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INDUSTRIAL ADVANCEMENT

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Fig. 2.1 Site Infrastructure Collage (Author, 2017)

REFECTION ON INDUSTRIAL DEVELOPMENT: THE CULTURAL ORIGINS OF FOOD PROCESSING

Initially food production and processing originated around a community setting that formed an integral part of any society. Food processing in particular formed an integral part of the rituals of everyday life, in so far as everyone took part in the process of supply, refinement and consumption of food. These practices inherently embraced the culture of the urban settlement supporting it and shared not only its products but also its craft with the community. Ancient Ghana, Mali and Carthage holds examples of the cultural richness of early African settlements. (Davidson, 2013) The Southern African settlement of the Shona people in Mapungubwe, Great Zimbabwe shows how craft spanned between art and food culture. Artefacts clearly display how art traversed the culture surrounding food as depicted in the Ancient Shona pots in figure 2.2 (Tiley-Nel, 2014).

This symbiotic relationship between the above-mentioned crafts continued through the introduction of maize into the Shona culture. A new addition to the staple diet of the people, locally known as Sadza lead to the development of a new technique which is used to depict scenes of everyday life and continues the cultural bridge between food and art.

This productive condition was heavily centred on a community setting and proved to be a viable model for processing food throughout human existence prior to the industrial revolution. European settlement in Southern Africa however aimed to establish new trade posts. Firstly, for the Portuguese, then later for the Dutch-India Company (Wilson, 1969) and these colonial trade routes brought with it new materials and products and amplified the existing economy centred around trade. Due to Southern Africa's unique abundance of natural and human resources, mining interests later increased and saw a rapid growth in population (Wilson, M. 1969). Food production hence shifted from a collection of individuals towards a labour relation that had to address food security on national scale.

Global technological advancements brought about new farming techniques and a new way of refining food through the mechanization of the First Industrial Revolution c.1817 and 1861. (Trew, A. (2014). Later with the enhancement of technological discoveries Industry, as a whole, became increasingly mechanized and quickly traded the art of hand crafting for mass production. These new production methods held great financial gains as the production lines became refined towards profit and thus quickly became monopolized, leaving the individual largely unable to compete against the industrial tycoons.

The individual had lost the ability to compete and much of the culture surrounding food preparation as integrated spaces in the city, had been lost to the monotonous machines.

MECHANICAL DEVELOPMENT OF FOOD PROCESSING

Production and manufacturing outcomes increased substantially as a result of mechanization during the late 18th century and became known as the industrial revolution first Industrial Revolution after the invention of the . In 1913 during what became known as the second Industrial revolution (1870-1914) Henry Ford adapted the concept of mechanized industry into Assembly lines (Mokyr, 1998). This new process

Fig. 2.2 Patterns on Mapungubwe Artefacts (Tiley-Nel, 2014)

Fig. 2.3 Ramses iii bakery depiction (ANWAR, N. 2017)

Fig. 2.4 Ancient African Community (DEXTER COLOR INC.1946-1960)

was first employed in automotive manufacturing but could be adapted to suite many different products including the food. This process separated production into separate consecutive stages with raw ingredients (materials) entering at one end and a product leaving at the other.

The process was dominated by large repetitive processes and thus a long, drawn-out structure that served only as a shell to accompany the processes within, manifested itself within cities without concern for the urban fabric and social implications. This architectural manifestation of the production line (Weber, 2013) was purely process driven and became large warehouse type structures that spanned over the moving production line. Production companies including food processing industries adopted this model and shifted refinement from a single small business between the farm and the market towards a large-scale process between multiple farms and multiple markets.

The second industrial revolution was further contributed to by the refinement and streamlining of the production line into a vision for scientific management of production and supply chains by Fredrick Taylor (Merkle, 1980: 7 - 15). Numerous production lines could be linked through scientific management. Where assembly lines prepared ingredients into products, supply chains increased the scope to dominate the entirety of supply, production, refinement and sale. Various industries were physically linked as the output of one would become the input of another. Cities saw large complexes of industries establish with infrastructure connecting complexes to national and international suppliers of raw materials. Whilst the economy benefits from vastly increased

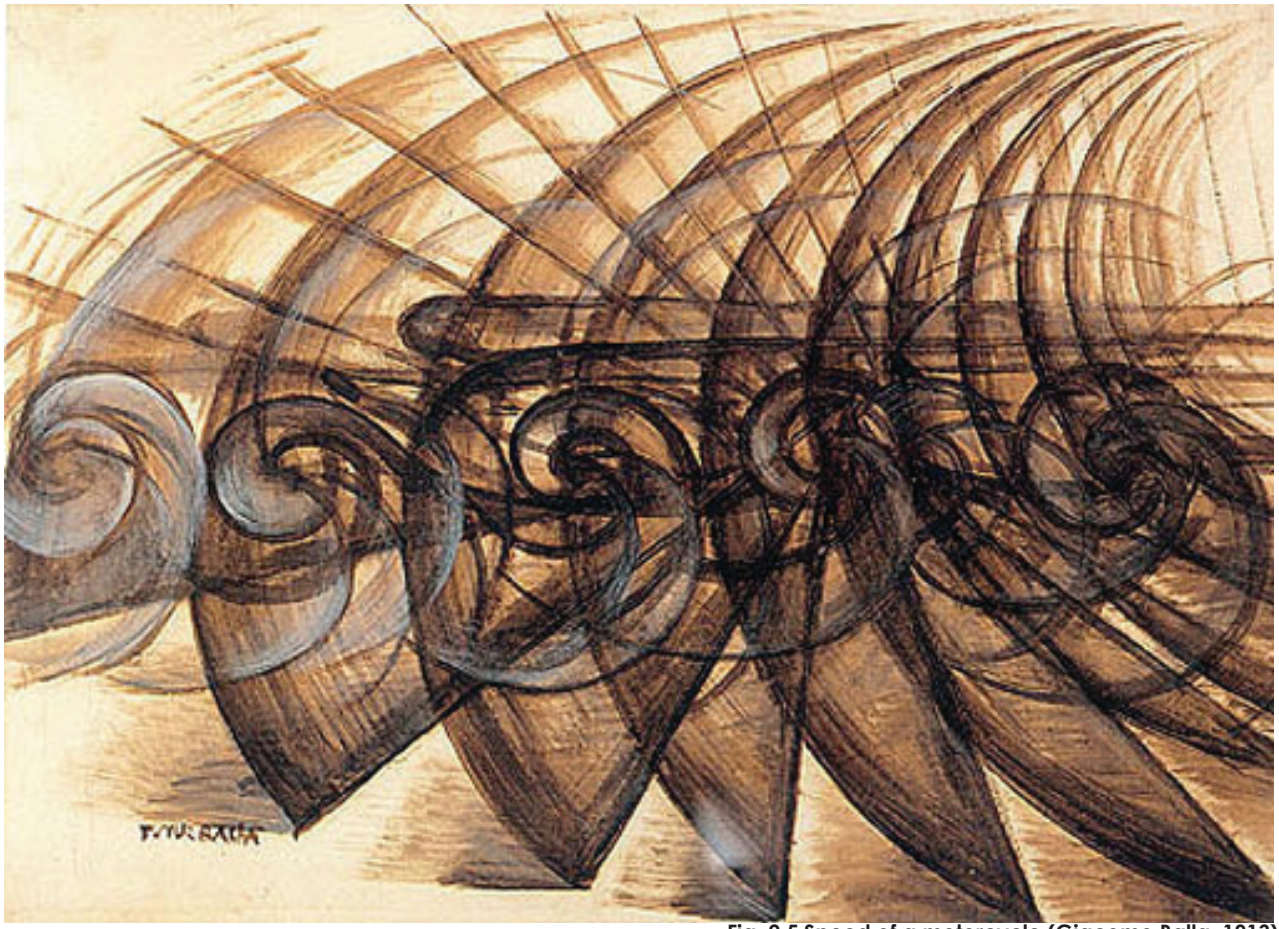

Fig. 2.5 Speed of a motorcycle (Giacomo Balla, 1913)

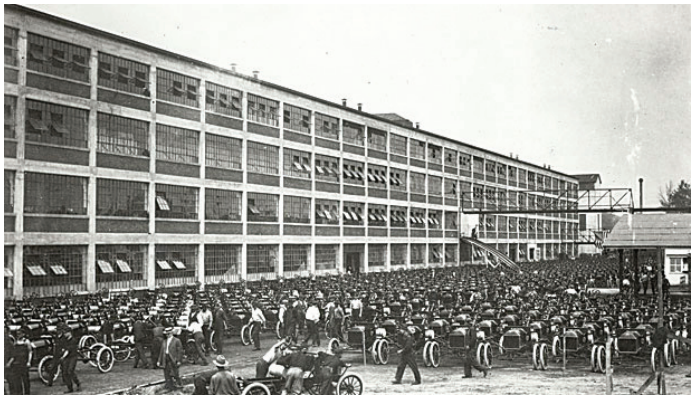

Fig. 2.6 Ford motor company factory. Weber, A. (2013)

Fig. 2.7 Ford's moving Production line. Weber, A. (2013)

GDP (Gross Domestic Product) the large mono-functional complexes left the individual unable to compete with complete end-to-end production.

> *"From a purely economic point of view, it could be argued that the most important invention was not another chemical dye, a better engine, or even electricity, since, with the exception of steel, most of the inventions described had serviceable albeit less efficient and more expensive substitutes, if not as efficient or as cheap. There is one innovation, however, for which "social savings" calculations from the vantage point of the twentieth century are certain to yield large gains. The so-called American System of manufacturing assembled complex products from mass-produced individual components. Modern manufacturing would be unthinkable without interchangeable parts."*
>
> - (Mokyr,1998: 8)

INDUSTRIAL FUTURE (THE THIRD REVOLUTION)

Recently a third industrial revolution has taken place in the form of information technology, extending the ability of production to individuals through new methods such as 3D printing and CNC machining (Rifkin, J., 2012). Most valuable of this latest revolution is the connective platform supplied by the wide use of the internet. This has not only led to the availability of specialist equipment and machinery in the food industry but also to a database of shared knowledge, methods and recipes. This is leading to extremely flexible production methods with large varieties of possible products for home industries.

