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Feature Article:

Bibliotheca Alexandrina: Fit or Misfit?

A Dilemma Demystified

By Heba Safey Eldeen

Introduction:

The task of creating a story about the Bibliotheca Alexandrina first appeared as a bewildering job. As for us –Egyptians, it is more of a fancy then just an archetypical building. An aspect that evokes a prominent obsessing dilemma which formulates –in turn- a more empathetic approach to go along with the piece, that is: Fit or Misfit?

Back to the late eighties, the debate on the Bibliotheca was evoked right after the declaration of the winning project. This project was subjected to brutal criticism by a considerable number of Egyptian architects claiming the misfit of the project, asserting its denial of a number of considerations, which they considered fatal. According to the 1990's Egyptian architectural press, those considerations were environmental control, building and operational cost, safety, and value and meaning. Once again in 2002, and after the completion and the inauguration, the Bibliotheca is en vogue, re-evoking the dilemma of fit or misfit …

The Emergence of an Idea:

- ***Historical Background:***

The ancient library of Alexandria was begun in the 3rd century BC by Ptolemy I and served the city and the school of Alexandria as well as the world's famous classical scholars such as Archimedes, Euclid and others. The library contained many important publications and scrolls of the ancient world. Although not largest, yet the most important institution of the world culture for almost 1000 years. As for Alexandria, the capital of Egyptian Ptolemic and Roman Empires, home for 1.1 million inhabitants and the most modern city in the classical world of that time. This very city was home for Alexander the Great, Julius Caesar, Marc Antony and the last of Ptolemaic Cleopatras. According to the typical mythological theme associated with the ancient Egyptian civilizations, the ancient library has a mysterious history related to its disappearance, said to have fallen victim to fire, earthquakes and neglects.

- ***The Competition:***

The first call for reviving the Alexandria Library was in 1974, an idea that was later adopted by the Egyptian Ministry of Higher Education and soon an independent organization was developed to implement

the project. In 1989, Snohetta architects won first place in the competition organized by the International Union of Architects (UIA) and in co-operation with the Egyptian government, UNESCO and UNDP, excelling over 524 entries form 52 countries. Registered in Norway, Snohetta architects is composed of preliminary designers from the US, Austria and Norway.

The client's agenda aimed at establishing a comprehensive new research library of a unique collection, serves as a catalyst for vitalization and development for the city and the entire region. Intended as a centre for pilgrimage and long term viability, the new library was to encompass cultural and educational functions, including a planetarium, several museums, a school of information, science and conservation facilities, a young persons' library, new conference centre, and other facilities that bring about the bibliotheca as a centre for both learning and debate.

The program stressed on basic imperatives as fundamental requirements, these were; environmental control; maximum use of natural lighting and ventilation with maximum protection from direct sun rays, efficiency and control of illumination and ventilation, noise control and sound isolation. Economy and employment of appropriate building technology, energy conservation, were other indispensable imperatives of the program.

- ***Design Team's Perspective:***

It was quite difficult for the design team to find a neutral starting point for the project. On the one hand, the anticipated building was a futuristic program for the third millennium, a building that must surpass its predecessor in its engineering viability, to have an extended life span, with engineering principles to withstand all manners of environmental conditions and underground water infiltration of the Mediterranean. On the other hand, there was no escape from the new building's association with the ancient library and Pharaonic Egypt. For the design team, the conundrum was mystifying, a building that could be neither historic nor futuristic, and could not rely upon pre-existing architectural definitions. "*The timeless character was meant to respond to the program's requirement of creating an institution that would have a long life and relate to many cultures*", says Craig Dykers, architect/director at Snohetta architects.

Design Features:

- ***The Form:***

A circular 45000 squared meters area in the neighborhood of "el-Shatby". The site is located alongside the ancient eastern harbor of Alexandria in the "Royal Quarter", where the ancient library is thought to have been located, currently adjacent to the faculty of commerce and arts of Alexandria University. The very piece of land is located along Corniche El Guiesh Avenue, the artery of the city, and not in the midst of a

particular fabric, with no attached or close buildings to relate to in terms of heights, volume or style. Even the rear building -that of the faculty of commerce - is out of the visual contextualization of the observer. "*The building itself is a landmark and should not be in harmony with the scale or style of the surrounding neighborhood*", stresses Ashraf Salama, professor of architecture/director of research and consultations, Adams Group Consultants, USA.

