

UAE GREEN BUILDING STRATEGIC MODEL

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Green Building and Sustainable development is a relatively new trend within the construction industry in the UAE whereby organizations seek economic development approaches that benefit the local environment and improve the quality of life. This paper aims at developing a Strategic Model that would guide the local authorities and practitioners embarking on the challenging journey in pursuit of sustainable construction in the UAE. The model was developed over three stages. Stage one produced the theoretical framework based on two of the existing models published in the literature meanwhile building on the findings of previous work of the authors on the subject matter. The second stage witnessed the development of the initial model through the analysis of the data collected via in-depth interviews with 20 experts from the various categories of practitioners representing clients, consultants, project managers, contractors and suppliers. In the third stage, the developed model was refined and verified through a second round of in-depth interviews with experts. The results indicated the satisfaction of the interviewed sample with the suggested model as an effective tool towards the implementation of the green building initiative in UAE.

Keywords: green building, strategic model, sustainability, UAE

INTRODUCTION

The construction industry in the UAE has recently started setting the stepping stones towards sustainable development. In general, the level of awareness of green building in the UAE needs enhancement as this initiative is still in the infant stage (Salama et al., 2010). Accordingly, the building industry is now working on developing and marketing products and processes that are more environmentally and economically viable to facilitate the move towards green building. It is argued that using these products and/or processes may result in higher initial project costs but with lower long-term operational costs (Kats, 2003).

Realising the significance of sustainable construction and green building in the UAE, The Emirates Green Building Council (EGBC) was established in July 2006 making the UAE the 8th country in the world to establish such a council. The UAE became a member of the World Green Building Council in September 2006 (Wilen, 2008).

EGBC adopted LEED (Leadership in Energy and Environmental Design) as a green building rating system, for the UAE in general and Dubai in particular. It was slightly

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modified to suit the local conditions. For example, in water usage, the UAE moved from a 5 point system to a 12 point system, as water issues are very important in the country (Wilen, 2008). On the other hand, Abu Dhabi launched the sustainability program, Estidama, in May 2008 whereby the Pearl Rating System was drafted for new buildings in 2007 and complemented in 2008 by the Interim Estidama Community Guidelines (IECG).

CONTEXT AND RATIONALE

Reviewing the literature, it was clear that there were many models addressing various issues in the context of sustainability and green building and all of them were mainly related to the developed world; there were no comprehensive models developed to provide the correct path towards the 'green building' concept in the developing countries including the UAE. In addition, the green initiative in the UAE is still in its infant stage (Salama and Hana, 2010). Hence, this paper addresses the need to develop a strategic model which guides the local authorities and the construction industry towards the implementation of the green building initiative. Further more, the model can be considered by the construction industries in developing countries within the Middle East; outlining the road map towards 'sustainable construction'.

AIMS AND OBJECTIVES

This study aims at developing a Green Building Strategic Model for the UAE (UAE GBSM) that outlines and combines the main features and measures of the road map towards the 'green building' notion. The aim of the model is to provide guidance and direction to the local authorities and the construction industry, and to assist them in ensuring the successful implementation of the green building initiative in the UAE.

LITERATURE REVIEW

The suggested strategic model was initially drafted based on the combination of two theoretical frameworks. The first theoretical framework builds on the work of Vanegas et al., (1996) and Huovila and Koskela (1998) with regards to the evolution and challenges of the sustainable construction concept in a global context, known as 'sustainable belief systems' model. This has the shape of a triangle where the 3 corners represent: environmental, social, and economic sustainability. The traditional design and construction, referred to as the current belief system, focused primarily on delivering a building to the client with the best possible balance of cost, time and quality (economic objectives). Sustainable design and construction adds to these criteria the minimization of resource depletion, minimization of environmental degradation, and creating a healthy built environment (Kibert, 1994; Crowther, 2006). The shift to sustainability could be seen as a new paradigm where sustainable objectives are reflected within the building design and construction throughout the various stages of the life cycle of the building / facility (Vanegas et al., 1996). This should be in line with environmental sustainability and would expand upon the economic objectives to include major sustainable goals such as minimizing depletion of resources, conserving biodiversity, and reducing harmful emissions. The new paradigm was further developed by Huovila and Koskela (1998) where these sustainable goals would then sit within a 'global context', also referred to as 'sustainable beliefs system'

The second theoretical framework builds on the work of Richardson and Lynes (2007) on the key ingredients for success, exploring the barriers and motivations to the construction of green buildings at the University of Waterloo (UW) in Canada. Their

overview on the barriers and motivations to the implementation of green buildings revealed two recurring themes: financial and organizational. They concluded that the successful implementation of green buildings requires four key ingredients namely 1) leadership, 2) sustainable targets, 3) financial vision and 4) communication & collaboration.

