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Socio-anthropological analysis of the new form of justification for the choice of compressed earth block for the construction the housing masonry in Ouagadougou, Burkina Faso

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Abstract:

This article builds on the basic reflections initiated to study the logics and motivations that justify the choice of CEB as masonry for housing construction in Burkina Faso. Few sociological studies have been carried out in relation to the construction methods using CEB. Through a qualitative approach, semi-directive interviews were conducted with a minority of users of CEB who have very high economic and cultural capital. The article shows that the construction using CEB among a fraction of the elites is based on four main interconnected forms of justification: i) a technical justification based on ecological reasoning, ii) a culture of social distinction and a quest for social prestige and conspicuous consumption, iii) an identity-based justification based on a desire to re-appropriate autochthony and "reimagined authenticity" iv) and a justification that transcends that of autochthony through post-materialist values linked to the global issues of the sustainable development goals (SDGs). In view of these new forms of justification, the article shows that one of the ways of disseminating CEB in Ouagadougou would be through the dissemination of ecological reasoning in the public space.

Keywords: Compressed earth block; social distinction; ecological reasoning; re-imagined authenticity; inductive approach; post-materialist values; Burkina Faso

1. Introduction and Background:

Located in the Mossi plateau, the city of Ouagadougou covers an area of 2,800 km². It is a cosmopolitan and multicultural city with a diversity of ethnic groups and architectural practices. Ouagadougou is also the administrative and political capital city of Burkina Faso. From an

estimated total population of Burkina Faso of 20,487,979 (INSD, 2019), the capital city Ouagadougou is home to 45.4% of the total urban population.

Historically, Ouagadougou was a “fairly important pre-colonial city” whose birth dates back to the 14th century (Dulucq, 1997). A diachronic analysis of the urbanization process reveals that the pre-colonial city was organized around the royal palace, before the French conquest, whose dominant characteristics in the structuring of the city in the 18th century still constructed around the “royal palace and the market binomial” (Fourchard, 2001). Architecturally, historical sources reveal that the morphology of the city resembled to a village town; where the widespread used building materials were "banco/adobe/ mud bricks", according to information reported by the first explorers (Dévérin, 2005).

After the colonial conquest and with a view to modernizing the capital, the first Governor Hesling undertook major works in the chief town of the colony, which he named "Bancoville" in the 1930s because of the dominant building material of "banco bricks” (Jaglin 1993, Ricard, 2002; Salo, 2015). This sobriquet of "*Bancoville"* attributed to the city throughout the French’s West Africa area is explained by the fact that it was perceived as “*a city of huts, a city of poorly assimilated rural dwellers, a city of Africans*” (Dulucq, 1996: 223).

Although banco was the oldest material used in the construction of housing in Ouagadougou; it can be seen that there is a strong tendency to use cement blocks in the construction of housing in the urban space, from the post-colonial period to the present day. Today, adobe, compressed earth blocks (CEB), cut laterite blocks (BLT), and cement blocks are among the most used materials for masonry construction (Figure 1).

Figure 1. Different types of masonry bricks used in construction in Ouagadougou : a) adobe bricks, b) compressed earth blocks, c) cut laterite blocks (BLT), and d) cement blocks (ZOUNGRANA, field survey 2017 and 2018)

However, the literature shows that mud bricks have better advantages than cement bricks, in terms of thermal properties (Cannon et al, 2014 and Assad et al, 2018). For example, for a bulk density of 2000 kg/m^3, the thermal conductivity of CEB is 0.6 W/m.K (Cagnon, 2014), compared to 0.9 W/m.K for clay bricks (Cagnon et al, 2014) and 1.3 W/m.K for concrete (Assad et al 2018). Although, old architecture has had an influence on housing construction patterns (Lidón de Miguel et al, 2021); it is worth noting the slow return to the use of eco-materials such as CEB in the building sector in

Ouagadougou, given the international injunctions in favour of climate and energy efficiency issues. Therefore, the present study assesses the question of what are the meanings attached to the choice of CEB in housing construction in Ouagadougou

1.1 State of knowledge of studies on CEB in Ouagadougou

There is little scientific work on building with CEB with a perspective of the social sciences. While one study has focused on aspects relating to the different forms of representation of CEB in Ouagadougou (Zoungrana et al., 2021), most works mainly carried out in the field of materials science and engineering. To clarify the position of this research from a socio-anthropological perspective, it should be noted that the work on CEB at the global level in the field of materials science has endeavoured to propose solutions aimed at reducing the constraints related to durability (resistance to erosion) and improving the physico-mechanical properties of CEB (Walker, 2004; Fabbri et al.; 2019; Medvey & Dobszay, 2020).

In the Burkinabe context, work has similarly focused more on two aspects. On the one hand, there are studies that have focused on the use of industrial or agricultural by-products and municipal wastes to strengthen the engineering and durability performances of CEB (Ouédraogo et al., 2015 ; Soré et al.,2018; Nshimiyimana et al.,2020 2020a, 2020b, 2020c ; Nshimiyimana et al. 2021; Nshimiyimana et al., 2022, Malbila et al.2018; Tarmangue et al. 2021). On the other hand, some has sought to assess the potential of CEB constructions with a view to improving indoor comfort and reducing energy consumption for building cooling (Paulus, 2015; Hema et al. 2018; Moussa et al. 2019; Hema et al. 2020; Hema et al. 2020a; 2021; Neya et al. 2021; Ouedraogo et al. 2022). Similarly, it should be noted that a conceptual framework to support the implementation of sustainable construction using CEB has recently been proposed; following three key principles: conservation of natural resources, cost-effectiveness, and design for adaptability and human well-being (Assoumou et al., 2022).

Although, the technical and engineering aspects have been addressed, an epistemological break is still needed in order to shed new light on the phenomenon of the low diffusion of CEB from a socio-anthropological perspective. This break with the common sense is a necessary step in order to better understand the objective of the present research, which was lacking in theoretical and empirical references. This research has given an important part to the field study. However, the field study must obey the main principles of a scientific approach which implies breaking with common sense in the production of knowledge (Bourdieu et al., 1983). This posture is an indispensable condition for shedding light from a socio-anthropological perspective on the new forms of justification that surround the choice of CEB among a fraction of the Burkinabe population. In the following section, the methodological tool used to analyse the phenomenon will be discussed.