In addition to freeing the building from particular formal constraints, the site characteristics are believed to have inspired both the conceptual as well as the physical notion of containment. The choice of the explicit, bold circle in this sense is not limited to symbolizing the representation of the sun in the ancient Egyptian civilization, which was an intrinsic notion of the designer. Rather, it is believed to be a geometrical choice that is the most provocative for the desired required architectural expressions; containment and continuity of both form and time "*From my point of view, I am happiest with the degree of intimacy and the meditative character the building produces despite its very large size.* says Dykers. "*While it is monumental, it is also very human in scale and atmosphere, such aspect I believe to be unusual in larger public and institutional buildings*", he adds.

- ***The Titling Roof:***

The building is tilted towards the eastern harbor, a deed that transformed the façade towards the Mediterranean, accordingly towards the northern light and wind direction. Moreover, this has pulled down the huge building to the foot of the neighboring conference center, which is already an attraction for the people of Alexandria. According to Snohetta, this tilting expresses one moment cut of a series of movements that is frozen in time. As it descends into the earth, it enters the past, during its motion, it touches the present, and as it reaches up towards the sky, it rises into the future. Although not perceived as intended to express, yet, the overall form has proved to be appealing and satisfying for the ordinary users. For them, this form asserts on the ability of the Egyptians to cope with tomorrow's technological enhancements. "*Prospective, inspiring and indicative for people to meet and act within a collective space that is successfully treated*", comments Akram El-Magdoub, visionary architect.

The inclination angle is 16.08 degrees, derived form the interaction of the structural module with the floor slabs that are 4.5 meters floor-to-floor heights. The resulting roof is divided into a structural module 9.6*14.4 meters, based upon book shelving and storage requirements. The roof is completely visible from street level, and is made transparent, so that the interior of the building is completely exposed to the passers by, making readable and inviting.

In contrast to the transparency, straightness, openness to the sea of the glass roof, the containing circular wall is made of stone. The wall consists of nearly 6000 squared meters of hand carved stones from various

alphabets and symbols of the world throughout the past 10000 years of history. "*The stone wall is exceptional in that it contains a great deal of hand craftsmanship and is monolithic rather than a veneer in the traditional sense*", says Dykers.

The stone was brought from a granite quarry in Upper Egypt. Placing the covered stone also created problems as no stone actually touches the adjacent one. Each one is secured individually on stainless steel shoes at the bottom and rest on bolts at the edge and top. Thus, the sequence had to be rigidly controlled as to how they were delivered to site. "*The shear complexity of random world wide letters will amaze people for ever*", says Jack Thomson, Project manager, Balfour Beatty, England.

- ***The Reading Room:***

A diameter of 160 meters spans over 20000 squared meters of reading area, and accommodates up to 50000 volumes. Set unto 14 half levels resembling a giant amphitheatre, connected by a spine of stairs and lifts and fully accessible for the disabled. The grandeur of the reading room is meant to allow the visitor/reader to feel part of a larger society. In the meantime, it is carefully designed so that it remains intimate and individual. "*Being the largest reading room in the world, it never fails to hold people in awe*", says Thomson. A plantation of columns is rooted at the intersection of the modular structural system of the roof. A row of offices and meeting rooms form a buffer zone to the closed access of book storage areas. "*Proper relationships are envisioned by translating a complicated program into a successful spatial organization*", verifies Salama. The dramatic contrast of the modular structural system and the spiral arrangement of terraces and ramps instill a great variety of atmosphere within the reading areas. The overall interior setting actually eliminates the need for a complicated book transportation system as well as makes easy accessible for both staff and public.