In addition, the literature review identified the four-pillar model of sustainability includes four interlinked dimensions namely 1) environmental responsibility, 2) economic health, 3) social equity, and 4) cultural vitality (Hawkes, 2001). In addition to the triple bottom line of sustainability that reflects on the economic, environmental and social dimensions, the cultural bottom line was included due to the crucial role that culture plays in defining the attitudes, values and behaviours of a society (Kingston, 2010).

METHODOLOGY

UAE Green Building Strategic Model (GBSM) Configuration

A first draft of the UAE Green Building Strategic Model (UAE – GBSM) was configured by combining both theoretical frameworks mentioned in the literature review. The proposed Strategic model consisted of four key pillars namely 1) Leadership, 2) Financial Vision, 3) Sustainability Objectives/Targets and 4) Communication & Collaboration, and their relevant measures. Each pillar has the shape of a triangle and pointing towards the ‘Green Building in the UAE’ circle which is in the centre of the model as shown in Figure1(see p.8). In addition, the model proposed that the four pillars should be embraced by a UAE Federal Legislation. This will bestow support to the areas in which the UAE needs to improve and will endorse the forward-looking approach towards sustainable construction as well as ensuring the successful implementation of green building projects.

Two-Stage Semi-Structured Interviews

The qualitative data collection technique was conducted through two-stage semi-structured interviews with a total of 26 interviews. The main objective of the 1st round of the semi-structured interviews was to examine and evaluate the themes underlying the development of the proposed UAE Green Building Strategic Model (UAE GBSM) as shown in Table 1, while the 2nd round of semi-structured interviews sought to verify the modified model that was based on the findings of the first round.

Sampling & data collection

A purposive sampling approach was considered, for both interviews. In the 1st stage of data collection a set of ‘20’ interviews were conducted with the construction key stakeholders, in Dubai and Abu Dhabi, covering the five categories and the distribution was as follow: 4 clients; 4 project managers; 4 consultants; 4 contractors and 4 manufacturers and suppliers. The 2nd stage of data collection comprised a set of 6 interviews with 2 clients and one from each of the other 4 categories. The informants were chosen based on three criteria: a) having expertise and recognized experience in the green building practice, b) working for organizations which are active members in the Emirates Green Building Council (EGBC) and c) being an active representative of his/her organizations to the EGBC. The interviews were carried out in the informants’ offices.

Table 1 Interview’s Themes and Purpose

1 st Round of Interviews – Themes	Purpose
Q1 – Leadership	UAE Government Vision & Leadership with regard to sustainable development.
Q2 - Financial Vision	The financial dimension being an essential ingredient for the success of green buildings in the UAE.
Q3 - Sustainability Targets & Objectives	Sustainability targets are important pre-requisites to the construction of green buildings in the UAE.
Q4 - Communication & Collaboration	Communication among construction industry key stakeholders, collaboration with Emirates Green Building Council (EGBC) and worth of integrative design process (IDP).
2 nd Round of Interviews – Themes	Purpose
Q1 - Impression	Getting the feel of the construction industry on the model
Q2 - Suitability and Applicability	Identifying the suitability and applicability of the model in terms of being comprehensive and practical.
Q3 - Challenges and Barriers	Identifying the challenges and barriers that could face the using of the Model as a road map towards the successful implementation of green building in the UAE.
Q4 - Recommendations and/or Modifications	Spotting any recommendations and/or modifications that might make the model more efficient.

DISCUSSION & FINDINGS

1st Round - Discussion & Findings

All the interviewees agreed that the UAE federal government should lead the transition towards sustainable construction and lay the foundation for environmentally, socially, and economically sustainable development throughout the UAE. Five attributes emerged: 1) vision, 2) green legislation, 3) leading by example, 4) education & media and 5) financial incentives. All 20 informants agreed that the financial dimension is a key pillar for the successful implementation of green buildings in the UAE. Primarily, this dimension aimed at minimizing the initial investments as well as the operational costs of buildings. The local authorities are requested to introduce regulations that reward building designs with lower energy costs and higher savings on water and emissions. During the interviews, the following nine factors were thoroughly discussed: 1) initial investments, 2) short-term budget horizons, 3) energy cost, 4) life-cycle cost, 5) operation and maintenance cost, 6) pay-back period, 7) return on investment (ROI), 8) financial incentives and 9) credit crisis impact.

The results indicated that sustainability objectives (targets) are important pre-requisites to the construction of green buildings in the UAE. Experts stressed that quantitative sustainability targets should be identified, clearly set and closely monitored from the outset and throughout the project life cycle various stages. The majority pointed out that the stakeholders of green projects required these targets to be identified, well communicated and clearly explained from the outset. This should provide guidance through the design process and should facilitate the effective monitoring of the project progress. Ideally, these targets should be guided and further embraced within the governments green legislation and regulations reflecting the most significant environmental, economical and social issues to the UAE such as energy

efficiency, water efficiency, building materials, waste management, gas emissions, renewable energy, etc...

The majority of the informants agreed that effective communication and collaboration amongst stakeholders is a key element for enhancing the awareness of the green culture initiative particularly that the UAE green building culture and knowledge is still in the infant stage. In other words, all should be involved and committed from the inception stage of the project to attain the required green targets. A few informants stressed that once the legislation and regulations are in place, the construction industry will be regulated by the new laws and subsequent chains will be developed. This will enhance communication to the required level.

The majority of the informants acknowledged the importance of the role of the Emirates Green Building Council (EGBC) in endorsing green building principles and practices to achieve high performance buildings that utilize environmentally friendly technologies. In addition, the results indicated the need to work closely meanwhile effectively exploiting EGBC expertise and knowledge in sustainable construction. Both will endorse and further enhance the communication and coordination amongst all the parties.

There was a common consensus that the Integrative Design Process (IDP) is a whole building approach which is very important to green building since it leads to simpler yet high-efficiency buildings and improves the economic and environmental performance. It was agreed that IDP enhances green building decision making through clear understanding of sustainability goals and economics from the inception stage. In this pursuit, integrated multidisciplinary design team comprising owners, architects, engineers, technicians, contractors and suppliers should be active and effective.

Verification of the modified UAE Green Building Strategic Model (GBSM)

The analysis of the findings of the 1st round of 20 interviews was instrumental in refining the initial model in the context of the UAE green building initiative. Hence, a modified strategic model was developed to embrace the findings of the interviews. An additional level indicating the need for sustainability policies and quality monitoring body through appropriate KPI's was introduced based on the findings of the interviews as shown in Figure1. The modified model was verified through a second round of 6 semi-structured interviews with experts. The informants were generally satisfied with the suggested draft of the Green Building Strategic Model and reflected that it is comprehensive and practical. They stated that the 'cultural vitality' dimension should be indicated as the fourth bottom line of sustainability although the 'cultural heritage' dimension is cited in one of the main three corners of the sustainability global context referred to as 'social equity and cultural heritage'.

In addition, the following comments were raised on the applicability of the model: a) the model should present a dynamic process that accommodates different circumstances, which allows the interaction amongst the four pillars, b) the model should be flexible; i.e. the legislation should have flexibility in terms of being reviewed, meanwhile allowing for adjustments and interaction with the four pillars, c) the model should embrace the different target groups with emphasis on the government, developers and building owners, d) the model can be used as a guide line for the UAE different local governments to check whether all aspects of sustainability are covered, e) the majority of the informants agreed that legislation is indeed the

main driver for sustainability and e) the model needs to identify a base-line and a benchmark for the financial measures pertaining to pillar 2.

Furthermore, the informants identified some challenges that could face the use of the model as a road map in Abu Dhabi and Dubai such as a) financial barriers and the credit crisis impact, b) the culture and knowledge of society – the informants conceded that the UAE society experiences a lack of culture and knowledge with regards to sustainability in general and ‘sustainable construction’ in particular and c) the subsidized price of electricity and water. At the moment, the low cost of energy / water is not going to encourage firms / individuals to minimize consumption. This is obviously a massive political issue which has many far reaching consequences and is unlikely to be resolved in the near future.