The Third industrial revolution is often discussed surrounding personal manufacturing and distributed manufacturing (Leitão Paulo, 2009) that uses information technology as a new industrial infrastructure for manufacturing. This decentralized model competes against the second industrial revolution's concepts of an isolated production line.

.These newer and smaller individual-driven industries hold financial opportunities and it also brings with it the opportunity form groups of individuals to form a distributed manufacturing networks that can compete against the existing industries. (Srai, 2016) By returning to a human driven process the producer or manufacturer is required to engage with the product and the issues that arise throughout the process as a unique process and product.

Existing industries, through their connections to the rest of the supply chain and the sheer scale of operations, result in fixed systems that are rigid and resistant to change.

This process produces a single product as quickly and as my times as possible to achieve economy, but leaves the entire operation at risk of becoming absolute should that specific product fail in the market place. The scale of operation has led in the past to an uncompetitive advantage and the inability for newcomers to truly question the status-quo and inspire change – leaving visions such as urban agriculture, individual food production to search for alternative structures instead of latching onto the existing models.

Existing production focuses on supplying on a national scale and operations are usually isolated on the outskirts of the city and far away from consumers with large transportation networks in between.

Individuals, on the other hand, can create new products each time the production process commences, leaving flexible outcomes tailored to

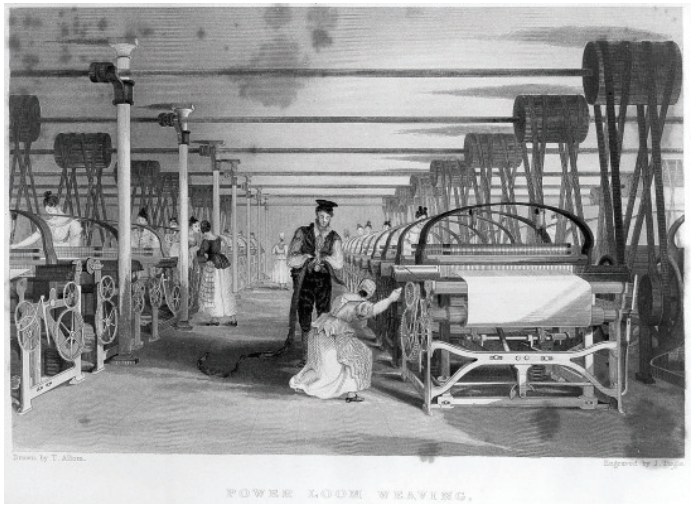

Fig 2.8 Power loom weaving (ANON. 2017)

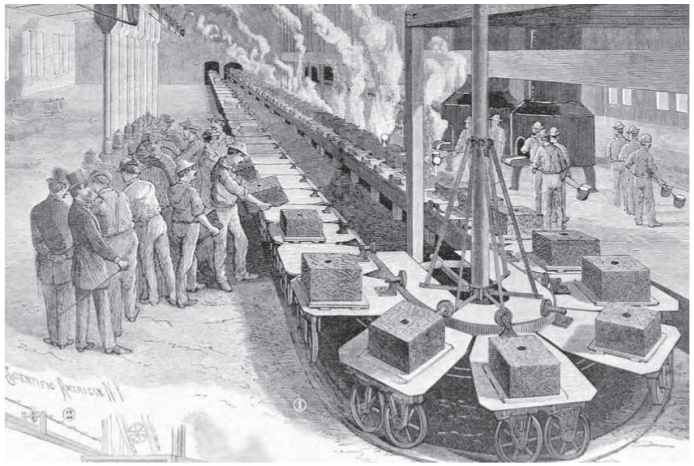

Fig 2.9 Mechanical Industry (Muhutdinova, 2015)

each consumer's specific dietary requirements. Smaller scale, individually driven industries, however have the ability to establish in close proximity to clients and relocate should the need arise.

These benefits that the individual now holds over large scale monotonous industries are negligible when comparing the number of products produced, but as the third industrial revolution brought connectivity through the introduction of the internet individuals now find themselves able to connect to a wider client base and form networks large enough to compete. As large industrial complexes are slowly becoming abandoned and as the rigid systems are unable to adapt and incorporate newer technologies, individual production holds the potential for change.

PLANNING FOR THE FUTURE

Previous industrial revolutions have required vast infrastructural developments to support the relevant technologies and concepts that allow production operations to function. As the third industrial revolution gathers momentum it too brings changes in infrastructure and sees the abandonment of existing complexes as these industries are abandoned or relocated in rapidly changing times. While newer industrial extensions flourish, the historic industrial areas are becoming abandoned. These buildings were designed to accompany machines and as production halts, it becomes difficult to repurpose them for human habitation. Where core functions that supply a network of other industries with raw materials are removed the entire network is at risk, including the infrastructure surrounding it. Currently the vast majority of architectural theories surrounding Industrial heritage, such as Post-Industrial Landscapes (TICCIH, 2012: 208) focus on post production scenarios, while