This reading room has been a subject of debate since the declaration of the project as winner of the competition. It was accused of not responding to the criteria of the original program of the client; said to discard the panorama of the sea, to basically depend on artificial lighting, to suffer uncontrollable noise and to result in an exaggerated operational cost. Based on the fact of inauguration, the room proves to be suffieciently illuminated by a mixture of natural and artificial lighting. "*Great care has been exercised to ensure little or no direct sunlight to the reading hall in order to protect the contents from ultra violet light*", affirms Thomson. As for noise control, with its oak flooring, the perimeter of the reading room is clad in large pre-cast concrete panels that are perforated and lined with acoustic absorbing textile to eliminate any reverberation or uncomfortable noise in the space. "*A good ambience made up by several materials*", concludes El-Magdoub.

As for the sea panorama, the scene is quite convenient from the upper levels; some architects expressed their disappointment in the denied panorama, while others perceived it as irrelevant. Some staff rooms are provided with natural light and outdoor balconies facing the sea. Other administrative and service zones are completely wrapped up in the solid part of the mass, completely independent on artificial lighting, which is acceptable in such a building type.

Once again, a contrasting effect is achieved by the combination of smooth forms set against strong lines. "*Great thought was dedicated to the use of the materials to blend in into a single harmonious element; wood, granite, stainless steel, anodized aluminuium, glass and plain oak furnishings*", says Thomson. The users ' appraisal for the reading room revealed their ultimate satisfaction with the overall ambience and the tastefulness of the space. "*This is a state-of-the-art building, with everything in it that can be to ensure smooth functioning*", expresses Laila Dowidar, external relations at the Biblotheca. "*Beautiful, tasteful, quite elegant*", she adds.

- ***The landscaping:***

Outside the mass of the library, is a public, stone-paved plaza, spanning over an underground car park, and connecting the different entrances of building elements. In the plaza are situated a planetarium and a science museum that are connected to the surroundings by a bridge ejected from the adjacent university campus, piercing the circular body of the library, passing over the planetarium and was intended to bridge over the vehicle stream of the corniche. According to local ordinances, this bridge was trimmed at the edge of the site. As for the planetarium, it is a ball on structural steel bridges in the shape of a cross and clad in glass reinforced concrete panels with strip lights embedded to form rings of light.

A pool surrounding the library reflects the building into the earth, planted with papyrus and native vegetation giving the sense of floating of the building. Some envisage this reflection as symbolic, while others totally deny its effect. Furthermore, it is believed to would have been advancement if there was a main entrance onto the sea façade, in order to emphasize it as the main one, and which would have worked on occasional basis for VIP's. According to Snohetta, other than the trimmed footbridge, the building is very much as it was when the competition was completed in 1989. "*An unusual aspect of this building was that the original design intent from first architectural thought to the model concept has not been changed*", adds Thomson.

Engineering Concepts:

Located in an earthquake zone and threatened by the saline ground water conditions permeate the area, and subjected to large uplift forces that result from the fact that the building's lowest basement level lies about twelve meters below the ground water level, the entire structure was undertaken to delineate the solutions

to these challenges. "*Special constructions were required for the foundation due to its large size, depth and relation to salt water*", says Dykers. Several advanced technologies were employed in the design related to the piling, diaphragm wall –one of the largest ever built-, and the construction of the roof. Some of which are geotechnical adopted for the first time on a large scale. Sonic logging to check the homogeneity of the concrete; embedded potential gauges to predict the corrosion of steel; and embedded anode ladders to monitor the advance of chloride into the concrete. As for foundation, the diaphragm wall is designed to resist earth and water pressures by the development of hoop stresses. In addition, there are additional walls internally embedded in the diaphragm wall, the outer carries vertical loading and is capable of resisting water pressure if the diaphragm wall leaks at any stage during the extended life expectancy.

As for Mechanical, Electrical and Ventilation systems, the air-conditioning duct runs up behind the internal wall cladding and inside channels cast into the roof beams. The electrical power cables are passed beneath the floor screed. The reading area roof can accept a wide range of alterations to the layout of the electricity data outlets through the use of the under floor channel system. The entire building is under a sophisticated autpmatic climate control system that keeps humidity at all times below 50% and the temperature in summer and winter at 18 degrees in book stores and 22 degrees in the main hall. According to the design team, environmental issues have been given a very high priority in the design to meet the international standards of the Montreal Protocol. In addition, the building is completely under a complex fire control system with sprinkles or FM 200 gas suppression. The detection is covered for smoke, heat or flame, and direct communication with Fire Services.

