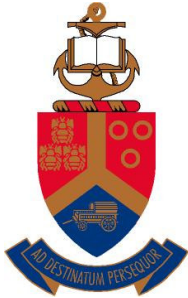


THE INFLUENCE OF WAR ON THE CONSTRUCTION INDUSTRY

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In the faculty of Engineering, Built Environment of
Information Technology



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October 2010

Declaration by student

I, the undersigned, hereby confirm that the attached treatise is in my own work and that any sources are adequately acknowledged in the text and listed in the bibliography.

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ABSTRACT

Title of treatise : The influence of war on the construction industry.

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Throughout history from the Great Wall of China, the Berlin Wall and even the construction of megalomaniac structures, the construction industry has been greatly influenced by war.

The objective of this treatise is to identify the effect on the construction industry before, during and after a war. How it can affect the economy, labour pool, infrastructure and the technological developments that took place indirectly or directly because of war and the structures that were built that still influence architecture and the entire built environment today and also the effect that war had on South Africa's construction industry and the effect that a modern war would have on the industry.

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CHAPTER 1:

INTRODUCTION

1. Introduction

This research project is about the effect on the construction industry during and after a war. How it affects a country both positively and negatively and how it changed the world to what is known today.

The first part of the project is to investigate the effects on the economy of a country during a war, and how this in turn affects the construction industry. In this section the period and conditions after World War 1 will be investigated which led to the collapse of Wall Street and the Great depression. Here the research will be focusing on the economic collapse, how the construction industry survived it and then how the time leading up to World War 2 influenced the construction industry in a few countries.

The development of improved security buildings, educational, health and infrastructure buildings was influenced by the growing need for these buildings after a war is finished. The solution of housing estates for the homeless and soldiers returning from battle and the creating of jobs by rebuilding the country's infrastructure will be

looked at to determine if this was a result of war or not. The improved methods and new technology gained from other countries to see if war speeded up the globalization process will be investigated.

War could have been the catalyst for "megalomania construction." An example of planned mega construction is the Volkshalle and the Palace of Soviets, two structures, that was planned during the reign of Adolf Hitler and Joseph Stalin. The construction of these structures was interrupted and later cancelled by the outbreak of World War 2. These structures can certainly be seen as one of the most famous cases of possible "megalomania construction".

Another two cities will be studied for the modern side of megalomania in construction. Dubai and Singapore currently hosts some of the most amazing and creative structures to date. There will need to be a study to understand whether or not these cities were influenced by war enough to promote the construction of mega structures or if there were other factors that played part in the construction world.

A case study will be done here. The construction industry in South Africa during World War 2 will be researched to understand what happened during the period and if a war were to break out how will the industry be affected now. Will the construction industry be able to survive the strain of such a war? This will be a "what-if" type scenario where the

answer will be based on what was researched in the previous sections of the research project.

1.1 Can war influence the global construction industry?

War influenced globalization and thus created advances in technology, new methods for construction and more competitive global market to name a few.

1.2 Sub-problems

1.2.1 Does war have an effect on a country's construction industry?

War affects the construction industry, it is expensive, disruptive and has a major influence on the economy of a country, but it can also lead to new developments, the repair of infrastructure and buildings that were destroyed during a war.

1.2.2 How did war influence construction throughout history?

After World War 1 there was a considerable need for housing for people with lower income. Could the aftermath

of war have led to the development of modernist housing estates in Germany?

World War 2 contributed to the post-war buildings and modern architecture which had an affect on the surrounding communities and created a growing need for the quantity surveying profession.

1.2.3 Can war create “construction megalomania”?

Megalomania is defined as “An obsession with grandiose or extravagant things or actions.” A present day example of “megalomania construction” is the boom in construction activity in Dubai during the past few years.

1.2.4 Will the South African construction industry be able to cope with a war?

The negative and positive influences of war on South Africa and will the country’s construction industry be able to survive a war.

1.3 Hypotheses

1.3.1 Can war influence the global construction industry?

War influenced the global construction industry by creating demand for housing, jobs and security.

1.3.2 Does war have an effect on a country's construction industry?

War can have a positive and negative effect on the economy of a country and therefore have similar effects on the construction industry.

1.3.3 How did war influence construction throughout history?

The aftermath of war led to the development of social housing, new modern movements in architecture and ultimately to the growing need for the quantity surveying profession.

1.3.4 Can war create "construction megalomania"?

War can lead to construction megalomania and it is not just a newly developed idea.

1.3.5 Will the South African construction industry be able to cope with a war?

The influence of the Second World War in South Africa on the construction industry and if there is a war the industry will be able to survive during and after it.

1.4 Delimitations

Countries mostly affected by war during history: North America, Germany, Saudi Arabia, Singapore, Russia, United Kingdom and South Africa. Some countries in Africa will be mentioned.

Further delimitations is time period, not all the wars throughout history can be discussed the main focus will be on the Second World War.

1.5 Importance of the study

When studying for a degree in construction economics there is a need to know the history of construction and how it has been influenced throughout history by major events.