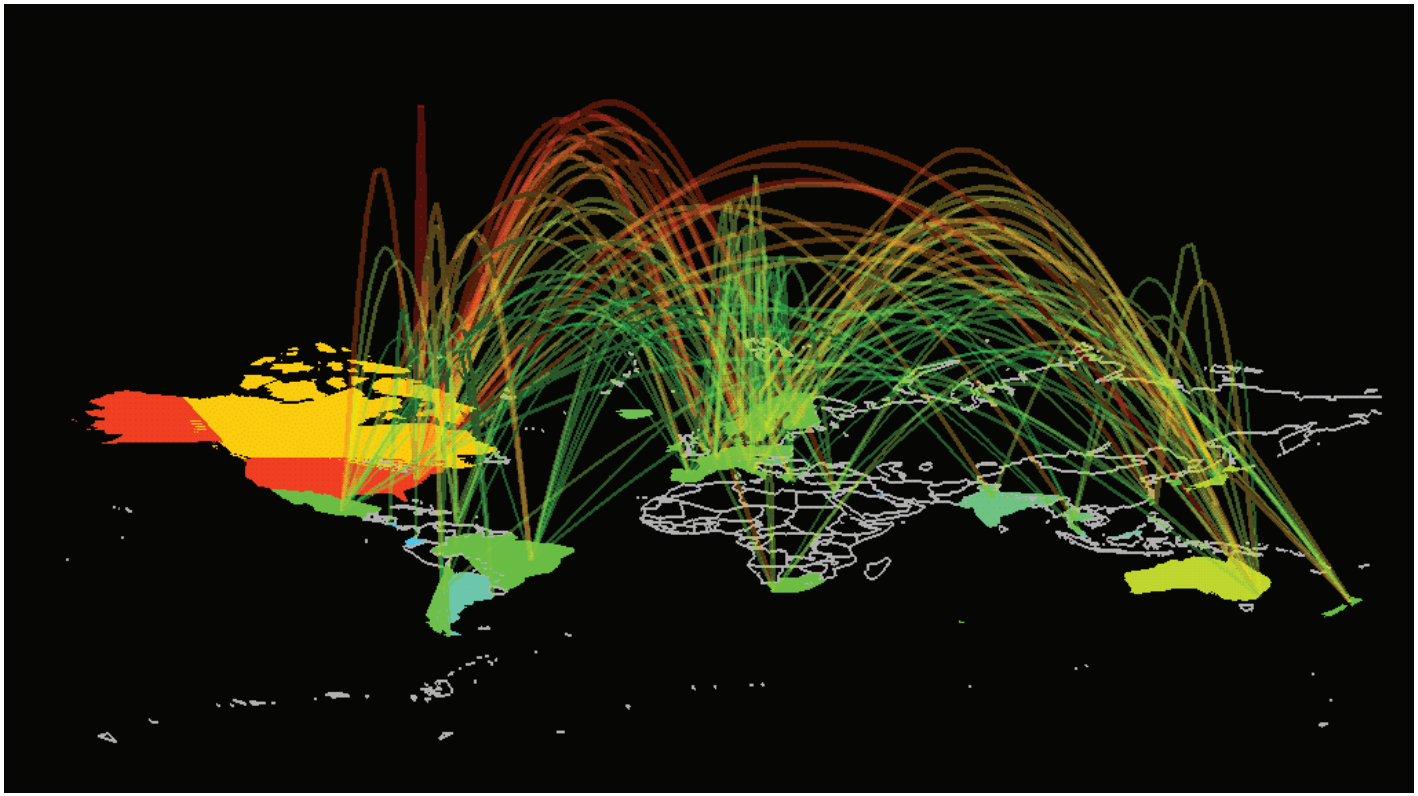

Fig 2.10 Global Internet traffic (Arabiya, 2016)

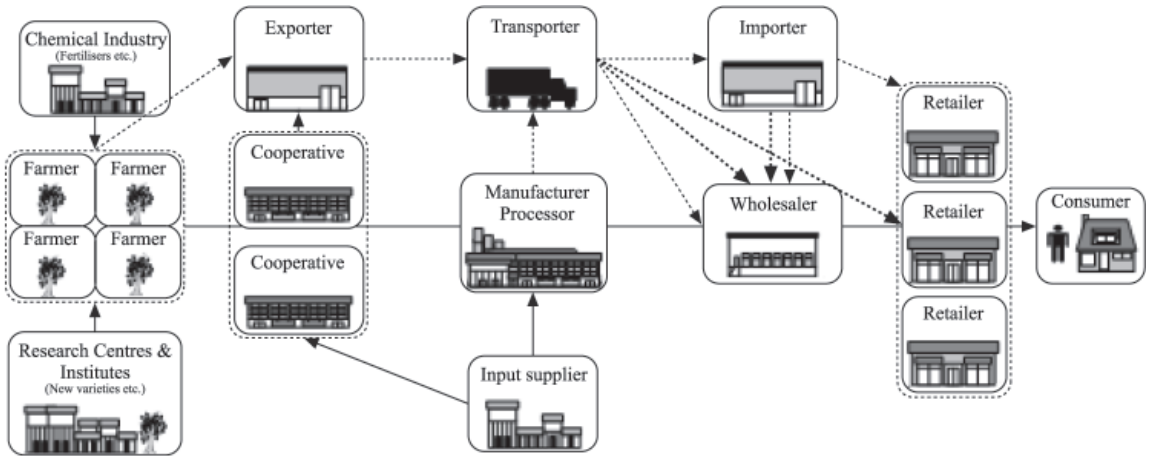

Fig 2.11. A conceptual framework for supply chain collaboration (Matopoulos, 2007)

allowing these industries to die before attempting to address the connection between industry and city.

The question therefore arises should we allow these core industrial complexes to die?

The cost of the supporting infrastructure should be acknowledged that would as a result also become negated when these industries ceases to produce. This includes massive railways, roads, freight lines and well-established trade networks that needs to be re-established once these industries move and change. The Silverton industrial area is an example of industrial relocation whilst many of the industries in Pretoria West lies abandoned.

In contrast to the value in infrastructure, is the difficulty to repurpose these rigid production driven buildings that were not designed with the human condition in mind. It can therefore be concluded that these original functions should not be completely be removed but that it should rather be adapted to project these industries towards future production models.

A THEORY FOR THE FUTURE: ECO-INDUSTRIAL PARKS

A contemporary approach to industrial development includes the theory pertaining to Eco-Industrial Parks. (Hein, 2015) The shift in thinking is driven not only by a more environmentally friendly approach, but also of economic opportunity, shortening the supply chain and ultimately causing a more eco-systemic and holistic world view.

Industry should be integrated into the city as well as other natural systems. The connection between industry and community becomes an integral part in the regulating and management of produce and waste. (Anja-Katrin Fleig 2000:)The adaptation of community-based planning within the industrial development sector in order to build relationships and interdependencies is fundamental to this model. This aligns directly with the historical reflection and projection of industry mentioned throughout this chapter. The return towards a community centred industrial platform could reunite the city with industry.

The most relevant shortcomings of the Eco-Industrial Parks Theory is the co-operation model for industries which could hinder technological advancements. This issue is a result of the implementation of a rigid system within the network of companies that creates a steady flow of materials with predetermined methods to dispose of waste. Opposed to the Tsukiji Market in Japan, this creates an integrated yet noncompetitive relationship between companies and results in a stagnation of technological advancement.

AN IDEA FOR THE FUTURE: MANUFACTURING MAKERSPACES : A POSSIBILITY FOR FOOD INDUSTRIES?

A makerspace is defined as a communal environment with shared resources where individuals can participate and engage in the production process. These spaces are often used to educate newcomers in a specific manufacturing trade where they can learn to make things in a hands-on approach. (van Holm, 2017) Fig 2.12 & 2.13 highlights the contrast between the interactions and craft of makerspace and the current food production lines. Larger manufacturing businesses often offer makerspaces as an extension of their training and education system, this allows the aspiring artisans direct experience and access to its established infrastructure and tools, whilst reducing the burden of remunerative training on the host.

These aspiring artisans often establish small enterprises that would not have been possible without the shared equipment and space that is offered by makerspaces. They are not required to accept or be offered employment but after a given training period they their places are taken up by new trainees. To the trainee this model allows for sufficient training and a start-up potential for a small business, but for the host it offers an opportunity to scrutinize how a trainee operates in a productive environment before employment and training without remuneration.

Whilst small-scale manufacturing industries are latching onto existing infrastructures in the form of makerspaces in the latest industrial revolution, the future for the most accessible informal industry is not yet defined. The food industry offers economic empowerment to millions of South Africans ranging from street merchants to home industries but often lack the supporting network that could shift food processing from financially supporting a household to a thriving formalized business. A parallel can be drawn between the manufacturing industry and the food industry.

Initially formal large-scale assembly line industries completely overshadowed hand-crafted manufacturing, however during the third industrial revolution the individual became increasingly empowered through the information technology.

The individual however still lacked the physical connection to the supply chain. The industries that once threatened the individual soon held the key to thriving individual manufacturing, housing a multitude

of individual crafters in a communal space or makerspace encouraging collaboration, community and the trading of skills - all of which are principles outlined by the eco-industrial park theory. (Hein, A.M., Jankovic, M., Farel, R. and Yannou, B., 2015)

Is it possible that the large-scale food industries could host the informal food sector that it once threatened?

If possible, this could cease the abandonment of these large industries as evident in the abandoning of inner city silos and milling operations across the globe. Additionally, small food processing entrepreneurs can connect to established networks and grow their businesses.

PRECEDENT: DISTRIBUTED FOOD PRODUCTION THE TSUKIJI FISH MARKET, JAPAN

The Tsukiji Market in Japan offers a food processing example for a similar symbiotic relationship that exists between host and guest industries in makerspaces. The market is interwoven into the city, provides an integral function to the city and requires the participation of its inhabitants in order to function.

> *''As the distributional centre for the domestic and international fishing industries that feed Japan as an entire nation the market provides an interface between multinationals suppliers and producers, the small-scale shopkeepers that still hold a large stake in Tokyo's food retail, and members of the public. For this reason, Tsukiji as it is now appears doubly paradoxical in the context of contemporary urban economic logics: it is both distributional warehouse and farmer's market exactly where we would not expect to find them: in the centre of the city.''* (Colverd and McLean, 2013)

Fig 2.12 Manual Tinkering Makerspaces (Design Engine, 2015)

Fig 2.13 Mechanized Food Production (Flowers Foods. 2017)

Although the market was established around large scale existing rail and fishing infrastructure, it relies largely on cart based deliveries. The functional unity between the regulated inner market and unregulated outer market shows the possibility of collaboration that is allowed by government policy in embracing the informal sector. While each merchant constructs their own facilities within the infrastructural frame, the visual chaos is regulated by means of a grid of columns that defines a modular set of stalls.