Construction Challenges:

"*Construction, this is where the real challenge lay and where innovation and value engineering all played a big part*", says Thomson. "*I had to take lines and turn these into reality to a quality that had to be of the highest order*", he adds. Technically, all the materials were known but the innovative use challenged the resources in Egypt. A lot of this was overcame by producing mock-ups of all complex details and allowing the labour force to touch and feel what was aimed at achieving. "*The major challenge along was the complex geometric shape being translated into the concrete frame with the pre-cast panels to the main hall proving very difficult*", asserts Thomson.

According to Thomson, the main challenges to construction pertained preliminary to planning, columns and capitals. As for planning, there were some areas that were completely changed from the original tender method statement. As for columns, couldn't be the pre-cast as the original intent, thus, there were special formwork, the concrete mix was redesigned, the external vibrators were fixed and after two test tours, it was satisfactory to achieve what was required to meet the design criteria. As for capitals, and because of the limitation of tower cranes relative to capitals heavy weights -10 tonne, each of the capitals was cast on site at the base of each column, where specialized cranes were attached and could work in tandem and lift

the capitals as well as 20 tonne beams (also cast below). These cranes were then able to be lifted by the tower crane to any point in the building.

- ***The Concrete Frame:***

The building is designed as a single, monolithic reinforced concrete frame and has no movement joints across its basic, visible geometry. "*In that it was concrete but of high strength yet pumpable and after many trial mixes there was the approved mix design using washed river gravel as the aggregate*", says Thomson. The floors were laid out in a waffle pan arrangement to accommodate the high loads of the book storage on the grid of the roof structure. Each floor of the main hall has a closed access bookstore of huge proportions to accommodate some 8m volumes. This was constructed on a waffle pan grid more often used on multy storey car parks. Also it was desired to allow for high loads on the floor due to the weight of the books in storage. All floors are linked with 8 or more stair cases and some to the outer walls are curved to follow the line of the pre-cast. "*Thus, while the frame was the most traditional part, it also caused us headaches due to the sheer size and necessity to work on different fronts simultaneously*", affirms Thomson.

Reflections and Interpretations:

After this building review, we reach a phase of inquiry, which is the main probe of this article; fit or misfit? As for formal considerations, this question brings to mind the 1970's dilemma of Pompidou Centre, Paris, France. According to Essam Safey Eldeen - architecture consultant for the Egyptian Academy of Arts, the winning project of Piano and Rogers has stirred up conflicting positions and standpoints. A conservative stand point completely rejected the project, stressing on the must of the complete loyalty to the character of the neighborhood. Another revolutionary standpoint welcomed the project, claiming the urge for such a futuristic vision. A third insightful standpoint perceived the project as an opportunity for an ultimate experience, left for the coming generations to judge. Upon its completion in 1977, the Pompidou Centre has become a global attraction as well as a catalyst of conservation and renovation for all surrounding buildings. The overall experience was and still is quite evocative for everyone to claim his own interpretation, devising new criteria for the reasoning of fit and misfit of such a building.

Questioning the functional considerations of the Bibliotheca's fit or misfit, I'd like to revert to Aly Abdel Raouf - ass. professor of architecture, Cairo University. In one of his articles, Abdel Raouf points out the resemblance of the case of the Bibliotheca with the cases of the early 1970's Utzon's Opera Sydney in Australia, and the late 1990's Gehry's Bilbao museum in Spain. Designed preliminary as landmarks, the two buildings have transformed into symbols of culture for the two countries, not only for their own home cities, thus, acting as means of development and revitalization of the cities and placing the countries onto attraction.