2. Research methodology:

A qualitative methodological approach was used in this research. In this section, three types of data collection tools were used: life stories, GPS for collection of geographic coordinates, and direct observation.

2.1 Life stories from owners of CEB dwellings:

In this case study, which focuses on owners of CEB dwellings in Ouagadougou, a number of methodological precautions are necessary. These precautions are based on the size of the study area, which consists of 12 districts and 55 sectors. Thus, this study recommended the dwelling as the unit of study, rather than the household. By dwelling, it means, *"a physical unit of residence, delimited according to precise rules and concretely identifiable in space. Its fixity on the territory allows repeated moves without the problems of allocation that we encounter with households that move"* (Delaunay, 2009: 9).

As a reminder, the data from the exploratory survey carried out in 2017 revealed two types of families, users of CEB in Ouagadougou: a few individuals made up of mixed couples, nationals and

expatriates; and collective facilities belonging to public or private actors or NGOs.

In this section, the survey tool focused on the lifestyles related to the choices of CEB in housing construction during data collection. Among this minority of CEB homeowners, there are types of dwellings consisting of a few flats (multi-storey houses), villas (single-family houses with a living room, one or more bedrooms and the interior amenities: shower, toilet with septic tank).

In order to understand the meanings and logics of this form of housing construction in CEB; particular attention was given to the characteristics of the socio-demographic profiles of the respondents. Indeed, a qualitative approach was chosen, in order to better analyse the motivations and forms of justification of the choice of CEB as a masonry material. This is because "*qualitative methods restore the coherence of the actor and the orientation of his action"* (Juan, 1991: 17). The choice of this method of data collection is motivated by the fact that we are in the presence of a minority of city dwellers who have built their dwellings in CEB. Moreover, this choice was motivated by the fact that *"there is a life story as soon as there is a description in narrative form of a fragment of lived experience"* (Bertaux, 1997: 9). This tool makes it possible to explore the part of the narrator's life, the experienced situations or events through semi-directive interviews (Poirier et al., 1983).

This biographical approach was chosen because the common point for this minority of users is the choice of CEB as the masonry for the construction of their dwelling. The biographical approach allows for the production of knowledge that can make this study phenomenon intelligible. Moreover, the studies that integrate life stories are grouped in the "*life course paradigm*", in the field of social sciences (Lalive D'épinay et al., 2005). The theory of the life course makes it possible to identify the trajectory of individuals in a given temporal context; because it is at the intersection of several disciplinary fields. Thus, *"the life course has the ambition to understand and explain the unfolding of human lives from the intersection of three temporalities: the individual life cycle, the historical context of the subject and the historicity of the subject in his or her social relationships"* (Lalive D'épinay et al, 2005: 198-199).

The homeowners who live in buildings made or under construction with CEB were surveyed. As Beaud and Weber (2010) have pointed out, the researcher can only access the point of view of the interviewees by having them tell and describe their practices. In this particular case, the study sought to understand the motivations and values associated with building using CEB. Thus, the collection of life stories from the owners of the CEB dwellings were conducted through the establishment of a climate of trust and sympathetic listening. The study was able to collect information about the overall price of the construction, anecdotes and related discourses about their construction with CEB.

This part of the interview took place in a reflective posture, considering the level of education, the number of children and the profession. This aimed to understand the meaning associated with the choice of the CEB material by the users. These data were recorded using a dictaphone. All narratives were collected in French. Fifteen (15) owners of CEB dwellings were surveyed: three (03) mixed couples, seven (07) Burkinabè nationals, two (02) expatriates residing in Burkina Faso, and one (01) no residing expatriate (Table 1). Table 1 also describes the profile of the users of CEB dwellings: medical doctors, engineers, teachers, diplomat, among others, who have various education background and family sizes.

In this inductive approach, the new data did not emerge from the last life stories at some points, as the data were collected from the minority of homeowners of CEB-made dwellings. This theoretical saturation allowed us to end the data collection. In summary, the collection of the life stories of the CEB homeowners provided us with empirical data to identify the motivations and meanings associated with this form of CEB construction technique.

However, the biographical method is very often used in the social sciences. It is subject to criticism within the sociological discipline. According to Passeron (1990), the researcher must observe a certain caution and epistemological doubt, given the dimension of subjectivity that surrounds the biographical approach. Bourdieu (1996: 69) describes this method as a biographical '*illusion*' because it can lead to an *"artificial creation of meaning"*. In this work, permanent distancing was observed during the whole process of collecting empirical data.

Table 1. Profile of the users of CEB as wall masonry (Zoungrana, field surveys 2017, 2018, 2019, 2021)

Respondents	Sexes	Occupations	Educational Level	Number of children	Observations : citizenship
E1	M	Medical doctor	Bac+8	-	Expatriate: French-Burkinabè
E2	F	Agricultural engineer	Bac+5	four	Mixed couple: French-Burkinabè
E3	F	Anthropologist	Bac+5	two	Mixed couple: French-Burkinabè
E4	F	Research Officer	Bac+8	two	Mixed couple: French-Burkinabè
E5	M	Civil engineer	Bac+5	four	Expatriate
E6	M	Diplomat	-	two	Expatriate
E7	M	Teacher	Bac+5	two	Burkinabè
E8	M	Paramilitary	BEPC	two	Burkinabè
E9	M	Project coordinator	Bac+5	two	Burkinabè
E10	M	Communicator	Bac+5	two	Burkinabè
E11	M	Engineer	Bac+5	two	Burkinabè
E12	M	Marketing Officer	Bac+5	three	Burkinabè
E13	M	Computer engineer	Bac +5	-	Burkinabè
E14	M	Marketing Officer	Bac+3	two	Burkinabè
E15	M	Contractor	Bac+3	three	Burkinabè
Bac : high school degree (e.g: BAC+8: high school + 8 years of university study)					

2.2. Life story analysis techniques:

The data collected was transcribed as long as the life stories were conducted. The aim of this full transcription was to capture the social trajectory and background of CEB homeowners. It also aimed to identify the motivations and values conveyed by the users through the choice of CEB as a building masonry. As recommended by Bertaux (2016), the analysis begins with the collection of the first life story. First, the analysis proceeded to a reconstruction of the narratives without distorting them or modifying them in a perspective of temporal coherence. This took the form of a re-reading of the different corpora of life stories. As Sanséau (2005) has pointed out, this approach aims to objectify the subject studied by the researcher. As far as the analysis of the life stories from this research is concerned, three methods were combined:

-a biographical analysis based on individual cases to understand the pivotal periods and events that led users to choose CEB;

- a thematic analysis, which consists of identifying passages in each story that correlate with several

themes in order to compare the stories of one owner with another;

- a comparative analysis by highlighting the recurrences and forms of meaning associated with the construction using CEB.