The outer market embraces a mixed residential community and market as workplaces. This enriched the relation between families and individual shopkeepers that they supplied. The Tsukiji market offers a unique mixed-use development and an integrated model for city and industry in the 20th and 21st century. It expresses the relationship between the formal(host) and informal(feeder) industries at varying scales.

> ''These implied boundaries are studied and agreed upon between adjacent stallholders and encourages comradery. In pursuit of fairness stall locations are reassigned every 4 years by means of a lottery, as proximity to anchor points such as auction houses grants an essential spatial advantage. This contradiction between formal and informal maintains a mutually beneficial relationship through both respective permanent and temporal existences.''(Colverd and McLean, 2013)

> ''Tsukiji plays host to a spatial consolidation of the multiple stages of exchange in urban food supply: stages that are elsewhere growing increasingly separate, disparate, and invisible. Tsukiji's connection to trade at all levels and its openness to the public still play a crucial role in its urban identity as both guardian and heir to a conception of pre-industrial mercantile Tokyo.'' (Colverd and McLean, 2013)

SOUTH AFRICAN INDUSTRIAL CONDITION

South Africa has a unique relationship with industry, especially considering its historic labour relations and spatial planning policies during the apartheid period. The discovery of natural resources in the country saw a rapid growth in population and saw the development of industries surrounding mining and refinement of coal, diamonds, gold and various other natural elements establish. (Wilson, 1969)

Businesses and other industries further down the refinement process moved in and workers settled close by with all the amenities of a city accompanying them. Infrastructure linked cities and their industries to where raw materials were required. Railway lines serviced many of these industries and assisted in transporting raw materials such as coal to supply power stations and maize to be milled into flour. The established rail infrastructure and growing workforce also allowed for new industries to attach to it and saw the forming of industrial areas.

During Apartheid times, South Africa applied spatial planning tactics to segregate the white population from the non-white population. This was achieved by relocating the non-white population to the outskirts of the city and by controlling their transport into and out of the city. The segregation was largely assisted by using industrial areas and its infrastructure to further strengthen the barrier between neighbourhoods.

Fig. 2.14 Interior Tsukiji Market (Chris, 2017)


Fig. 2.15 Tsukiji Fish Market (Chris, 2017)

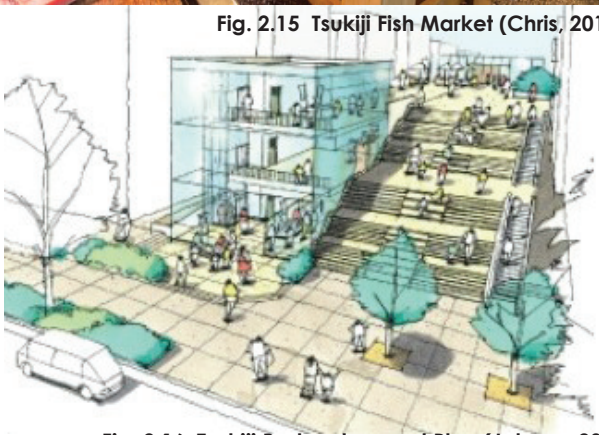
Fig. 2.16 Tsukiji Redevelopment Plan (Johnny, 2015)

Figure 2.20 (*Giraut, F. 2009*) The effects of this planning scheme ultimately lead to a strained labour relationship and later social unrest within the country.

After the abolishment of apartheid in 1994, many of these industrial zones are underdeveloped and remain as undissolved barriers between segregated communities. The third industrial revolution is causing industries to relocate and abandon these zones, with large portions of valuable infrastructure deteriorating and large portions of the city wilting away, thereby severing the connection between communities even further. When relocating, the overall footprint of our cities increases and the urban as well as environmental sustainability decreases as more transport, building materials, energy and space is required. This relocation results in a city that is further detached and allows industry and the city to function as separate entities without dissolving the apartheid city.

Whilst formalised industries seek greener pastures, the informal sector has since been embraced and many previously disadvantaged entrepreneurs are establishing informal food processing businesses instead of seeking direct employment. (Christie, 2017) South Africa boasts a cherished street culture surrounding these informal street traders and in many instances the streetscape is a celebrated public space. The empowerment of the individual is present in legislation that seeks to promote economic growth and can potentially be amplified through the latest industrial revolution as industries of the future will rely more on networks of individual based operations.