Conclusion:

The story of the bibliotheca would have never been completed unless the design team responded to some critical concerns. "*The most viable criticisms related primarily to cost. As response, a great deal of effort was placed upon utilizing local materials and craftsmanship to keep costs within the domestic economy. Modifications to the sub-basement and foundation design were undertaken to alleviate costs related to building below the sea water table*" asserts Dykers. As for operational cost, he adds: "*operation costs are at a minimum due to the simple form and basic nature of the planning of the building*". As for the panorama issue, the design team affirms that the views from inside the library have always been well considered and remained so in the final design. Environmental issues have been considered from the time of the design competition. The stone wall protects the contents of the building from the harsh southerly desert winds, while the tilted form helps to deflect winds from the sea. As for cleanliness, it is very easy to clean the roof due to the slight incline of the tilt making it easy to walk across.

Aiming at demystifying the fit or misfit dilemma, a methodical questionnaire was devised to investigate the positions of a number of Egyptian architects and users. Despite their different views and perceptions, the results rendered the majority's agreement on the building success, revealing an average accumulative score exceeding 85%. Furthermore, and in a celebration held last July in Berlin, Germany, the Bibliotheca has been awarded as the best building in the Middle East and Africa. It is worth mentioning that the building was nominated among all three categories for the World Architecture Awards that also includes the building of the year and the best public building in the world. Hence, it can now be deduced that - and considering the intention of the building as a unique memorial construction, with all its embedded moral associations and futuristic visionary functionalities- the Bibliotheca Alexandrina has fulfilled its mission, now open and performing, and perfectly ***FIT*.**

Heba Safey Eldeen

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BOXES:

Box #1:

Numerical Facts:

Site area: 4,500 sq.m.

Gross area of building: 85,405 sq.m.

Diameter of visible structure: 160 m

Height of visible structure above street level: 32 m

Tilting: 16.08 degrees, highest point 32 m above plaza level, 12 m below plaza level

Floor to area ratio: 1.88

Built of area coefficient: 53%

Reading area: 20,000 sq.m. net area

Reading and book areas: spread across 7 main and 7 secondary terraces

Two enclosed study rooms – up to 60 persons

Height of columns: from 6 to 12 m

Total seating areas 2000, including 550 carrels

Open library floor areas: 20, 170 sq.m.

Enclosed book storage:18000 sq.m.

Operational Support: 3625 sq.m.

In addition to the new library (55,000 sq.m.), the Bibliotheca includes related functions such as:

- **Administration: 2,000 sq.m.**
- **International school for information studies: 4,500 sq.m.**
- **Cultural activities: 4,000 sq.m.**
- **Planetarium (105 persons)/Science museum: 3,500 sq.m.**
- **Meeting rooms: 3,200 sq.m.**
- **Car park (180 cars): 7,000 sq.m.**
- **Auxiliary functions: 5,800 sq.m.**
- **Existing conference center (3000 seats total): 20,000 sq.m.**

Basic Structure: Designed to accept live loads of 1300 kg. per sq.m.

Whole building designed to accommodate loads for earthquake zone 3 (Egyptian code for loads)

Stone Carvings: Grey Schulmann Aswan Granite. Stones ranging from 1-2 m. height and 1 m width and approximately 20 cm thickness

Cost (un-official estimates): Foundation 59 million USD and Completion 158 million USD

Box #2:

Project Credits:

Competition: Design Team: Snohetta Architects, Norway.

Project: Principle Designers: Snohetta Hamza Consortium

Craig Dykers, Christoph Kapeller and Kjetil Thorsen of Snohetta; Oslo, Norway

Mamdouh Hamza, Ahmed Rashid and Mashhour Ghoneim of Hamza Associates; Cairo, Egypt

Construction Supervision on-site: Snohetta Hamza Consortium

Laid by: Mamdouh Hamza; Resident Engineer and Christoph Kapeller; Project Architect

Main Contractors:

Foundations and Civil Works: Joint Venture: Radio/Trevi (Italy) – Arab Contractors (Egypt)

Superstructures, HVAC, Finishes and Landscapes: Joint Venture: Balfour Beatty (UK) – Arab Contractors (Egypt)

& Other Specialist Contractors

Planning and Construction Funding by the Egyptian Government and International Donations

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