Reviewing the model layout, the following recommendations and modifications were highlighted from the interviews and helped looking into refining the model:

- The arrows should not only be clockwise but anti-clockwise. In addition, vertical and horizontal arrows should be indicated to emphasize on the dynamism of the process and ensure the flexibility of the model.

- There were two opinions on the pillars’ weighting. The proposed model introduced equal weights since the four pillars are claimed to be equally important as a basis for sustainable design. However, the weights should not be static but rather dynamic in response to particular projects / policies. The first opinion suggested that the pillars should carry similar weight. Whereas, the second opinion suggested that different stakeholders would be allowed to give different rankings / weights. The implications of this second opinion were not clearly justified by the interviewed experts. In addition, the first opinion left the door open for different weights on case by case basis if and when needed based on the merits. Further comments on the pillars included the following:

- *Pillar (1)*: The vision of the UAE government should be clear and concise resulting in definitive long-term and short-term strategies where all stakeholders should be aware of their role. These strategies need to be holistic in nature with the various authorities working together rather than acting on parallel routes. This hinders collaboration.

- *Pillar (2)*: LCC is vital for future developments in order to establish ‘best value’. However, best value may not necessarily mean reduced upfront capital. Detailed LCC will identify the most appropriate design, construction and facility management practices. In addition, a base-line should be identified whereby the financial targets of a green building as mentioned in pillar ‘2’ measures, are set and compared against the odds.

- *Pillar (3)* – Sustainable Objectives/Targets need to adopt the top-down approach; to be driven by UAE Leadership through a clear vision / strategy as clarified above. The following points were raised: a) the correct infrastructure, policies and support need to be in place before these objectives are set, otherwise confusion / incorrect practices will emerge diluting intent of objectives; b) how the objectives are going to be monitored and measured using the appropriate key performance indicators (KPI’s) which need to be set and c) the question of mitigation if objectives are not met.

- *Pillar (4)* – Effective collaboration and communication should adopt the top-down approach. This will need to then cascade down through different levels of business /

society / agencies / companies and should be encouraged at grass-root level. Effective aims for this collaborative working have to be set and monitored through clear policies and drivers. In fact, the majority of the informants emphasized the importance of working intensively on increasing the cultural awareness and knowledge level of the society (end users) with regard to sustainability and green environment in general. In addition, the educational aspect should be considered to raise awareness amongst the construction industry key stakeholders and ensure their active participation, including the operators and facility management companies.

- The 'cultural vitality' dimension should be introduced to each pillar of the model being the fourth bottom line of sustainability since it encompasses the 'cultural heritage' theme which is one of the main three corners of the sustainability global context, referred to as 'social equity and cultural heritage'.