These flexible yet competitive industries can once again embrace the culture of a society as home

Fig. 2.17 Tsukiji Urban Context (Colverd, 2014)

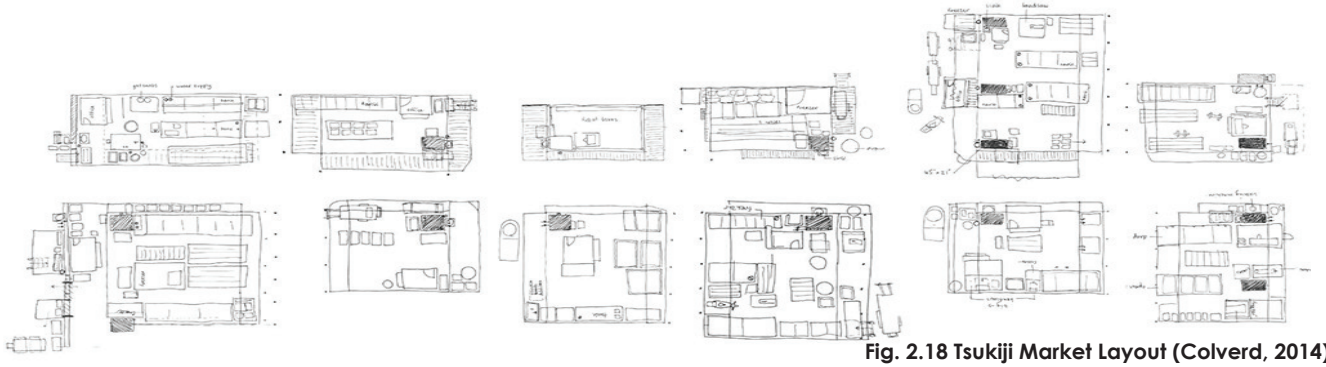

Fig. 2.18 Tsukiji Market Layout (Colverd, 2014)

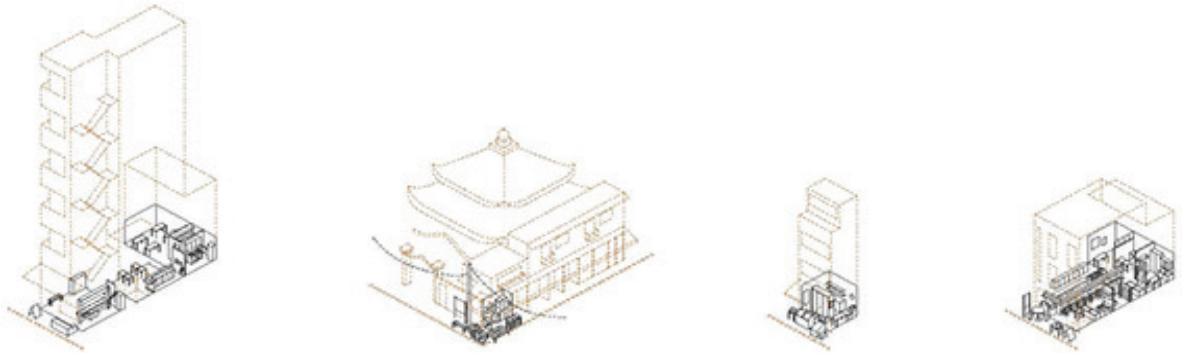

Fig. 2.19 Tsukiji Ground Floor Activation (Colverd, 2014)

industries catering to individual needs. Without the supporting network that surrounds larger operations, the informal entrepreneurs still rely on the formal trade sector for the supply of raw materials and in some instances as marketplace to sell their products.

PRECEDENT STUDY
WARWICK JUNCTION: INFORMAL MARKET

The post-apartheid stance embraces informal trade as a vibrant and celebrated enterprise that promotes culture and economic growth. Warwick junction is a manifestation of this embrasive stance. After it was established by Indian traders an influx of African traders began trading on the sidewalks. A distinct culture and character developed around the market, but the traders were violently harassed by police (Skinner, C. 2008: 233).

The existing market occupies an abandoned highway overpass and connects various markets between transport nodes in a linear progression. The transport infrastructure that spans the market dominates the environment but in the lower market, also offers traders escape from the elements Fig. 2.24. Between these nodes entrepreneurs process meat, grain, fresh produce and various other products that are bought in bulk from surrounding food industries before being processed and distributed by various traders.

Today the street culture is celebrated and used to attract tourists and customers but ultimately designers were tasked with addressing safety and enhancing the livelihoods of traders (Snow 2012).

Emphasis was placed on connectivity instead of control and isolation and while circulation routes were clearly defined, the programming of spaces were largely left to be filled by the traders themselves. This alternative to achieve safety and security through community participation resulted in spaces that were recognized and controlled by the community that used them and not by external policing.

The priorities in design was shifted from the needs to police and govern, to rather satisfying the needs of the traders, who as a result found unique solutions to problems and turned that into businesses. For instance, small informal food processes were linked by transportation via wheelbarrow and became a flourishing business. Open air food markets and traditional medicine are amongst the largest commodities sold in the markets and unique products are produced through informality, that contributes to the character and culture that is connected to Warwick Junction.

THEORETICAL CONCLUSIONS

Just as those preceding it the third industrial revolution will force large industries to adapt and change. It is necessary however that established core industries not relocate and leave surrounding networks to wilt, but rather to seek alternative methods to adjust for change. Through the precedent study of Warwick Junction and Tsujiki Market, I conclude that theories pertaining to the coexistence of multiple formal and informal industries can be successfully applied to existing food processing industries. A mutually beneficial relationship would allow for core industries to adapt for future changes whilst smaller industries can form competitive networks that connect to established infrastructure.

