities (Danielski et al., 2019; Pitts, 2013).
- Occupancy: is related to the length of time which residents spend in the space. According to occupancy, the common spaces are categorized into three types: (i) entrance zone where the residents spend short time (five minutes or less); (ii) circulation zone, where the residents have slow walking pace and an occupancy that is less than 10 min; and (iii) long occupancy zones, where the time that residents stay varies depending on activity and function (Pitts, 2013).

Based on the foregoing illustration, the residents may pass through the common spaces, reside in them, and try enjoying their unique features like views or any particular thing that makes those spaces different from others. In this context, several countries initiate incentives and formulate policies for providing common spaces by permitting further floor area to be built. Unfortunately, such policies are not available in Jordan despite the noticeable deficiency in public parks at the neighborhood and city levels (Tomah et al., 2017). Moreover, common spaces have been widely used in Jordanian vernacular buildings. They were commonly known as courtyards that serve as transitional space between exterior and interior zones, or intermediate space between nature and the built environment. They also used to provide a lot of charm since they were a center of family life and their daily activities (Mitchel, 2010). Such layout increased inclusiveness and sense of attachment because it was well designed, well connected, and thriving, and because it served the occupants. However, these courtyards are increasingly being replaced because of the rapid urbanization and economic pressure on the housing sector.

In general, the literature focuses on the physical layout of the common space and overlooks the social aspects of this space. Therefore, this research studies the morphology of common spaces and its impact on social sustainability.

1.3 Social sustainability in common spaces

The common or collective space can increase the residents' daily informal social interaction, which may be improved to be substantial contact, and foster the sense of neighboring. Furthermore, its association with effective activities can improve the sense of place and the spirit of partnership (Farida, 2013). These activities vary from essential activities that connect with basic needs and circulation to optional activities and end with a social type of activities that focuses on engaging people (Gehl, 1987). This is supported by Lang's model for urban public spaces that focuses on creating opportunities for social interaction. When people interact with other people in society, they feel having a relationship with the place and its community than when they do not. These factors determine the presence of different social groups, the formation of social networks, and staying in the domicile (Lang, 2002). Consequently, the common spaces can improve the quality of life.

The common spaces allow individuals to meet acquaintances and attend activities to form different types of social ties as discussed by Granovetter (1973) in. The Strength of Weak Ties, which is a work that highlighted the spread of social networks and compared between strong and weak ties, where the weak ties are more likely to connect different social circles and to be the source of non-redundant information, whereas the strong ties provide redundant information. Strong ties are often characterized as ties among close friends, while weak social ties are occasional ties that enforce casual friendship and neighbors' relations. Based on that, common spaces can provide opportunities for individuals to engage in a high level of social interaction and, then, strengthen the relation. This is supported by Whyte (1980) who believed that interaction between children in a space may lead to informal interaction between parents, which has the potential to evolve into something that is highly significant and long lasting. This makes these spaces have potential for increasing social integration and cohesion with stronger social support and larger social network. Furthermore, it develops the sense of pride that motivates the residents to be engaged more, which has a positive effect on social capital and resilience of community (Carmona, 2019).

Few researchers tried to highlight the significance of common spaces in residential buildings. For instance, Modi (2014) discussed the criteria of common spaces in low-rise residential buildings. They are identified by the following indicators: (i) access to improve movement through different common spaces besides a pleasurable walk. This may offer an opportunity for both physical and visual interaction, and make the walk more pleasurable and exciting; (ii) participation that may create opportunities for unplanned engagement and involvement with the surroundings; and (iii) adaptability, which is connected with the possibility of expansion by providing common spaces. These criteria are similar to reasons that explain the need of people for public spaces, which include comfort, relaxation, passive engagement, active engagement, and discovery (Carr et al., 1992).

All in all, common spaces can be considered as places that symbolize the ideal universal access and participation. Further, they are a center for the dynamics that inspire a range of uses and activities to engage residents (Carr et al., 1992). This supports a space with informal surveillance based on the 'eyes on street' concept that makes it safer and more vital (Jacob, 1961). In contrast, when common space is abandoned or neglected, it is no more a place where residents feel secure. Generally, the relation between social sustainability and common spaces has been discussed separately due to its irreducibility and complexity. So, there is a need for identifying the current situation of common spaces in apartment buildings in Amman, and determining how they can be enhanced to improve social sustainability.

2 Research methodology

A mixed-method approach was adopted in conducting this research according to the following steps. First, observation of the spatial configurations of apartment buildings. This step aimed at exploring the common spaces in Amman. Second, an online survey of residents (demand side) to understand the users' perceptions of common spaces. The target population mainly related to middle income working families (educated and employed couples with 2–3 children), since it represent the majority of apartment residents based on the local statistics (DOS, 2017). Third, face-to-face interviews with knowledgeable professionals (supply side—who have more than 10 years' experience)

to determine the opportunities and challenges of common spaces so as to, eventually, improve the potentials of these spaces for better implementation. This helps in clarifying the impact of indoor common spaces on social sustainability. Additionally, this study proposes guidelines that are aimed at enhancing the social dimension of these spaces for the residents.

2.1 Spatial analysis

The main objective of spatial analysis is to identify the dominant spatial configurations in the layouts of the apartment buildings and their effect on the pattern of social interaction. Therefore, these layouts were surveyed using records of Jordan Housing Developer Association (JHDA) which was the source of the research sample because it is the main provider for the market in Amman. Sixty five out of 237 layouts constructed within the period 1998–2018 were chosen because of their commonality, where each was constructed more than three times as shown in Fig. 1. Then, these sample layouts were sorted based on density, that is, number of apartments per a floor level and total number of units per a building.

The research sample was classified into the following four prototypes (Fig. 2):

- Prototype A: this prototype represents the lowest density buildings. It consists of a duplex or an apartment per floor level. The total number of apartments ranges from two to seven dwelling units. Thirteen layouts pertaining to this class were analyzed in the current study.
- Prototype B: this prototype concerns the low-density buildings. It consists of two apartments per floor level. The total number of apartments ranges from eight to 14 dwelling units. Twenty one layouts in this class were analyzed.
- Prototype C: this prototype represents the medium-density buildings. It comprises three or four apartments per a floor level. The total number of apartments falls in the range of 15–24 dwelling units. Twenty three layouts of this prototype were analyzed.
- Prototype D: this prototype pertains to the high-density buildings. It consists of five or more apartments per floor level. The total number of apartments is more than 25 dwelling units. Eight layouts of this class were analyzed.

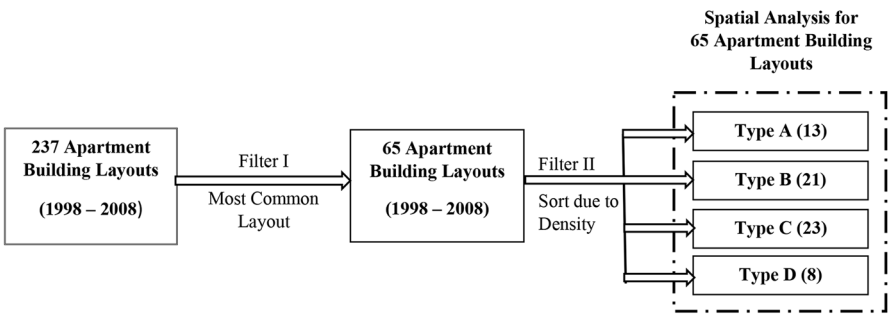

Fig. 1 Sampling method

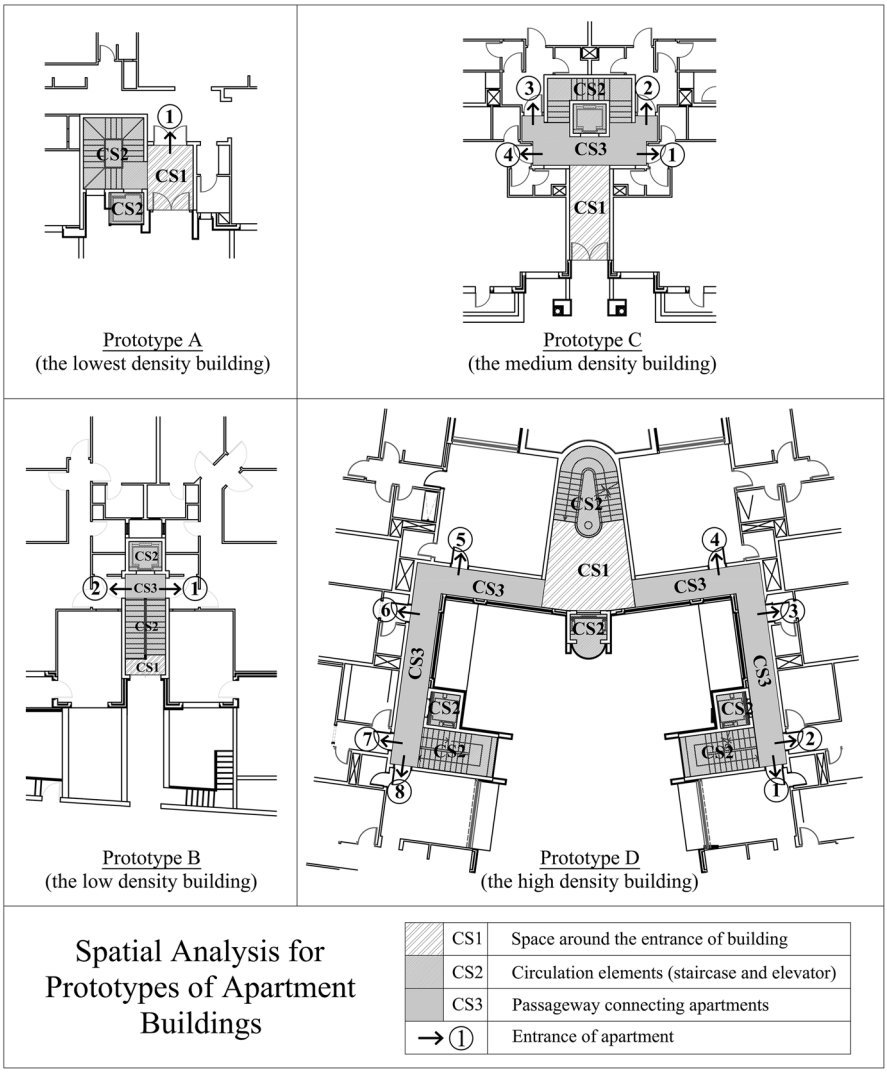

Fig. 2 Spatial analysis of prototypes of apartment buildings

A comparative analysis of the different prototypes was performed to spotlight the logic of the common spaces according to the following spatial variables (Table 1):

- Area, which is expressed in this study as the ratio of the area of the indoor common spaces to the area of the ground floor.
- Locations of common spaces relative to the apartments.
- Hierarchy of spaces, which is assessed based on the availability of buffer zone(s) between the indoor common spaces (semi-public spaces) and the apartments (the private zone).
- Use, which was evaluated based on diversity of functions and activities within the indoor common spaces.