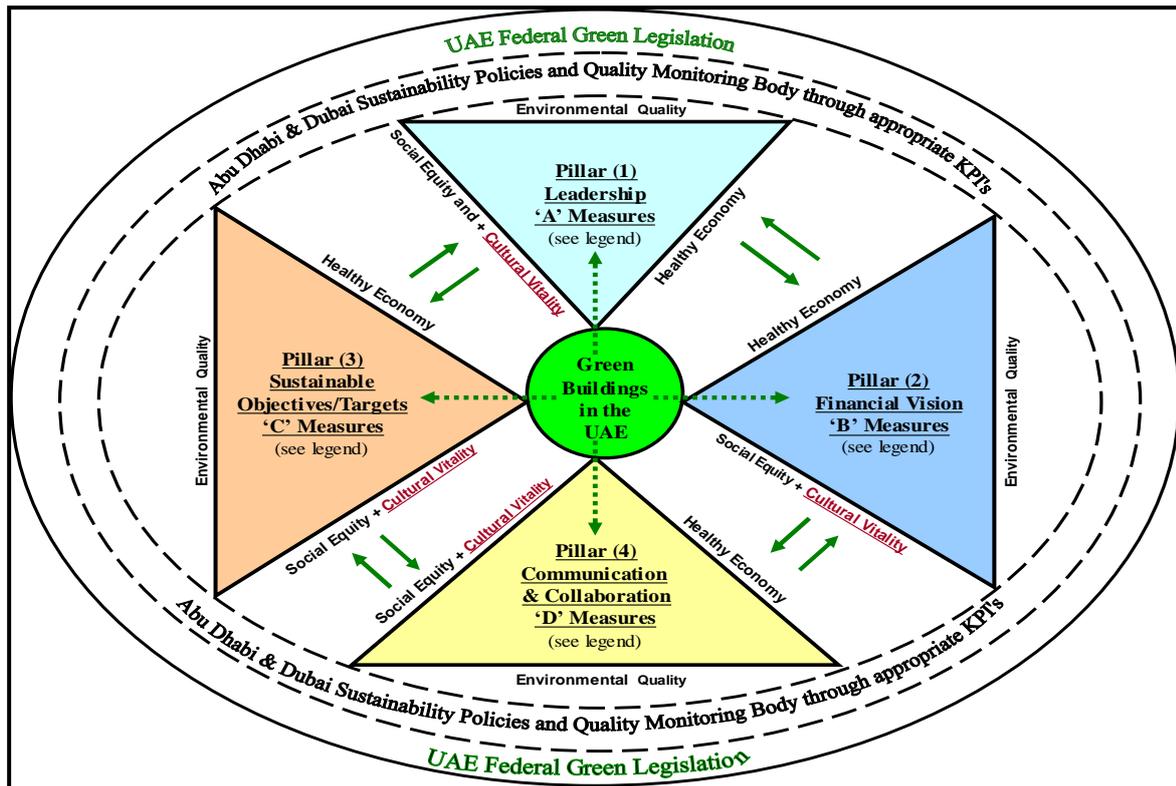
The UAE Green Building Strategic Model (UAE GBSM)

Given the above-mentioned recommendations and modifications spotted by the interviewees, the modified Strategic model was reviewed and amended to produce the UAE Green Building Strategic Model (UAE GBSM) as shown in Figure 1.

The UAE Green Building Strategic Model (UAE GBSM) consists of four key pillars namely 1) Leadership, 2) Financial Vision, 3) Sustainability Objectives/Targets and 4) Communication & Collaboration. Each pillar has the shape of a triangle pointing towards the 'Green Building in the UAE' circle which is in the centre of the model. Each pillar has a triangular shape outlining the three main corners of sustainability namely environmental (environmental quality), social (social equity and cultural vitality), and economic (healthy sustainable economy) The model embraced the evolution and challenges of the sustainable construction concept in a global context which includes minimizing depletion of resources, conserving biodiversity, and reducing harmful emissions besides the traditional view focusing mainly on economics in terms of handing over a building with a balance of time, cost and quality. The four pillars are embraced by 'Abu Dhabi & Dubai Sustainability' Policies under the umbrella of a UAE Federal Green Legislation supporting the areas in which the UAE, with emphasis on Abu Dhabi and Dubai, need to improve and endorse the forward-looking approach towards sustainability as well as ensuring the successful implementation of the green building initiative.

The implementation of these policies, adopted by Abu Dhabi and Dubai authorities, should be monitored by a qualified regulatory body, through appropriate Key Performance Indicators (KPI's) in order to ensure that the construction industry is abiding by the rules and regulations and pursue the anticipated positive and negative alterations resulting from adopting the sustainable construction concept on projects in both emirates. Despite the tendency towards top-down approach as aforementioned in the analysis of the interviews data, it is argued that the combination of bottom-up approach will ensure the active participation of various levels of stakeholders. This will add value and will result in a more practical set of KPI's, accepted by all parties. The clockwise and anti-clockwise arrows as well as the vertical and horizontal ones emphasize the dynamism of the process and ensure the flexibility of the model. The four pillars complement each other and should work in parallel and not in a sequential manner.

Figure 1 UAE Green Building Strategic Model (UAE GBSM)



LEGEND

Pillar (1) - Leadership - 'A' Measures

- Clear and concise vision of the UAE Government.
- Holistic definitive strategies.
- Collaborative working amongst Authorities.
- Strong Leadership from the UAE Government and Authorities.
- Open attitude towards innovative designs.
- Financial and non-financial incentives from the local governments.