Finally, pseudonyms were assigned in the analysis of individual social profiles, to keep the respondents anonymous.

2.2. Data collection using a Global Positioning System (GPS):

In order to have a spatial distribution of the universe of buildings made of CEB at the scale of the city of Ouagadougou, GPS data were collected. Indeed, the use of geo-referencing combined with other qualitative data collection tools such as the observation grid or the interview guide was very useful in the mapping process. The Geographic Information System (GIS) software was used for spatially representation of GPS data on the administrative map of Ouagadougou. It allows the location of several simultaneous and multi-spatial information in real-time in relation to events that have taken place (Nikièma, 2007).

Firstly, the information on the various constructions made of CEB was collected from the architects and construction company, during the exploratory survey. Then, other complementary information on the state of the art of construction using CEB was also collected, as the field survey progressed in 2017. This information was collected from strategic groups; such as masons, Building and Public Works companies, bricklayers, contractors and some architects in the city of Ouagadougou. This stage allowed to have exhaustive ideas of the geolocalisation of the buildings made of CEB in the urban space of Ouagadougou. In this regard, here is what one respondent said, during the exploratory phase: "*In Ouagadougou, I built a house using CEB for disabled children in the centre (orphanage) in 2014 and two mini villas made of CEB for a private individual in 2015 in the zone of the_AN III housing estates_"* (Architectural engineer, interview on 11/01/2017).

Secondly, the documentary analysis as well as the cross-checking of the information collected from the different construction professionals allowed to identify more (pilot) constructions carried out under the project LOCOMAT (National Strategy on Local Building Materials), later on in 2018. In addition, the investigations made it possible to list new construction projects in the city of Ouagadougou (facilities for public and private collective, NGOs, individuals, etc.). Therefore, the data were collected iteratively because new information on sites under construction or already built using CEB were identified at each steps of field survey. This is why the data were collected progressively with the identification of households hosting CEB construction sites.

Thirdly, the information collected on the construction sites on the urban scale allowed for the identification of the construction sites of CEB. It also allowed for GPS surveys of CEB constructions

to be carried out throughout the research. However, it should also be pointed out that, beyond direct observation, other buildings made of CEB were identified randomly in certain districts of the capital during the fieldwork. As Hannerz (1983 :154) has pointed out, *"the fact of discovering something by chance while looking for something else, is perhaps an ability that is privileged in urban life"*. In other words, the discovery of the unknown is an integral part of urban studies.

Finally, after the treatment of the collected GPS coordinates, all the data was sent to the IGB (Institute of geography of Burkina) for processing and mapping in 2019. Thus, these data were processed using the ArcGIS software to obtain a map of the distribution of CEB construction at the scale of the city of Ouagadougou. This analysis of the spatial distribution of CEB constructions was developed in section 4.1. The following section further describes the aspect related to direct observation carried out during our study.

2.3. Direct observation:

In this work, direct observations were carried out, in a first step. In a second step, direct and systematic observations of inhabited spaces were also carried out during individual interviews with owners of CEB dwellings. Thus, in the collection of life stories centred on the owners of CEB dwellings, the overall descriptive information on the building were collected in a notebook. For example, after an interview with a mixed couple, owners of a CEB dwelling, the different compartments of their house were visited. This guided tour allowed to collect more information on the location of the children's room, the visitor's room and the storage of toys. In addition, the presentation of the patio area designed by the architect and which favours the circulation of air currents was described by the houseowner. Similarly, the description of the choice of the location of the balcony was also given by the houseowner. These observations allowed to grasp in a short period of time the experience of the household; as well as the reasons that favoured the choice of CEB as the construction masonry. The data were+ collected in these different contexts through sympathetic listening.

Thirdly, the field data were collected in situ on the CEB construction sites mentioned above. The return to the survey field in May 2021 provided an opportunity to discuss and make observations on a CEB villa which still were under construction. All of these sites were a springboard to understand what is hidden inside the construction sites. However, the treatment of the collected data enabled to understand the social practices and the experience of the actors related to the choice of the CEB. The following section presents the reference theory used to study the new forms of justification attached to the choice of CEB as a masonry construction material.

3. Theory of reference: Bourdieu's structuralist constructivism:

The approach is an operation for analysing and understanding the meanings given to the practices studied individuals. A constructivist posture was adopted in order to analyse the lifestyles and modes of living of CEB users. The choice of building materials (cement block, CEB, adobe brick or LCB) is a function of social position and capital mobilised in the social space.

Based on the empirical data from the exploratory phase of the survey, it appears that a minority of the urban population builds the dwellings using CEB. Indeed, the Bourdieu's structuralist constructivism theory was chosen as a framework for analysis (Bourdieu, 1979); in order to understand the preferences/tastes in relation to the use of these local materials. This option aims to analyse the meanings associated with the choice of CEB by this minority of the urban elite. But what exactly are the forms of justification that legitimise the mode of housing construction using CEB?

Bourdieu (1979) argues that tastes, contrary to the assertion of common sense that all tastes are in nature, can be subject to sociological analysis. Thus, the distribution of aesthetic, artistic, culinary and musical tastes is organised according to the 'class habitus': "*for there to be taste, there must be goods that are classified, of 'good' or 'bad' tastes,*

distinguished or 'vulgar', classified and at the same time classifying, hierarchised and hierarchising, and people endowed with principles of taste classification, enabling them to identify among these goods those that suit them, those that are to 'their taste'" (Bourdieu, 1984 : 162).

This concept of 'habitus', which is central to Bourdieu's sociology, primarily links the formation of tastes or the orientation of (artistic) preferences to the determinism of dispositions acquired at the stage of primary socialisation and which frames all behaviour (Bourdieu, 1980). Thus, in Bourdieu's opinion, "*'the habitus' is a product of history, producing individual and collective practices, and therefore history, in accordance with the patterns generated by history; it ensures the active presence of past experiences which, deposited in each organism in the form of patterns of perception, thought and action, tend, more surely than all the formal rules and all the explicit norms, to guarantee the conformity of practices and their constancy through time'* (Bourdieu 1980: 91).