Table 1 Spatial analysis of indoor common space

Prototype	No. of apartments per a level	Spatial variable				
		Density		Location	Hierarchy	Usage
		average area (m^2)	Percentage of the ground floor			
A	One	27.2–36	7.9–10.6	30% Center 70% Edge	Fair	CS1, CS2, CS3
B	Two	19.2–59.2	5.8–14.6	90% Center 10% Edge	Poor–Fair	CS1, CS2, CS3
C	Three	34.3–67.6	7.9–13.5	90% Center 10% Edge	Poor–Fair	CS1, CS2, CS3
	Four	32.1–62.1	6.4–11.2	100% Center	Poor	CS1, CS2, CS3
D	Five	61.4–89.9	8–10.1	90% Center	Poor–Fair	CS1, CS2, CS3
	Six	63.5–92.5	8.3–10.2	90% Center	Poor	CS1, CS2, CS3, CS4
	Eight	73.2–236	7–22.8	90% Center	Fair–Good	CS1, CS2, CS3, CS4

CS1 Indoor space around the entrance of the building, *CS2* circulation elements (staircase and elevator), *CS3* passage-way connecting apartments, *CS4* Courtyard

2.2 Survey

The main objective of the survey in this study was to explore the impact of common space on social sustainability from the users' perspective. An on-line questionnaire was used to elicit data, from residents who are living in apartment buildings in Amman. This technique was used due to its convenience where it can be deployed through various online channels (Facebook, WhatsApp, email, etc.). However, it is hard to identify respondents of the survey since it is only can be completed by individuals who are literate, have internet access, and may be biased/interested with research subject. Unfortunately, this may reduce the quality of random sampling which is the research limitation. Therefore, any participants who are not living in apartment located in Amman City were excluded and not considered for data analysis.

The primary data were collected during the period extending from 12 August 2019 to 5 September 2019 using a structured questionnaire that was translated to the Arabic language. The questionnaire consisted of the following parts: (i) socio-economic characteristics of the respondents, which covered gender, age, marital status, presence of children, family size, education, employment (head of household and spouse), ownership status, length of residence, and area of apartment; (ii) characteristics of apartment building like number of apartments per a floor level and a building, number of levels, construction date, and type of common space; (iii) assessment of social sustainability through exploring how the residents interact with each other; and (iv) assessment of the need for indoor common

spaces, which was performed through two open-ended questions about necessity of these spaces, opportunities for them, and recommendations.

Based on the definition of social sustainability, six variables were selected and assessed through 32 statements following a five-point Likert scale, with levels of agreement ranging from strongly disagree (SD) to strongly agree (SA). The six selected variables are:

a. Social equity: this variable was evaluated based on the quality of common spaces in terms of proximity, layout, diversity of activities, area, level of privacy, furniture, and maintenance. This variable is represented in the questionnaire by statements 1–7 as illustrated in (Table 2).
b. Social capital: this variable was assessed in the current study by the frequency of communication with neighbors. Level of social capital ranges from knowing neighbors' names, stopping and talking to friends, and having positive inter-generation and intra-generation relationships. This variable is represented in the questionnaire by the statements 8–12 (Table 2).
c. Civic Engagement: civic engagement was evaluated in the present study by having membership in building organizations, and participating in activities such as community meetings, volunteering work, solving issues, paying fees, and raising funds. As such, this variable measures relations of individuals with groups or associations. It is represented in the questionnaire by the statements 13–18 (Table 2).
d. Community stability: in the current study, community stability was assessed by suitability of the community for sustaining neighbors' relations and rebound from changes. It is connected with resilience or ability to restore social equilibrium in case of disturbance and with constancy of community over generations. It is represented in the questionnaire by the statements 19–22 (Table 2).
e. Place attachment: this variable was assessed by the feelings of belonging to common spaces and caring for public property in the building. It is represented in the questionnaire by the statements 23–27 (Table 2).
f. Safety and security: safety and security were treated in the present study as one variable and evaluated in terms of the visibility of common space that contributes to elimination of crimes, vandalism, and anti-social behavior. It is addressed in the questionnaire by the statements 28–32 (Table 2).

2.3 Interview

The main objective of the interview was to have feedback on the dynamics of common spaces and social sustainability from the practitioner's point of view. Data were collected using face-to-face interviews with professionals from the supply side (designers and developers) using snowball sampling technique. The interviews were held by the researchers during the period 9 to 23 September 2019.

The interview was conducted using a structured questionnaire that consisted of five open-ended questions about the current situation of indoor common space in multi-family housing, challenges, and recommendations for design strategies. The interview questions also addressed the indoor common spaces in terms of their necessity, market need, market trend, maintenance policy, impact on social sustainability, implementation scale, and legislation.

Table 2 Responses related to impact of common space on social sustainability

Variables	Statement	Average
a. Social equity	1. Common spaces are accessible to all residents	3.08
	2. Common space is a well-defined zone	3.10
	3. Common spaces allow for diverse activities that suit all residents	1.88
	4. Common spaces have a sufficient area for the residents	1.80
	5. Common spaces are surrounded by physical barrier to provide privacy for the residents	2.18
	6. Common spaces are well furnished	2.02
	7. Common spaces are clean, pleasant, and well maintained	2.79
	Average (a)	2.41
b. Social capital	8. I know names of most of my neighbors because I meet them in common spaces	3.08
	9. I meet regularly with neighbors in common spaces	2.21
	10. I have a social contact with neighbors (occasional visits)	1.94
	11. My kids play with neighbors' kids in common spaces	2.19
	12. The relation with my neighbors developed to be a friendship	2.97
	Average (b)	2.48
c. Civic engagement	13. I am a member in building group or association	2.6
	14. I attend community meetings that discuss upcoming changes for common spaces	2.50
	15. I participate in volunteering work for common spaces	3.00
	16. I am willing to be engaged in proposing solutions to existing problems in common spaces	4.15
	17. I am willing to pay a monthly fee to keep common spaces clean and maintained	3.95
	18. I am willing to participate in fund raising to improve common spaces	3.65
	Average (c)	3.31
d. Community stability	19. I would stay in this building because it is the best place for me	3.21
	20. I would not substitute this building with another one, because it has common spaces suitable for all my family members	2.74
	21. Most of residents have been staying in this building for more than 10 years	2.94
	22. I will work hard to stay and raise my kids in this building	3.11
	Average (d)	3.00

Table 2 (continued)

Variables	Statement	Average
e. Place attachment	23. I am proud of living in this building and I feel it is part of me	3.26
	24. I would be sorry if I have to move out of this building	2.35
	25. I have many memories in this building, especially the common space	2.26
	26. I take care of the facilities of the common spaces	3.90
	27. I consider common spaces part of my home, so I treat them as I treat my home	3.98
	Average (e)	3.15
f. Safety and security	28. Common spaces are safe. I did not experience any type of crimes in them	3.84
	29. Common spaces are safe after dark	3.80
	30. Residents tackle anti-social behavior in common spaces	3.91
	31. Residents tackle vandalism action in common spaces	3.94
	32. Residents communicate with each other because they are feeling safe	3.63
	Average (f)	3.82
Overall average		2.99

3 Research sample

A total of 197 heads of households who are living in apartment buildings participated in this study. More than 80% of the respondents were married and 70% of them have two children or more. In addition, most of the sample members were educated, where less than 5% of the respondents were neither having high school qualification, nor vocational degrees. This can explain why the majority of the sample members (75%) are employed and more than half of their spouses have jobs. Moreover, about 80% of the respondents owned their apartment units, whose prices ranged from 50,000 JDs to 150,000 JDs. Two-thirds of the sample members are living in apartments with areas ranging from 100 to 180 m^2, while only 11% of the participants live in large apartments (areas higher than 250 m^2).

Thirty interviews were held with 15 architects, and 15 developers. Almost 80% of the sample architects had an experience of more than 10 years in designing multi-family housing and 60% of them are working in a consultation firms that include more than 30 architects, each. All developers are members in JHDA for more than 10 years and each of them has developed several multi-family housing projects. Moreover, a third of them are involved in an initiative aiming at enhancing the quality of the built environment for multi-family housing and ensuring feasibility of the housing projects.

4 Results and discussion

This study aimed at exploring the impact of common spaces on social sustainability. The study objectives were achieved by means of (i) spatial analysis, which was intended to determine the physical attributes of common spaces (area, location, hierarchy, and usage) for different apartment building prototypes; (ii) descriptive analysis for the research data derived from the on-line survey and the interviews. The related analysis results are presented in this paper in the form of frequency and measures of central tendency as shown in Table 2; (iii) correlation analysis to evaluate the significance and strengths of the relations among the variables of social sustainability (Table 3); and (iv) qualitative analysis of the interview data to uncover the logic behind the current situation of the common spaces in the apartment buildings in Amman.

The major findings of the current study can be summarized as follows:

4.1 Social equity

It was assessed by evaluating physical (tangible) aspects of the indoor common spaces that facilitate social interaction. Based on respondents' feedback (Table 2), there is a negative attitude towards social equity as the mean (M) on a scale of 5 was 2.41, where 1 represents the negative attitude and 5 denotes a positive attitude. This may reflect the deficiency of the built environment in satisfying residents' needs as noticed in their responses to the questions related to the area of space, diversity of functions/activities, furniture components, and privacy, which had the mean values of 1.80, 1.88, 2.02, and 2.18, respectively. In other respects, there are significant correlations between the aforementioned indicators and some aspects of social interaction, where the probability (p) values were less than the significance level (0.05) and ranged from 0.00 to 0.028 (Table 3). About 70% of the respondents who gave negative feedback on diversity, of functions have low social capital in terms of knowing neighbors and poor communication between children. Additionally, more than

Table 3 Correlations among the variables that have impacts on social sustainability

Variable		*p*
Social equity		
1. Common spaces allow for diverse activities that suit all residents	a. I will not substitute this building with another one, because it has common spaces that are suitable for all my family members	0.001 (<0.05)
	b. My kids play with neighbors' kids in common spaces	0.000 (<0.05)
	c. I know the names of most of my neighbors' because I meet them in common spaces	0.007 (<0.05)
2. Common spaces have a sufficient area for the residents	d. I will not substitute this building with another one, because it has common spaces that are suitable for all my family members	0.001 (<0.05)
	e. My kids play with neighbors' kids in common spaces	0.028 (<0.05)
	f. I know the names of most of my neighbors' because I meet them in common spaces	0.001 (<0.05)
3. Common spaces are well furnished (soft/hard scape and outdoor furniture)	g. Frequency of interaction with neighbors	0.014 (<0.05)
Social capital		
1. I meet regularly with neighbors in common spaces	a. Length of residence	0.000 (<0.05)
	b. Marital status	0.008 (<0.05)
	c. Common spaces are clean, pleasant, and well maintained	0.025 (<0.05)
2. My kids play with neighbors' kids in common spaces	a. Length of residency	0.013 (<0.05)
	b. Marital status	0.000 (<0.05)
Civic engagement and collective groups		
1. I am a member in building group/association	a. Ownership status	0.042 (<0.05)
2. I participate in volunteering work for common spaces	b. Ownership status	0.030 (<0.05)
3. I am willing to be engaged in proposing solutions to existing problems in common spaces	c. Number of apartments in your building	0.013 (<0.05)
4. I am willing to pay a monthly fee to keep common spaces clean and maintained	d. Length of residence	0.000 (<0.05)
Community stability		
1. I will stay in this building because it is the best place for me	a. Ownership status	0.010 (< 0.05)
	b. I will work hard to stay and raise my kids in this building	0.000 (<0.05)

Table 3 (continued)

Variable		*p*
2. I will not substitute this building with another one, as it has common spaces that are suitable for all my family members	a. Common spaces allow for diverse activities that suit all residents	0.001 (<0.05)
	b. Common spaces have a sufficient area for the residents	0.001 (<0.05)
	c. Common spaces are accessible to all residents	0.007 (<0.05)
3. I will work hard to stay and raise my kids in this building	a. My kids play with neighbors' kids in common spaces	0.046 (<0.05)
Place attachment		
1. I am proud of living in this building and I feel it is part of me	a. Ownership status	0.029 (< 0.05)
	b. I will be sorry if I have to move out of this building	0.000 (<0.05)
2. I have many memories in this building, especially the common space	a. I know most of the names of my neighbors' because I meet them in common spaces	0.013 (<0.05)
	b. The relation with my neighbors developed to be a friendship	0.000 (<0.05)
3. I am taking care of the facilities of the common spaces	a. I participate in volunteering work for maintaining common spaces	0.000 (<0.05)
	b. I am willing to be engaged in proposing solutions to existing problems in common spaces	0.000 (<0.05)
	c. I am willing to pay a monthly fee to keep common spaces clean and maintained	0.014 (<0.05)
	d. I am willing to participate in fund raising to improve common spaces	0.046 (<0.05)
4. I consider common spaces part of my home, so I treat them as I treat my home	a. I participated in volunteering work for maintaining common spaces	0.011 (<0.05)
	b. I am willing to be engaged in proposing solutions to existing problems in common spaces	0.000 (<0.05)
	c. I am willing to pay a monthly fee to keep common spaces clean and maintained	0.001 (<0.05)
	d. I am willing to participate in fund raising to improve common spaces	0.004 (<0.05)
Safety and security		
1. Residents tackle vandalism action in common spaces	a. Common spaces are clean, pleasant, and well maintained	0.000 (<0.05)

50% of the sample members who are not satisfied with furniture of the indoor common space indicated that it is not suitable for all family members, which negatively impacts social interaction between neighbors. More than 80% of the respondents wish to have a playground for children and a walking trail. This means that the well-designed common spaces will have positive effects on use of the space and, therefore, the social interaction since it will encourage engagement with others and achieving relaxation and comfort as demonstrated by Farida (2013), Modi (2014), and Bramley et al. (2009). The agreement on the need for communal space associated with the respondents' style (nuclear family with 2–3 kids) who need spaces for their children to play and exercise rather than being attached to electronics. Also, affording spaces for adults to practice their hobbies and activities. General speaking, such space could act as lungs for residents helped them to be refreshed and recharged to do their routines since it will encourage social interaction between inter/intra-generation.

The deficiency in indoor common spaces is mainly due to the insufficient area as evidenced by spatial analysis, where the area constitutes 4.3–8.7% of the ground floor area. It is noteworthy that the area fluctuates and has no relation with density (number of the apartments at the floor level or a building) and diversity of functions. This may be explained by the absence of regulations and codes that oblige the developers to provide common spaces, except providing two staircases if the building has more than 16 apartments as shown in (Fig. 2) and (Table 1). Moreover, there are no dead space restrictions that organize the use of common spaces (GAM, 2011, Article 66). This can be argued by the theme of smart flexible design that provides several uses or activities within one zone if the area is managed efficiently and reusing any unused or under-used spaces as discussed by Abed (2017). Therefore, the designers have to think out of the box to solve this dilemma, especially as 80% of interviewed architects assured the necessity and role of common spaces in improving life quality in general and in the apartment units of small sizes in specific. Developers argue the possibility of providing such spaces at the building level (for feasibility considerations) and suggest providing it at the neighborhood level with innovative design and incentives to avoid extra financial burdens.