Pillar (2) - Financial Vision - 'B' Measures

- Minimizing both the upfront capital and lifetime operation costs of a building against a conventional one.
- Setting an operational structure that rewards building designs with life-cycle cost, long-term budget horizon, lower energy costs and higher water and emissions savings.
- Life cycle costing (LCC) as a contribution to sustainable construction.
- Financial incentives
- Payback period and return on investment (ROI)

Pillar (3) - Sustainable Objectives/Targets - 'C' Measures

- Quantifiable targets set by the UAE Government addressing the most pressing sustainability issues to the UAE and reflecting on Estidama (Abu Dhabi) & LEED (Dubai).
- Quantifiable targets to set goals and to assess the success of the building once it is operational (quantify progress).
- Key Performance Indicators (KPI's) to be set to monitor and measure the progress towards achieving these objectives.
- Green project stakeholders to use these targets/objectives for educational purposes, to give guidance through the design process and monitor and quantify progress.

Pillar (4) - Communication & Collaboration - 'D' Measures

- Effective communication amongst construction industry key Stakeholders (clients, designers, facilities management, contractors and suppliers) / Holistic Approach - Worth of Integrative Design (IDP).
- Effective communication and collaboration between the construction industry key stakeholders and the EGBC making effective use of its expertise and knowledge.
- Effective communication and collaboration between the construction industry key stakeholders any green Non Governmental Organization (NGO), i.e. the Emirates Environmental Group (EEG).
- Culture Vitality – a cultural input should be reflected in evaluating the impacts of the environmental, economic and social initiatives that are implemented in Abu Dhabi and Dubai communities.
- Education of the construction industry to increase knowledge and awareness on sustainability in general and sustainable construction (green building) in particular.
- Education of the society (end users) about sustainability is paramount to implant the right values and sense of responsibility towards the environment and the planet's limited resources.

The relative weights of each of the four pillars attracted a debate amongst experts. Given that the green building initiative is still at the infant stage in the UAE, this study recommends that the four pillars would carry equal weights. However, this can be changed in the future with the development of the green building practice in the UAE. It is expected that, over time, the weight of the Leadership pillar can be relatively reduced as the green building regulations and procedures become more established. On the other hand, the financial pillar is expected to attract relatively higher weight. This will be reinforced once the current ambiguity about the claimed higher costs associated with green buildings is clarified through practice and economies of scale. It is important to note that the weights are dynamic rather than being static. This will depend on the nature and priorities of the entity (category) looking at the model and in response to particular projects. The ‘social equity and cultural heritage’ corner of the global context sustainability (the triangular shape) is replaced by ‘social equity and cultural vitality’ since the culture heritage is an element of the culture vitality, which comprises four themes namely 1) arts, creativity and environment, 2) history and heritage, 3) active citizenship and 4) diversity (Focus Kingston, 2010). The ‘cultural vitality’ dimension is underlined and indicated in bold to stress on the key role it plays and the core influence it has on the triple bottom line of sustainability: environmental, economic and social. The measures of each pillar of the model were modified as shown in Figure 1.

CONCLUSIONS

This study aimed at developing a Strategic model that would guide the government, local authorities and construction practitioners in the UAE. The results indicated the satisfaction of the interviewed experts with the developed model where all features pertaining to the sustainable construction concept were well thought of. There was a general consensus on the suitability of the model to the context of UAE. In addition some recommendations were raised emphasising three main dimensions: 1) the ‘cultural vitality’ dimension should be included as a fourth bottom line due to the vital role it plays in considering the attitudes, values and behaviours of the society. 2) the ‘life cycle costing’ (LCC) approach should be applied as an integral dimension of the green notion. 3) The end users’ culture and awareness of sustainability should be developed through education to change the current mindset and increase the sense of responsibility towards the environment.

The developed model was re-examined and amended accordingly; generating the UAE Green Building Strategic Model (UAE GBSM). Subsequent to the findings of this study, the next step would aim at investigating, in further depth, the way forward towards the effective implementation of the green building concept in the UAE, having identified the coordinates of the current position, with emphasis on the Initial Capital Cost, Life Cycle Costing (LCC) and Insurance and Risk Management Benefits of Green Buildings. In addition, further direction includes the attempt to validate this model in a practical context through contacts with the industry and local authorities. The most recent announcement by the government of Dubai about imposing green building regulations starting 2014 will provide an attractive opportunity in this pursuit.

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