In summary, habitus theory allows to grasp the logic of action of agents around a given practice, by showing that, in accordance with his tastes, each agent has a behaviour that seems natural to him; but which is in reality the product of his experiences. These experiences are the reflection of belonging to a given class. For Bourdieu, agents are endowed with capital. They are distinguished by four (04) types of capital: (i) economic capital, which implies wealth and income, (ii) cultural capital, which refers to the cultural asset that an agent possesses, or to a diploma sanctioning a cultural level, (iii) social capital, which refers to the set of relations that an individual or his family may hold, and (iv) symbolic capital, which refers to social prestige (Bonnewitz, 1998).

Therefore, what analogy can be drawn between this reference theory and the adoption of CEB by an urban elite? The present study sought to analyse the motivations and meanings attached to the choice of CEB as construction material, among many other materials, through a case study focused on the fraction of the elite who built their dwelling in CEB. Following this theory, the choice of objects (CEB materials) must consider the structure of capital in order to identify the logics behind this form of construction. The Bourdieusian paradigm can be transposed to the present study, because behaviour, attitudes, social reactions and even the most trivial gestures such as the choice of CEB are not accidental. This mode of construction using CEB contain particular meanings that deserve to be elucidated because *"taste is the propensity or aptitude for the appropriation (material and/or symbolic) of a given class of object"* (Bourdieu, 1979 : 193). However, it should be noted that this Bourdieusian interpretative framework has been criticised in certain aspect: such as the determinism of actors in the social game, the legitimacy of the learned culture and the transformation of a society of class into a society of individuals (Rigaux, 2011). Therefore, this theory of reference has made it possible to identify the forms of justification and the meanings associated with the construction using CEB in the city of Ouagadougou.

4. Discussion of the findings:

4.1 Analysis of the spatial distribution of CEB constructions in Ouagadougou:

This section analyses the spatial distribution of CEB constructions that were identified around Ouagadougou. The analysis is based on empirical data collected from house owners, architects, building companies and geographical coordinate surveys. As a reminder, the analysis of the mechanisms of diffusion of the CEB constructions in Ouagadougou can only be better achieved by considering the whole of the urban policies applied to the city, the historical context, the evolution of the housing estates, the types of materials used in the housing sector. This retrospective is necessary because the urban centres of Upper Volta were marked by public intervention and only experienced piecemeal development, until after independence (Nikièma et al., 2016).

Nikièma et al., (2016) also note the fact that the urban growth of the city of Ouagadougou is subject to successive subdivision depending on the circumstances related to the delayed planning. This

has given rise to several distinct spaces. The central districts, which are ageing, are followed by a peripheral ring resulting from the first urban development plans in the 1980s, whose subdivisions were supposed to make the non-developed areas disappear. Moreover, this diachronic perspective aims to ask again: What does this new form of housing dispersion in CEB refer to on the scale of the urban space of Ouagadougou? However, the analysis of the dispersion consisted in describing the types of CEB construction (numbered from 1 to 44) identified in the different districts of the city of Ouagadougou.