4.2 Social capital

It was evaluated by the frequency of contact between neighbors, which ranges from knowing neighbor's name to establishment of friendship. As can be seen in Table 2, the respondents have a negative attitude towards social capital, where the mean was 2.48. The study results point out that about 60% of the sample members were only socializing with neighbors living on the same floor level, and less than 15% of them know all neighbors. Poor relations among building dwellers are confirmed by residents' feedback on occasional visits, children's communication, and regular meeting, whose mean scores were 1.94, 2.19, and 2.21, respectively. However, there are significant correlations between marital status and each of the social interaction and length of residency, with the p values of 0.00 and 0.008, respectively (Table 3). Nearly 85% of the residents who have been staying for more than 10 years, have kids who have a good social network, which reflected positively at the family level and social sustainability as discussed by Whyte (1980). This means that a better social life is associated with a stable family who is willing to build a social network encompassing the relations of their kids as a tool of protection from undesired effects, which is an issue supported by Granovetter (1973) through the 'weak ties' theme.

As Table 3 shows, there is a significant correlation between regular interaction and level of hygiene/maintenance of common space ($p = 0.025$). This is supported by Carmona (2019) who stresses the necessity of providing public places of better quality to encourage people to communicate. Furthermore, based on spatial analysis (Table 1), there is a limitation in the definition of indoor common space in terms of hierarchy, where there is no transitional space between private and public zones, which forces pressure on residents and makes them behave in a defensive way to protect their privacies, visually, acoustically, and olfactory, or avoid any intrusion of their private territory (apartment). However, Jordanians were used to have spacious private space in vernacular homes that serve as transitional space between public and private which then improve privacy of residents as illustrated in (Fig. 3). Hence, the residents are working hard to personalize the space in the front doors of their apartments to prevent using them. This pushes residents away and makes them pass through, which has negative effects on social sustainability as discussed by Malloggi (2017), who maintains that lack of privacy makes citizens lose the capacity for obedience and, possibly, the freedom to pursue happiness, which makes them act aggressively. Consequently, low social capital is a result of a poor environment. Similar opinion was expressed by most the architects and developers who evaluate the majority of apartment building designs as poor or fair designs in terms of indoor common spaces since they do not provide spaces for people to stay and interact (Fig. 2). Meanwhile, these spaces can create

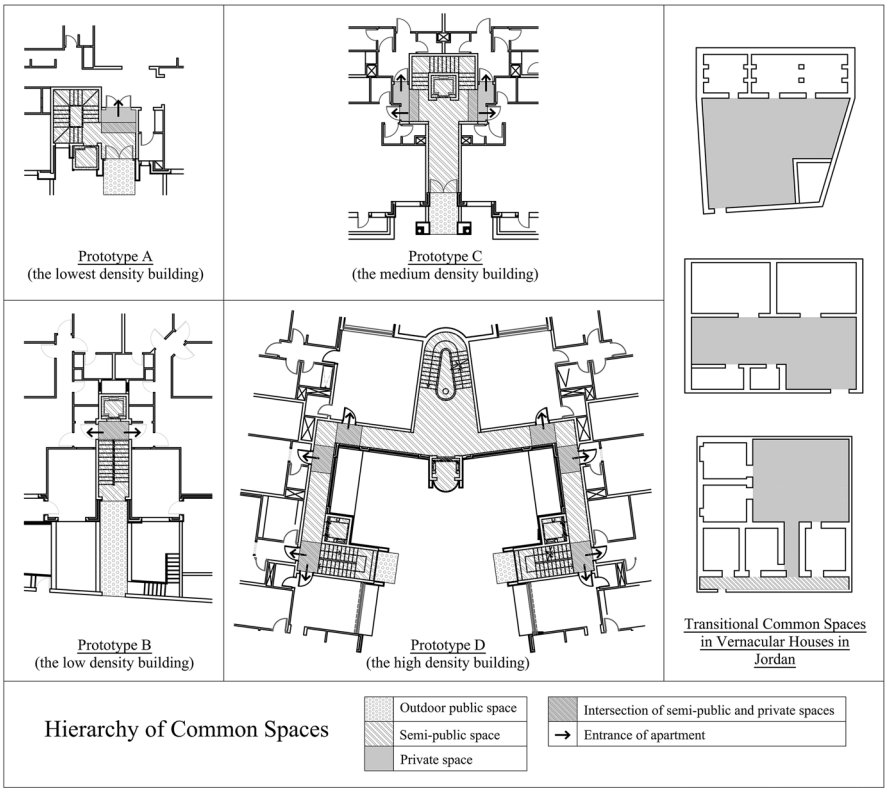

Fig. 3 Hierarchy of common spaces in apartment buildings

opportunities for casual meetings and talks and, over time, for frequent social interaction which may develop into friendships.

4.3 Civic engagement

It was assessed based on residents' participation in maintaining and improving common spaces. Table 2 highlights medium sense of community, where the mean score is 3.31 because the respondents are passive despite the fact that they wish to be active and positive. This can be noticed in the fact that they support initiatives for solving any problems, whose mean score is 4.15. However, they have a negative attitude to being active members of the building association (M = 2.5, 2.6). This was ensured by all developers who argue that the absence of dead space restrictions that enforce the residents to pay monthly fees so as to keep a decent level of maintenance and hygiene in the apartment building. Based on that, common space will be a source of tension and stress for the residents rather than a catalyst for social sustainability and empowerment of the residents. So, this may explain people's interests in, and preferences of, private zones (apartments) over the public or common spaces since they believe that they have limited access to, such spaces and that they receive limited benefits from them. However, the architects emphasized the need for indoor common spaces and that these spaces should be utilized to unite the residents.