A host and guest relationship could potentially address the tear between city and current food processing industries and could assist in dissolving the industrial buffer zones of apartheid city planning.

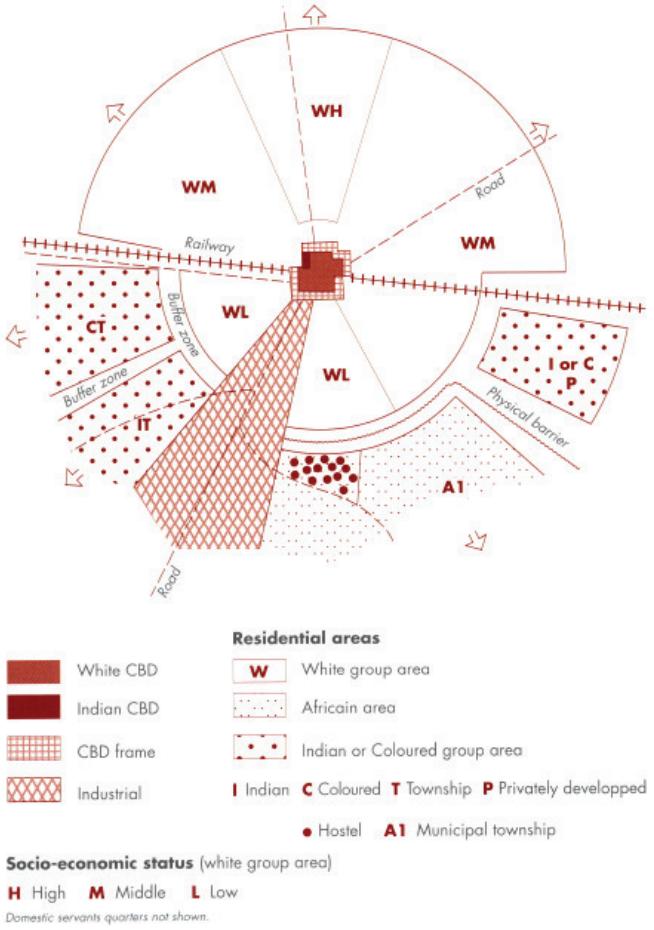

Fig. 2.20 Racial Divide through Apartheid Planning (Giraut, Frederic 2009)

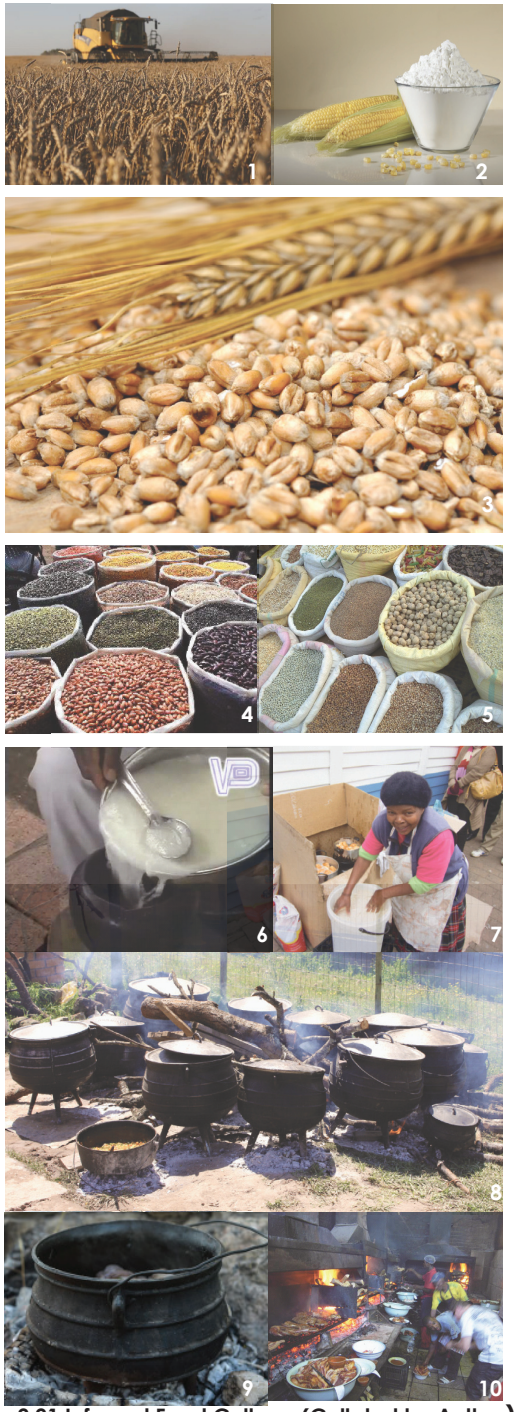

Fig. 2.21 Informal Food Collage (Collated by Author)

Fig.2.22 Urban infill in lower market (Snow 2012)

Fig.2.23 Road infrastructure as informal market (Battista 2017)

Fig.2.24 Urban infill in lower market (Battista 2017)