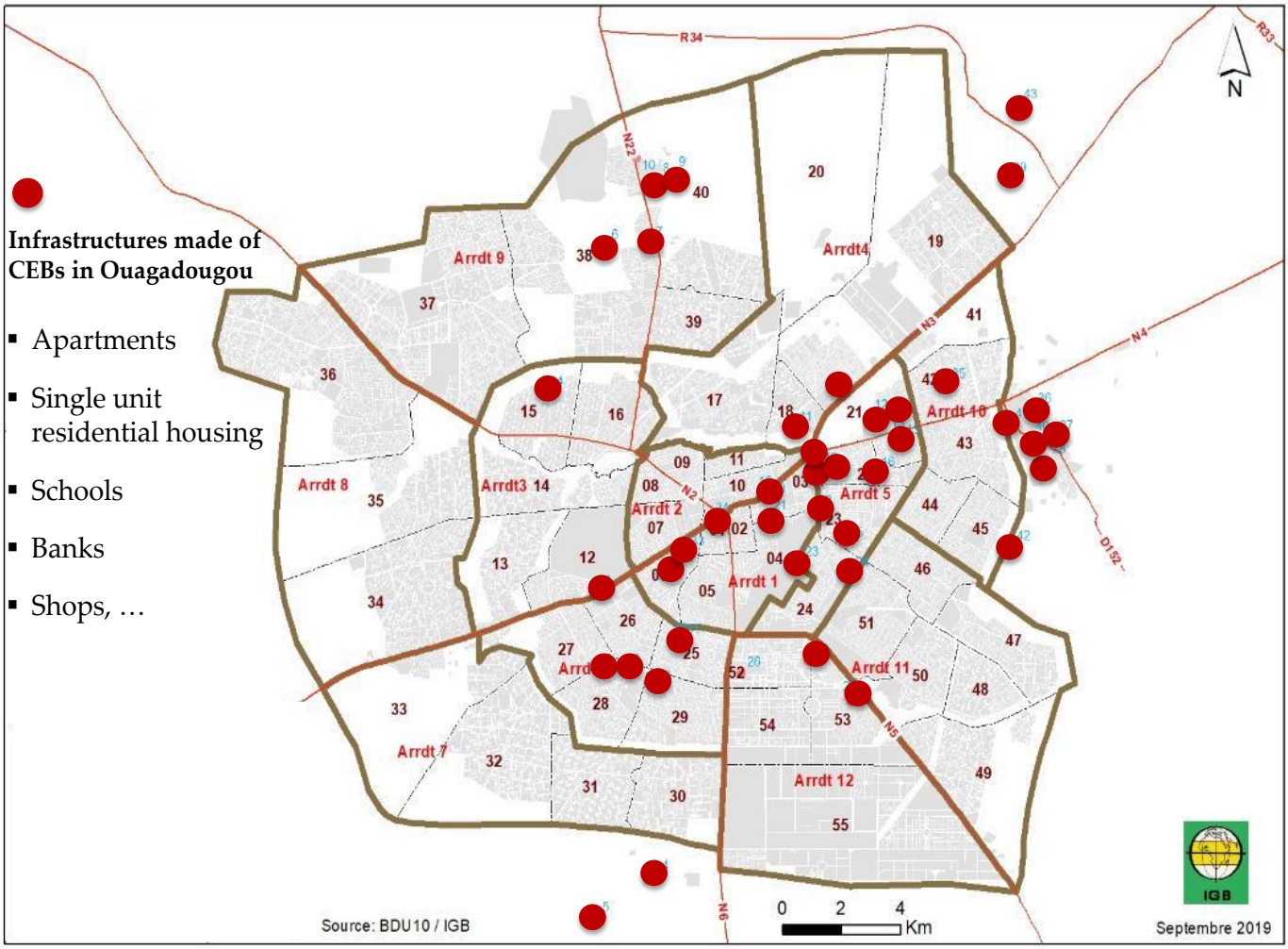

Figure 2: Spatial distribution of 44 constructions made of CEBs around Ouagadougou : arrdt1-16=different districts (Zoungrana, field survey 2017-2021)

Figure 2 shows the spatial distribution of the construction made of CEB in the city of Ouagadougou. There is a strong concentration of CEB constructions in the urban core constituted around districts (arrdt) N° 1, 2 and 5. In fact, in these former housing district N° 1, which has a surface area of 20.979 km², there are some pioneering and pilot buildings constructed in CEB. These include public collective constructions such as the Museum of Music: construction [22], built in 1983 during the revolutionary period by the Association for the Development of African Architecture and Urbanism (ADAUA). This construction was renovated in 2010.

In addition, other collective constructions made with CEB in partition walls are also geo-located next to the *zone of various commercial and administrative activities* (ZACA). These are shops in the Zabre daaga market [21], pilot shops of the LOCOMAT project [20], the road safety education centre [18] in Koulouba in sector N° 3 and other pilot shops of the LOCOMAT project in Bilbalgho

[34] and a private house [32]. The collected empirical data confirms that this dispersion is linked not only to the intervention of public authorities, but also to the implementation of public policy in the sector. In parallel to this type of construction, there is one privately owned dwelling [33]. There are also two dwellings in district N° 2, two (02) mini-villas [19] built in 2015 in the "Cité An III". This dispersion of construction in CEB in the urban space does not respond to an overall dynamic observed in the city, but rather to individual strategies.

However, there is low dispersion of CEB (housing) constructions in the central district. Moreover, there is a contrast with the overall urban morphology dominated by cement-block as construction masonry. However, in the central districts, the urban space is marked by "the evolution of the quality of building materials from the centre to the periphery and punctuated by districts inhabited by populations with a higher standard of living than the average : "Zone du Bois", "Petit Paris" and "Ouaga 2000" (Nikièma et al, 2016: 190).

Alongside this quality of materials in the central neighbourhoods, there are infrastructures made of CEB. However, the history of urban policies shows that the housing estates in these central districts predate 1972 (Delaunay, 2009: 19). Moreover, "one of the characteristics of Ouagadougou is that it remains a horizontal city, made up largely of individual houses or common courtyards" (Boyer, 2009: 108).

Like the in the urban core, in district N° 5 which covers an area of 20.028 km², there are public and private infrastructures made with CEB. On the one hand, the public collective infrastructures are composed of an apex structure for artisans [24] built in 1995 in the Bogodgo area in sector N° 24, the partition wall of a health centre [17] and the headquarters of the LOCOMAT project [18]. On the other hand, the private infrastructures built in CEB include two mini-villas [23] of type F2 (one living room + one bedroom) built in 2016, the walls of a company [15], the buildings of a private water management agency [14], and an orphanage [13], which are scattered throughout the western zone of district N° 5. Furthermore, two types of CEB housing (mini-villa) belonging to individuals (Burkinabè) [16] and a mixed couple [12], built in 2017, are also geolocated in the "Zone du Bois".

In contrast to the central neighbourhoods, there is low distribution of CEB constructions in other districts of the city. For example, in district N° 3, which covers an area of 32.116 km², there is a pioneering high-standing building in CEB (type G+1: ground floor + one floor) [44] dating from 1994 and belonging to a private individual (Burkinabè). There are recent private buildings of banking organizations [1] in CEB built in 2014. This low level of dispersion is also observed in district N° 10, which covers an area of 21.979 km², where there are individual CEB dwellings type F3 (two bedrooms and a living room) [35]. In district N°4, whose surface area extends over to 25.995 km², there is also a private CEB building [11].

Although, there is a weak spatial distribution of CEB constructions in the above districts, there are non-existent in districts N° 7, 8, and 9. Despite the treatment of empirical data, it was not possible to identify any CEB infrastructure in these areas at the time of the present study.

On the other hand, few collective facilities built in CEB were located in district N° 6. These are for a banking organisation [1], an orphanage [30], a shop [31], infrastructure and a CEB production site [3]. In this same area, a private high-standing flat in CEB (G+1) [3] for a mixed couple was geolocated in this part of the city.

With regards to district N° 12 (20.292 km²), located in the south of the central districts, the spatial dispersion of CEB construction is relatively low. However, there is one inter-locking CEB construction built in 2017 in double wall [27], and another construction located in sector N° 52 [26]. In addition to this form of construction, the field study also revealed F2 type (bedroom + living room) CEB housings [28] and [29] located respectively in the "Trame d'accueil Ouaga 2000". This form of housing production with local

materials in CEB contrasts with the dominant construction dynamics of the wealthy districts of "Ouaga 2000", where the dominant construction material is a cement block. It responds to a singular dynamic of housing production with local materials in CEB. Moreover, the spatial configuration in the peripheral zone is marked by the presence of two public community facilities, including the Ouagadougou traditional-modern health centre [4] and a public school [5], in the south of Ouagadougou.

However, in the northern part of the city of Ouagadougou, the distribution of buildings made of CEB remains fairly homogeneous. In district N° 9, which covers the largest area (37.374 km²), there are two types of CEB constructions. On the one hand, there are private collective facilities located in the Kamboinsé area, collective housing (dormitories) built in 2007-2008 [8], a health and youth reintegration centre [6] built by an NGO in 2017 and a housing belonging to a group [10] in sector N° 40. On the other hand, there are buildings belonging to expatriate individuals [9] and an F2 housing [7]. Moreover, a regular CEB production site [39] and an occasional production site [40] as well as community facilities and schools [43] are also located in this sector.

