ARCOLOGY:
The development of Arcology and its impact on the construction industry
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The research undertaken for this assignment was delegated into individual roles per the headings within the brief. This research was split as follows:

- Background & history-Ryan Law
- Limitations on the technology-Ryan Law
- Examples of how the technology is used and could be used in the future-Savita Rolia
- Ethical review and the impact of the technology-David Austin
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The background and history of arcology:

It is believed that by 2050 the population will grow to 9.6 billion with 66% of these people living within cities. These alarming statistics raise various questions in how can the human race accommodate this growth with issues such as urban sprawling, transport, and greenhouse gas emissions (Dellesky, C. 2014). Arcology is believed to be a possible solution to overcome these issues.

Arcology originated in 1959 from an Italian architect called Paolo Soleri who created the collaboration of ecology within architecture. As an avid philosopher and nature enthusiast he had various beliefs including that human’s as a race could learn from nature. The main belief behind this concept is that ‘In nature as an organism evolves it increases in complexity and it also becomes a more compact or miniaturised system’. This belief has created the fundamental aspect of an arcology which is to create a compact three dimensional urban form to house the typical facilities required for a city as a system to function, as opposed to allowing a urban sprawl to occur across the land as seen by today’s cities (Arcosanti. 2012).

However these structures were not proposed to be simple hyper structure of high density. They were instead envisioned to be ‘beautiful and lucite’ models rising 300 stories and be created of intricate polyhedral structures (Austin, H.M. 1974). These simplistic sounding structures would mimic nature in complexity to ensure the following characteristics were possessed:

- Antithesis of wasteful consumption, facilitating access to shared infrastructure services
- Conserve water and reduce sewage
- Minimise energy, raw materials and land use
- Reduce waste and environmental pollution
- Allow interaction to surrounding natural environment
- Emphasise human connectedness and through mixed use development makes walking primary transport mode
How arcology has been used and the potential for further use in the future:

The use of arcology as an underlining theme for a structure has not been embraced by a large amount of designers or communities; however there are examples that are in the process of development.

**Arconsanti:**

Arconsanti originated as a brainchild of Paolo Soleri in the 1970’s and was located within the Arizona Desert. Its aim was to take the characteristics presented above and create an environment that could house a community of approximately 5,000 people. The project boasted plans to create a ‘curvaceous, organic dwelling’ that utilised the locations solar gains, with assistance from the thick concrete structure, to sustain a comfortable environment (Wainwright. 2013).

The Arconsanti worked off the principles presented previously with systems devised within the design to ensure that they were accomplished, these included:

- The formation of a gestalt (a form) to acquire and maintain meaningful perceptions in an apparently chaotic world
- House the relations and interactions that the living organisms have with respect to each other and the natural environment
- Organic garden close to habitual for agricultural use
- A mixed use/urban environment offers a lively and efficient environment 24/7
- Vast open spaces outside amenities provides residential opportunities for residents to decompress from occasional stress
- Close proximity for healthcare facilities
- Greenhouse to take advantage of micro-climate produced
- Productive environment substantially reduces water usage, whilst delivering excess heat to upper structure for space heating
- Rainwater collected and used for irrigation.


Unfortunately the project has yet to be completed with the scheme peaking at occupancy rate of 200 in the 1970’s which has further reduced to 60 as of 2013, this low level of occupants has ultimately resulted in the pace of the project dwindling over the years before Soleri retired from the scheme in 2008 (Wainwright. 2013). Although this may have seemed the end of the scheme the Arconsanti society are still resilient and have conducted a secondary concept named the ‘Critical Mass Concept’ to which presents a smaller scale of the environment to act as a springboard that may kick-start the larger scheme if successful (Arcosanti. 2012).

In addition to this project there has also been further projects embarked on such as the Masdar City and Crystal Island, both of which are still to be completed.
Figure 1: Concept visuals of the ‘Critical Mass’ project (Arconsanti. 2012)
The ethical impact of arcologies:

Soleri claims that ‘escaping from the ills demands a new stage on human development. The bridge from materialism to the triumph of spirit can come through congruence through forging will among humankind, equality, compassion and aesthetics’ (Austin, H.M. 1974). This insight from Soleri portrays his emphasis on the need for communication and engagement in community which would be achieved with arcology, further to this it is believed that a complex, compressed and congruent city is the next step to evolving (Wall, G. 1970).

By designing a city to represent arcology it possesses the potential to:

- Ensure work is no further than 15 minutes away from any point of a structure
- Petrol/transport costs will be replaced by escalator running costs
- Dependency on automobiles are reduced resulting in a decrease in roads and automobile services
- Pollution and waste are reduced as the arcology model produces a more efficient system
- Close proximity to rural areas allow for dwellers to have access as well as agriculture for local food distribution

(Arcosanti. 2012)

Although the potential of these schemes present promising results there are vast reasons to doubt the success of a completed project. Soleri has stated that ‘the cities are not for everyman let alone today’s man, but are for purified man’ (Wall, G.1970) presenting the question of whether a structure of this magnitude would be suitable for the proposed users. Furthermore to this it has been also been stated that Soleri had not investigated the sociological, political or economic implications regardless of their importance as that would be the ‘task of the qualified’ (Wall, G. 1970).

Geirson (2007) has presented that the Arconsanti project is a test of validity for the theory in issues such as:

- Intensification in the use of space
- Self-containment of habitat
- Higher residential densities
- Centralisation
- Compactness
- The irrigation of land use
- Create a sense of community
- Integration of living, work, recreation

(Geirson. 2007)

In addition to this there appears to be flaws within the concept in regards to both the logistics and wellbeing of the occupants. In order to sustain the community consideration needs to be undertaken in relation to accommodating for a high density population of large numbers and how they are managed /governed; the expected vs achieved energy production and its adequacy to the environment and hospitality towards various cultures (appropriate food, facilities, orientated rooms).

Due to no previous projects being completed there is no comparison to learn from and improve therefore all of this is worked off assumption. There is also no evidence to portray how a
confined area such as an arcology could affect the mental state in relation to overcrowding (Inhabitat, n.d) or cabin fever.
The limitations of arcology as a technology:

As mentioned previously there are existing issues with the concept of arcology, however these do not rest with the ethics of arcology but in addition there are various limitations in the technology required to achieve a successful scheme.

Although the prospect of a self-sustaining environment that can produce its own food resources resounds as an advantage it is an unfeasible option with the technology available in hydroponics not sufficing to accommodate for this. Further to this even if the technology became available it would most likely be a cheaper option to grown the food outside of the structure (Cranz. 1971).

Moreover there is also the potential that the heat generated through the structure, although channelled and vented where possible, cannot be dissipate quick enough creating an overheated building that would require systems such as HVAC to help resolve (Cranz. 1971).

None the less, the main issue that is abundantly clear is the available resources in relation to construction methods and materials. This has been seen in the feasibility of structures such as ‘The Shimizu TRY 2004 Mega-City Pyramid’ in Japan where the structure was designed to house 750,000 people above the Tokyo Bay. However upon further calculations it became clear the structure was so large that the weight of the materials currently could not be withstood by the foundation layers. Although this project is of a different scale to the others proposed it still possesses a theme that is very believable to occur especially in schemes such as the Crystal Tower (Sicha. 2013).
References:


