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Brief

Postwar Reconstruction materials and technologies
A necessary innovation for a resource-based process

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Abstract

FEEM Policy Brief

The current condition of cities involved in recent wars are dramatic, only in Syria more than 4 million houses have been destroyed and almost a third of the entire population has been displaced. The constructive effort necessary for the upcoming reconstruction is well over the possibilities of the country: it would require the whole sector to produce more than ten times the houses produced in prewar years for over ten consecutive years (ESCWA, 2018). Materials and technologies will play a key role in the upcoming processes; for example the water shortage of the area will not allow to reconstruct with concrete technologies that are too water demanding (Dardari, 2016). It is necessary to identify, research and develop alternative materials that use rubbles and other wastes as resources through a process of sustainable transformation. Decisions made on the subject of materials and constructive technologies will be key elements in channeling future reconstruction policies.

To be thinking about the reconstruction of cities and entire countries in the MENA (Middle East and North Africa) region, and in particular at areas directly involved in war events, means to be thinking about a complex socio-economic context in which housing needs, aimed at rebuilding a substantial number of houses in a short timeframe, clash with the lack of an efficient production system and therefore with the possibility of providing the basic components for reconstruction interventions. In these areas, reconstruction cannot deal exclusively with settlement and technological choices aimed at responding to housing needs but must start from a broader strategy aimed at providing a higher degree of autonomy to the construction process.

The reconstruction process in the MENA region must therefore be guided by four key topics: efficient use of resources, sustainable production and processes, low water impact (WB, 2018) and human capital. Only in this way can the technological and construction choices related to the individual product be effective in an overall view of the reconstruction design schemes. The four key topics are part of a general subject, concerning sustainable and efficient development which must be the basis of any possible economic recovery in the MENA region. This is part of a strategy aimed at transforming the linear economic system - based on the import of the resources necessary for reconstruction - into a circular economy (Bompan&Brambilla, 2017) in which local production is the basis for the development of larger economies of scale that use, even in construction processes, waste or secondary resources deriving from primary production processes.

At a technological level, the needs expressed by the boundary conditions are transformed in a series of questions that must guide the research work towards the definition of multiple construction strategies, which can be integrated and adapted to the different contexts and conditions that characterise a vast area such as that of the North Africa and the Middle East (Devarajan&Mottaghi, 2017) both in term of climatic conditions and of different social and economic habits. In identifying the possible solutions for the reconstruction it becomes necessary to analyse on one hand the critical issues and the potential of the local context, on the other the possible innovation scenarios that can be introduced in the vast area of intervention related to building construction.

The main problems concern on the one hand the scarcity of resources, both in terms of production of materials and components and in terms of water and energy supply; on the other, there has been a substantial inefficiency of the local production system which, although present and active in the main areas related to construction, has low productivity characteristics linked to the limited economic resources and the low level of technological innovation in the production processes (Antonini, 2001. Baker-Brown, 2017). It becomes necessary to adapt the production systems to market logics aimed at innovation and sustainability and to find in technology transfer mechanisms the lever for a restart of the local production sector.

At the same time, the technological backwardness of the existing production systems in the MENA region is an opportunity for the development of new innovative production systems based on flexible and light systems, movable and adaptable to the different needs that can emerge in a highly dynamic context such as that of developing countries. For this reasons, innovative construction solutions, based on light materials, easy to produce and assemble, are to be preferred over technical solutions such as those in reinforced concrete and steel which, although now consolidated at European level, have high installation costs for the construction of the production plants.

A central reflection must be placed on the theme of environmental sustainability. The MENA region is characterised by a strong gap on the issues of efficiency and sustainability of construction solutions compared to what is happening in Europe and in other areas of the world today. However, it is precisely the possibility of rethinking the local production system from the base, that allows key considerations to emerge on issues such as environmental sustainability of the products used, reduction of resource consumption and implementation of circular processes (Charter, 2019). This opportunity is not only applied in the construction field but, thanks to a systemic vision of the problem, it can also be reflected in sectors such as agriculture and industrial production. Also in this case, the export of skills and know-how from the European context to the MENA region is configured as the most effective way to accelerate the development of a local economy (Erdogdu&Christansen, 2016).

Policy Conclusion

The preliminary analysis of the typical building typologies in the MENA region and of the relative traditional construction techniques requires to emphasise housing solutions which, while drawing on the local building tradition, allow to innovate the architectural and urban design language and construction methods. Starting from the availability of local labor, it is necessary to investigate construction systems and technological solutions capable of combining manual skills with innovation, the local resource with advanced production, trying to transform critical issues such as the lack of resources or the scarcity of water into triggers for a new urban and social development (Pellizzari&Genovesi, 2017. Sferra, 2018). In this context, solutions such as raw clay bricks or panels made from agricultural residues must be presented as an upgrade or an industrial engineering of production processes and systems already present in the MENA region, which need to be renewed thanks to the exploitation of technological innovation and using the push of sustainability as a driving force for the strong growth of local businesses and communities. The possibility of introducing advanced tools for production or building construction provide new stimuli for the reactivation of the local production fabric, making innovative forms of business practicable, originating from below in a bottom-up process but relying on technology to increase the production quality and efficiency.

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