In addition to the northern area, buildings made of CEB are also located in the peripheral area of the city. This form of CEB construction belongs to few individuals: F4 mini-villa (living room + three bedrooms) [41] belonging to the expatriate, a flat (G+1) [37] belonging to a mixed couple and an F3 mini-villa [36] belonging to a Burkinabè, middle class manager.

This analysis revealed the existence of two types of users of CEB construction in the city of Ouagadougou. The first category is made of constructions for individuals: mixed couples, nationals and expatriates, and the second is made of construction for collective facilities owned by public authorities and private operators or development partners (NGOs). Table 1 summarises the social profiles of some of the owners of surveyed CEB house in the city of Ouagadougou.

Similarly, the analysis of the spatial dispersion of the construction in CEB shows that among this minority of house owners, there are types of housings composed of a few flats (houses with only ground floor), villas (individual houses with a living room, one or more bedrooms with interior amenities such as a shower and a toilet and a septic tank).

In the city of Ouagadougou, the supply of housing is based on private real estate development and state-owned companies whose development is aimed at a group of senior government officials, expatriates and the diaspora. However, an individual private initiative in housing production remains the most diversified in urban areas. In the urban context of Burkina Faso, the production of housing rhymes with household income. Therefore, what are the new forms of justification associated with the choice of CEB in Ouagadougou?

4.2. Justifications of the choice of CEB constructions in Ouagadougou:

4.2.1. Justifications based on the technical aspects:

The narratives that combine determining factors (level of education, professional occupation, family type and numbers of children) highlight a wide variety of construction projects using CEB masonry. Indeed, the research revealed that the lifestyles and building styles in Ouagadougou are the emanation of a fraction of urban elites. The analysis of the narratives showed that the technical justification (breaking with the all-in-concrete or finding alternative to concrete) is the most dominant form of justification, among most owners of CEB housing.

This technical justification is accompanied by "environmental awareness" which is linked to the quest for thermal comfort in the building. The motivations of this middle-class minority to switch to building with CEB are dictated by an attitude of awareness of the alleged advantages and thermal performance of CEB. This attitude is widely shared by all owners of CEB housing, as expressed the two expatriates:

"*We always kept in mind that we did not want a concrete building in Ouagadougou. It was important to us.…It took us a while to decide to build in CEB, but as CEB met our criteria for thermal comfort, my husband and I decided to build our flat in 2016 »* (Monique, Bac+5, 2 children: interview of June 09, 2018.

"*I decided to build in CEB because I realised that the city of Ouagadougou is in a somewhat complicated climatic zone. (...) As I knew that we could not build to have thermal comfort to cover the whole year, we opted instead to reduce the temperatures during the hottest and driest periods through a ventilation device. So we opted to systematically orient all the windows with in a north-south direction. I think that the CEB will play its role in terms of limiting the heat inside the rooms, especially in hot periods such as during the months of March-April and May"* (Alain, Doctor, bac+8: interview of July 27, 2017).

These expatriates are joined by a Burkinabe who stated: "*I built my house in* CEB *because in terms of climate,* CEB *is a type of material that allows you to live in a standard climate because it is not too hot or too cold inside the house*" (Razack, Bac+5, communicator, 2 children: interview of July 29, 2019).

The data collected from the field obviously show that the choice of CEB as a building material among this minority of elites is based on a form of breaking with the all-in-concrete construction of their housing. While this form of justification is a common denominator among these users, the comparative analysis of the narratives reveals that after this first form of justification, the second most recurrent form of justification is undoubtedly the quest for social distinction.

4.2.2. Justification based on social distinction:

Apart from ecological reasoning, the corpus of other narratives also shows that the second most shared form of justification among CEB homeowners is unquestionably the desire for social distinction. There is a kind of social construction of "tastes" among this minority of CEB users in Ouagadougou. According to Bourdieu, *"taste is the principle of everything one has, people and things, and of everything one is for others, of those by which one is classified and by which one is classified. Tastes, that is, (manifested preferences) are the practical affirmation of an inevitable difference"* (Bourdieu 1979:59).

Although the choice of CEB is perceived as a banal gesture in architecture, the whole of the discourse and corpora reveal that there is a subtle culture of social distinction among all the expatriates, Burkinabè and mixed couples, justifying the use of CEB. This is illustrated by the following excerpts from the narratives: *"I built my house in* CEB *in 2015. I think that the construction of* CEB *is beautiful and aesthetic (...). I would say that I like what is natural because it comes from nature. If you build with CEB, it is like living with nature"* (Alex, Expatriate, Civil Engineer, Bac+5, 4 children: interview of September 08, 2019).

"I can say that I also like things that are a bit out of the ordinary: I said to myself why should I put so much money into building my house using cement when we are in a Sahelian country? (...) I am a natural person who likes things that are out of the ordinary. I chose to build with CEB because of the comfort and aesthetics" (Fayçal, Burkinabe, Bac+3, entrepreneur, 3 children: interview of November 26, 2021).

Similarly, while expectations in terms of social distinctions are omnipresent among most CEB homeowners, they are much more pronounced among mixed couples and expatriates than among nationals. This form of distinction is coupled with another expectation in terms of symbolic recognition. This quest for distinction is observed even in the choice of the colour of the raw material used to produce the CEB. "*I chose to build firstly in* CEB *for its insulating properties and secondly, it was for the aesthetic properties. (...). I like the colour of the earth, which is relatively light*" (Alain, expatriate, Doctor, bac+8 : interview of July 27, 2017). "*What motivated me the most was the fact that* CEB *allows you to make architecture with a local material that is beautiful and light. The ochre colour of the earth attracted me because the*

construction is so pretty and it blends in with our environment of a Sahelian country. I am not going to use varnish in order to keep the ochre colour of the earth, which I find very beautiful" (Roger, Burkinabe, 3 years of higher education, marketing manager, 2 children: interview of May 22, 2021).

In summary, there is a propensity for a taste for luxury/aesthetics and difference that shows that there is a permanent quest for social distinction that is interwoven into the choice of CEB among urban elites. Beyond social distinction, there is also a form of justification based on ostentatious social prestige in the Veblen sense of the term.

4.2.3. Justification based on an expression of social prestige:

The analysis of empirical data has shown that, beyond social distinction, there is a quest for social prestige among the owners of CEB housing. This quest for social prestige also contains a quest for symbolic recognition in the social space according to the users. The following corpus of accounts supports this view: "*Visitors are curious to ask me: what brick models did I use in the construction? People don't know about CEB. When they look at it, they know its clay, but as soon as they go inside they say 'wow'! They are seduced by the beauty of the building"* (Omar, Burkinabe, Bac+5, computer network engineer : interview August 24, 2018).

The choice of CEB as a building material allows the users to express their prestige in terms of architecture. This form of construction is not a reproduction of endogenous construction (banco), but an indicator of distinction in the social space. Investing in a building made of CEB is not a form of expenditure motivated by the usefulness of the material, but by expression of their material wealth and social prestige. "*When I started building in this area, people said that this house made of* CEB *belongs to a rich person or to someone who lives in Europe [...]. There are many people who have visited my construction site and look at it with envy. I prefer to live in a* CEB *house with less heat because it is a small pleasure in life that I will not deprive myself of when I have the means to do so... The total investment cost of my house (foundation, openings, roofing, labour etc.) is about thirty-five million (35 000 000) CFA francs*, [i.e. about 53 354 euros])*"* (Roger, Burkinabè, Bac+3, marketing manager, 2 children: interview of May 22, 2021).

The use of CEB by a category of people from privileged social backgrounds is motivated by a desire for conspicuous consumption. "*The investment cost of my house is about 42 million CFA francs. When we finished our construction in CEB, people were intrigued by the material ... When we had the plan of the house we did not know what it would look like because we made a big house. We were surprised. The house is not only big, it is also made of CEB, so it is very visible* [laughs]... *Often, when people pass by, they stop and look at the house or they go around. So far, they prefer to look at the house than to look at their way".* (Rosemonde, Expatriate, researcher, 2 children: interview of May 28, 2018).

Behind these expressions: "intrigued by the material" "having a "big, strong house made of CEB and very visible", "people stop and look at the house", "they prefer to look at the house than to look at their way", is hidden a quest for prestige and social differentiation. It actually contains an ostentatious production. In fact, "*in order to attract and keep the esteem of men, it is not enough simply to possess wealth or power; it is also necessary to show them off, for it is obviously only in this way that esteem is gained. By making one's wealth conspicuous, one not only sharpens and keeps alive their sense of its importance but also, and hardly less usefully, strengthens and preserves all reasons for self-satisfaction*"(Veblen, 1970:27).

In short, the choice of CEB is for manifesting the wealth of the owners. The choice of CEB is a way of displaying one's power or wealth in the urban space. The choice of CEB by elites is intended to justify their high social status by creating symbolic attraction or admiration.

4.2.4. Justification based on the identity or re-appropriation of autochthony:

In spite of the investment cost, the CEB construction expresses a way of transcending autochthony. Far from "Bancoville", the new

architectural mode using CEB expresses another form of rehabilitation of earth construction. Similarly, this way of building indicates a new form of justification that moves away from local conceptions. The users see this form of construction as a reaffirmation of autochthony and Africanness. For mixed couples, expatriates or Burkinabè living abroad, the return to CEB is a way of reconnecting with their original environment.

"We built our house in CEB, it is just a desire to use this type of local material [CEB]... *The other couples who build in CEB in Ouagadougou: it is our network. More expatriates and a certain category of social class are building with CEB in Ouagadougou. There are often Westerners or mixed couples. There are also nationals who build in CEB"* (Céline, mixed couple, agricultural engineer, Bac+5, 4 children: interview of June 06, 2018).

In the opinion of Hilgers (2009), the city can be considered as « a collective of belonging » by considering its history, material and institutional evolution which unites the inhabitants. However, in the context of this research, the elitist diffusion of CEB also appears to be a form of re-appropriation of autochthony, insofar as historically earthen construction (banco) was the most widespread. Thus, these individual strategies of building with CEB among expatriates and mixed couples also contain identity positioning. Among this minority of expatriates, mixed couples and Burkinabè residing in Europe, the use of CEB allows them to build a bridge between their Western and African lifestyles. However, the acceptance of identity associates a *"natural"* origin with the notion of eco-material. This side refers to the natural identity of eco-materials, just like plant materials (wood, fibres, etc.) or inorganic matter (rocks) firstly produced by the nature (Deshayes and de Medina, 2011).

In summary, for urban dwellers who have acquired a certain social level, the choice of CEB as a building material carries a certain identity that they try to revalue to match their urban tastes and status. These elites do not want to build housing like everyone else, they are oriented towards materials to show that they have a personal choice. This shows the rise of a certain form of individualism in the urban space. This positioning of identity is extended in terms of traditional local products which are revalued in modernity.

4.2.5. Justification based on the expression of a return to a "re-imagined authenticity":

The symbolism expressed by the construction using CEB,beyond the identity dimension, lies in the fact that this material, which represents both the earth and the bush, refers to a Burkinabè or a typically African product. In the speeches of some Burkinabè who own CEB house, there is a reasoning that shows that they do not want imported products. Thus, for these urban middle classes, the use of CEB expresses a certain form of « re-imagined authenticity ». This authenticity refers to the search for originality in materials and architectural methods that do not deviate too much from the tradition.

The choice of materials that do not very different from the local traditional brick (banco), but which are reinvested by the wealthy and highly educated middle classes in urban areas. In other words, the choice of CEB is a kind of reinvention of tradition, but which has been reclaimed in modernity by middle-class elites with very high cultural and economic capital. Although the city of Ouagadougou "Bancoville" was built with rural considerations; today, the interviewees' expressions such as "terroir", "local", "authentic", "comes from us" are associated with CEB to justify that the choice of material illustrates a quest for authenticity. "*I decided to build with CEB because it is a local, natural and authentic material, unlike other imported materials. Moreover, CEB is made from local earth that is dug in quarries here in Burkina Faso*. (Ibrahim, Burkinabè, Bac+5, marketing manager, 3 children: interview of July 30, 2019). Roger adds that: "*What motivated me most to build with CEB is the fact that it is a local material that is beautiful and light and it comes from our region. …, our grandparents always lived in houses built with local materials,*

…. The ambient temperature during hot periods was very controlled...I preferred to invest in these types of CEB materials to live in with my family. It is possible, it is thinkable and it is feasible by Burkinabè and for Burkinabè. I am a fervent defender of local materials from our land because we are in a Sahelian country and houses built in concrete are very hot" (Roger, Burkinabè (Bac+3), marketing manager, 2 children: interview of May 22, 2021).