Table 3 highlights that civic engagement, in terms of being active member in a building association, correlates with ownership status ($r = 0.042$, $p = 0.03$). Almost 83% of the sample homeowners have active participation in a positive manner. This may be related to the connection between property price and building quality, where the well maintained multi-family housing has a positive impact on individuals' property (apartment unit) price. This can be a means of enhancement that may be strengthened with increased stability (length of residence). Research results show that the residents who have been staying in the same place for long develop a sense of belonging and reciprocity which may enhance the sense of attachment. However, rentals are not willing to invest time and effort due to a temporary stay. This issue was confirmed by researchers who support that homeownership is connected with increased involvement in local organization(s), local problem solving, and increased formal social interaction in their community rather than their other community (Dipasquale & Glaeser, 1999; Rohe et al., 2013). Moreover, there is a significant correlation between civic engagement and density ($p = 0.013$) (Table 3). Small number of the residents in the building have a high level of civic engagement because the residents act as a family, which can be realized in a conflict situation, where issues can be handled easily. However, the large group is hard to manage and it is difficult to reach everyone. This may lead to misunderstanding and to a negative condition for the residents.

4.4 Community stability

It was measured in the current study by the level of stability that encourages residents to stay longer. As Table 2 indicates, the respondents' perception of community stability is medium (M = 3.0). This may reflect limited potentials for displacement and turnover, which is an issue that is supported by the fact that more than 40% of the sample members have been living in their apartments for more than 10 years and that approximately 75% of them own their apartments. This is confirmed by the significant correlation between community stability and ownership ($p = 0.010$). This was supported by Dipasquale and Glaeser

(1999) who clarified that homeownership reduces the mobility of household, while renting are relatively mobile.

Furthermore, Table 3 spotlights that there are significant relationships between community stability and social equity that includes diverse activities ($p=0.001$), area of common spaces ($p=0.001$), and accessibility of common spaces ($p=0.007$), in addition to its association with social capital for all family members, especially children and seniors who usually have limited mobility and prefer to have companionship which will be developed to friendship. Thus, the high level of stability can be considered as an indicator of the community's ability to mitigate tension and prevent conflict, which affects social networks positively and improves life quality in several aspects. Evidence (e.g., Carmona, 2019; Lang, 2002) suggests that an individual will be highly cooperative and will act positively if the public space is well designed, which enhances stability in the apartment residential context. Almost 80% of the sample home owners gave positive feedback regarding staying and raising kids, which reflects the level of resilience and ability to defy changes. On the other hand, renters are always shopping for a better place within their budgets. Therefore, they are not looking for fostering social networks with neighbors. But, based on the feedback of the developers and architects, few projects are trying to provide common spaces for rental furnished apartments, in order to improve stability and reduce the rate of turnover, which may then enhance social sustainability. The indoor common spaces include a gym and café with internet access.

4.5 Place engagement

It was assessed by satisfaction. Feedback on place attachment (Table 2) reveals a neutral attitude ($M=3.15$). The neutral attitude may relate to the contradictions in the respondents' perceptions, where they have a negative attitude towards shared memories and nostalgia to the place and positive attitudes to caring about indoor common space, where the associated means were 2.26, and 2.35 versus 3.90 and 3.98, respectively. The negative feedback can be a result of the deficiency in social elements in indoor common spaces that residents' preclude the residents from taking part in the community's activities. Such activities can create opportunities for bonding the residents through shared memories and wishes and, then, strengthen loyalty and the feeling of belonging. This is emphasized by the significant correlations with social capital, which range from knowing citizen ($p=0.013$) to developing friendship ($p=0.00$). This can be explained by how the human perceives space, which is connected with spatial experience and feelings that strengthen the senses of inclusiveness, and cohesion. These feelings motivate the building residents to interact positively at both the individual and group levels (Dempsey et al., 2011; Murphy, 2012). In this respect, half of the sample members who have a positive attitude towards place attachment gave positive feedback on the social capital.

Moreover, there is a correlation between place attachment and civic engagement at various levels, ranging from volunteering work, proposing solution, to financial participation as shown in Table 3. As well, nearly 90% of the respondents who gave a positive feedback on caring expressed motivation for volunteering work and willingness for financial participation. This can be explained by residents' desire to enhance this space by investing and incentivizing to improve life quality and, thereupon, gain a higher level of personal esteem and life satisfaction. Such a spirit may unite residents without considering ownership status, despite the fact that the results in Table 3 show a significant correlation with ownership, contrary to rentals. This initiative requires residents with passion and destiny to make

noticeable changes that may improve the sense of control over space and, then, heighten the sense of place attachment. Since "people make places more than places make people" (Worpole & Knox, 2007: p. 2).

5 Safety and security

Both have a direct impact on social sustainability; when the residents feel safe they may demonstrate high social involvement. Otherwise, they will withdraw and, then, be isolated. Table 2 reveals that the respondents have a positive attitude towards safety and security (M = 3.82). Since safety is a basic need based on Maslow's Hierarchy of Needs, residents have positive feedback on tackling vandalism and anti-social behavior where the mean scores were 3.94, and 3.91, respectively. Approximately 90% of the respondents who have positive feedback on this, variable have children. This may explain their collaboration against any danger that threats family safety, especially since the indoor common space is quite close to the apartments (basic territory) according to spatial analysis. In other respects, the 'safety and security' variable correlates significantly (p = 0.00) with the quality of space in terms of maintenance. This can be explained by residents' need to avoid blind spots which serve as a hot zone for anti-social behavior. Moreover, about 60% of the residents who believe that common spaces have a decent level of maintenance and hygiene are satisfied with safety and security.

Generally, the well-maintained safe space can encourage the residents to be in the space, stay and spend time and socialize with others more often. So, this makes the safe open space more vibrant and vital, which increases the level of safety due to the natural 'eyes on street' element of surveillance (Jacob, 1961). A better level of trust will be developed to encourage residents and their children stay longer. This will improve compatibility between people and space along with significant meaning of neighborhood for their residents to evoke human sense that makes it more distinctive from other places. On the other hand, low social sustainability will has negative impact on the perceived space safety and the residents will, in consequence, withdraw and may feel lonely. This makes them resort to technological systems for security purposes such as security cameras, video intercom, and electric gate to avoid intrusion (Davies, 2007). These systems became common lately, according to the sample architects and developers.

6 Design guidelines for common spaces

In general, it can be said that the respondents have a neutral attitude towards social sustainability (M = 2.99). This can be considered as a result of a lack of indoor common spaces, which weakens the social relations between residents, especially the people of Amman who used to be a collective community with strong bonds with their neighbors and the overall community because of cultural beliefs and values. This can be seen in the traditional villages or neighborhoods in any urban setting through Dewan (Divan), where people meet on daily basis to socialize, discuss upcoming issues, and celebrate social events (Bahammam, 2006).

Currently, there is a need for a space that can substitute Dewan, in Jordan, at both the physical and spiritual levels. The new vision of Dewan, at the building scale, can be achieved by considering the following key points:

- Combining several activities in one space to attract different people and promote interaction across social groups.
- Revitalizing passive spaces in buildings to be interactive zones and hubs for activity by, for example, designing a roof to be a gathering space with a seating area, greenery, playground, amongst others. Such a design requires a high level of flexibility and creativity to satisfy residents' needs. These spaces should have an interactive program of activities for them to be a vital zone.
- Facilitating atrium theme with diverse hierarchical zones (courtyard, and indoor balcony) can create an opportunity for frequent interaction and sense of community, which are two elements of social sustainability.
- Setting dead space regulations and law enforcement means that organize the relations amongst residents regarding use of the common spaces that engage the residents themselves to avoid conflict. These regulations should additionally address such issues as behavior in the space, the required maintenance system, the fee payment process, and similar vital issues.
- Providing incentives for the developers to relief the financial burden (e.g., tax cuts, discounted fees, and additional area) to encourage them to participate in bridging the prevalent public space gaps.

The foregoing recommendations, in Amman context, required require modifications to "The Organizational Law for Cities: Villages and Buildings" that classifies residential land uses into A, B, C, D, and E classes. This law was initiated in 1966 for the single-family house, not for multi-family housing. Few amendments were made to this law but they proved not to be sufficient enough to adapt with the current changes. Research results show that there are no significant differences between the different prototypes of buildings under investigation (Table 1). Therefore, there is a bad need for formulation of a strategy for developing apartment buildings within a series / or group of buildings (compound) to facilitate provision of common spaces at the building and neighborhood levels.

This research can be considered as a starting point for a chain of integrated investigations that aim at proposing apartment building design patterns with the optimal level of social sustainability. One of the limitations to this study is that it did not include the policy maker's (government) vision and the viewpoints of other law enforcement entities.

The common spaces need to be studied within the context of the cultural values of the people of Amman who appreciate privacy in terms of gender separation due to their conservative beliefs. On the other hand, the common spaces need to be explored within the housing market by assessing their effects on the housing cost, feasibility, and sales.

7 Conclusion

Due to the importance of social interactions among people who reside in the same places, indoor common places in multi-family housing can be considered as a basic need. Therefore, this study focused on the social dimensions of sustainability, through analyzing different sustainability indicators, including social equity, social capital, civic engagement,

community stability, place attachment, and safety and security, as critical aspects of development of residential apartment buildings in Amman. This study found that most of the contemporary residential developments within the study area are characterized by a standard mass building to find insensible interaction due to the lack of gathering areas and open spaces. This finding was supported by the finding that the apartment buildings suffer from a severe deficiency in indoor common spaces, quantitatively and qualitatively. As a matter of fact, this study found that most current residential buildings have limited indoor common spaces and that the existing common spaces are confined to circulation paths. Additionally, there is a lack of a hierarchical system in the studied apartments as manifested by the sudden transition from common areas to residential unit entrances, which are directly opened to the vertical circulation zone.

In conclusion, there is a need for engaging stakeholders in the provision of design principles and practical strategies that aim at pursuing socially-sustainable outcomes. This does not mean increasing the space quantitatively owing to that so doing may increase the housing costs. Rather, it is about further smart thinking and being more responsive to human needs through innovative design solutions. Consequently, it is necessary to examine the possibility of expansion of common spaces from a qualitative point of view to have an interactive space. As well, maximizing the opportunities for creation of new functions with hierarchical spaces (multiple sizes and types) is particularly important to enhance the urban amenity for the residents of these and similar places. This can be a profound contribution to the civil policy that supports the individual's wellbeing and contribute to development and deepening of a sense of community, both for the existing and new buildings.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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