In the representations of certain respondents from these elite social backgrounds, the desire for a return to authenticity is much more pronounced among certain nationals. The return to CEB is perceived by these respondents as a form of rehabilitation of local materials. These forms of justification reveal that the imaginary production of the consumer is an essential element in understanding the experience of consumption. These forms of justification reveal that the imaginary production of the consumer is an essential element in understanding the experience of consumption: "the post-modern quest for authenticity is experienced as a rediscovery of the local and the imaginary that it conveys. The territory, the land, the place, the people, the tradition, the legends, the tribes... this quest for authenticity translates on a daily basis into a search for experiences, a hierarchy of tastes and values that shift from the global to the local, but also from the future to the past" (Cova et al., 2002)

These wealthy classes are inspired by the building style from the village, thus the adoption of CEB in the urban environment does not refer to foreign production rather to the materials linked to their origins. In a study carried out in Ziniaré, the anthropologist Laurent emphasised that the identity referents of urban dwellers are built around the tensions between the “local and the global”, in a context of globalisation. These referents also oscillate around an articulation between the presence of “a somewhat exogenous modernity and an ever-present tradition” (Laurent, 2004: 453). In short, for these urbanites who have acquired a certain social level, the CEB is a material with an identity that they try to revalue in order to match their tastes and status in the urban space. In their choice of CEB, these elites assign a current value to its products that illustrates a desire or need to reaffirm their link to rurality or to ongoing building practices in their communities of origin.

4.2.6. Justification based on the post-materialist or post-modern values:

The analysis of the users' life stories also showed that the choice of CEB is based on an environmental reasoning. This type of reasoning is based on post-materialist values where the choice of material seems to be justified by a desire for less energy-intensive and environmentally friendly materials. The latter form of justification is based on the altruistic values that are linked to Sustainable Development Goals (SDGs). The revival of CEB is a form of reinvestment from urban elites who are positioning themselves in the face of global issues related to sustainable architecture. For these elites, the challenges of sustainable development influence their architectural practices. "*I do not want to invest a lot of money in a cement building because we are in a Sahelian country (...). Also, with climate change, I chose to build with CEB because it reduces electricity consumption in the building .... I do not need to install an air conditioner in my house*" (Fayçal, Burkinabe, Bac+3, entrepreneur, 3 children: interview of November 26, 2021). *"I think it is the search for comfort and beyond that, there is the search for types of material that are more ecological than concrete and more insulating in the city….in the end our expectations were met, concerning heat insulation"* (Rosemonde, Expatriate, researcher, 2 children: interview of May 28, 2018).

On the one hand, the disconnection from all-in-concrete in construction, the environmental reasoning, the need to reduce electricity consumption, and the integration of thermal comfort in the building design according to the climate show a justification resolutely oriented towards post-materialist values. In Inglehart's view, the scarcer the needs, the more people are concerned to survival; and when resources are

abundant, there is a shift in societal value (Inglehart, 1999).

From all the above, the analysis of individual and comparative strategies showed that there is a similarity in the forms of justification around the construction using CEB in Ouagadougou. These four main interconnected forms of justification are 1) technical justification (breaking with the all-in-concrete or ecological reasoning); 2) culture of social distinction (quest for social prestige with an ostentatious character and need for symbolic recognition); 3) justification based on identity: need to re-appropriate autochthony and quest for reimagined authenticity; 4) need to transcend autochthony through justification based on post-materialistic values (need for less energy-consuming materials) in relation to the global challenges of the objectives of sustainable development. Figure 3 summarises the new nomenclature of the four dominant forms of justification in favour of construction using CEB in Ouagadougou.

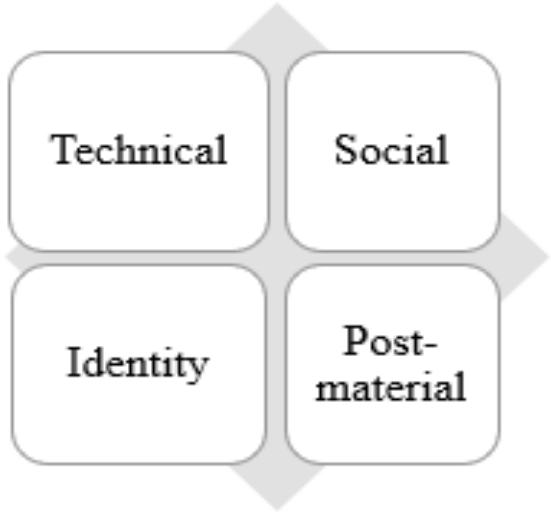

Figure 3. Four forms of justification of construction using CEB in Ouagadougou [1]

5. Conclusion:

The present paper has shown that construction using CEB is poorly distributed in the urban space of Ouagadougou. This construction is not part of a dynamic of popular housing; but responds to individualistic strategies of a fraction of the population. They are the prerogative of social agents with a high level of cultural and economic capital who have broken with the all-in-concrete approach in their housing construction in Ouagadougou.

Through biographical analysis, the paper has shown that the construction of housing using CEB in Ouagadougou refers to a very Europeanised way of life with regard to the size of households (number of children), the profession and the level of education encountered. These are small family structures with a flavor of Western lifestyle. CEB is a form of housing construction that is grafted onto other forms of construction practices, but which is not anchored in the Burkinabè social-cultural dynamics of the old community-type earthen construction (concessions) inherited from “Bancoville”. Among this fraction of the urban elite, construction using CEB is based on four interconnected forms of justification: technical, social, identity and post-material justification.

Although the users of CEB should be found among the working classes in Ouagadougou, there is a paradox because of the craze around a certain elite that are distinguished by the possession of a fairly high cultural and economic capital. From the point of view of these elites, the ecological argument takes precedence over the economic argument toward the choice of CEB. This can be explained by social determinants: social position and trajectory, the possession of cultural capital, and the desire for social distinction. If the people who build using CEB these days seek to adapt their construction projects to the climatic context, are we moving towards the emergence of a new form of housing culture marked by an ecological vision or the rise of eco-citizenship among a fraction of the elites in Ouagadougou?

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