The only focus in history subjects is the development of architecture and art movements, but no consideration is placed on:

- What influenced the movement
- Construction methods development
- Methods used to construct mega structures of today
- Technological advances in the industry because of globalization, that was influenced by war

This research will not change the construction industry as it is known, but will act as a supplement to the history and development of the construction industry.

1.6 Research methodology

This project is a Qualitative research project, the sub problems will be researched and the final problem will be based on the development of opinion and assumptions made from collecting data and analyzing it

CHAPTER 2: DOES WAR HAVE AN EFFECT ON THE CONSTRUCTION INDUSTRY?

2. Does war have an effect on the construction industry?

2.1 Introduction.

This chapter will take a look at the influence that war has on the construction industry throughout time by focusing on the negative and positive effects as well as the developments in construction during a war.

The victorious parties of war have shaped the economy of the world and the trade markets. This helped to create globalization in the trade market and thus influencing the new technology and knowledge acquired from the different countries.

But the main focus will be the effect on the economy and how this influences the built environment.

2.2 The positives and negatives of war.

War can have a positive and negative effect on the construction industry, it is expensive, disruptive and has a major influence on the economy of a country, but it can also lead to new developments such as the repair of infrastructure and buildings that were destroyed during a war.

2.2.1 Negatives

Inflation: According to the online Cambridge dictionary (24 October 2010) : "a general, continuous increase in prices" This is a short term effect of war which causes prices to rise and thus reduces the ability to afford the high cost of living day to day.

War is also very expensive and creates even more inflation in prices, this is known as the cost of war and was described by the Chinese strategist Sun Tzu: "Where the army is, prices are high; when prices raise the wealth of the people is exhausted" (Tzu Sun, c.400 BCE). He believed that before you can go to war you must be able to afford war.

The big problem with war is to finance it, in the fifteenth to the eighteenth century the European countries existed mostly out of mercenaries but in the case of war between Spain and Portugal who needed to import silver and gold to

pay for the war, the value of the metals decreased because of the large import from America (*Goldstein: 2003*) (*Braudel, Fernand: 1984*)

Presently the war between the United States of America and Iraq is costing the nation \$2 trillion according to a study that was done in 2006 that was done by nobel prize winning economist Joseph E. Stiglitz and Linda J. Bilmes. (*www.sourcewatch.org: 24 October 2010*) The breakdown of the costs included the following:

Army:

- \$132 million for vehicle armour
- \$879 million for helmets and clothing
- \$21.5 million for M249 squad automatic weapons
- \$27 million for ammunition magazines, night sights and ammo packs
- \$956 million for repairing desert-damaged equipment
- \$102 million to replace equipment lost in combat

Marine Corps:

- \$40 million for body armour, lightweight helmets and other equipment for "Marines engaged in the global war on terrorism"
- 1,800 squad automatic weapons
- 5,400 M4 carbine rifles

(*www.sourcewatch.org; 24 October 2010*)

In 2010 the new survey proved that the war is already at the \$1.12 trillion mark, the costs were allocated as follows according to the FY2010 Supplemental Appropriations Acts for DOD:

- \$1,121 billion including:
- \$751 billion for Iraq;
- \$336 billion for Afghanistan;
- \$29 billion for enhanced security; and
- \$6 billion unallocated

(Belasco: 2010)

The problem arising from such costs is: "How do you fund it?" There are several ways but the two most common ways of paying for war is to raise taxes as the United States of America revolutionary Thomas Paine (1737 – 1809) said: "war ... has but one thing certain, and that is to increase taxes" and to print more money, the printing of money leads to its decrease in value (As can be seen in the Spain and Portugal war earlier mentioned where the value of gold and silver decreased) and thus leading to inflation. The rises in inflation act as an indirect tax and increase the cost of materials and labour in the construction industry and therefore lower the growth in construction projects.

Even in wars that are more recent currency can become so worthless that they need a different way of paying. Like in the Angola civil war (1975 to 2002) they used bottles of beer as currency for day to day transactions (*Goldstein: 2003*) Obviously paying for a construction project in bottles

of beer is not practical but it would result in a joyous practical completion party.

Capital Depletion: War causes massive infrastructure destruction as this is the easiest way to get a nation to surrender because this causes a great depletion in production of necessary and even key services and goods. This depletion in production can then result in famine, health depletion which affects the lower social classes first. This eventually results in death. (*Howard: 1976*)

Germany's population was depleted by as much as one third during the 30 years war and French production was reduced to almost 50% in World War 1. This decreases the amount of labour available and this terrible circle then causes further lack in economic output. (*Howard: 1976*)

It was estimated that the total cost of World War 1 was \$400 billion - five times the value of everything in France and Belgium at the time. (*Howard: 1976*)

Labour: During war the labour pool decreases in such a way that labour can't be found easily or at the same cheaper price than when there is an abundance of labourers.

The labour pool decreases because war has the following effects:

- People signing up to join the military forces
- Casualties during war

- Viruses and epidemics like the influenza epidemic during World War 1 in 1918, and AIDS
- Quincy Wright estimates that "at least 10 percent of deaths in modern civilization can be attributed directly or indirectly to war" (Wright, 1964).
- Women need to replenish the labour pool because of the imbalance of the genders during war.

After war labour also increases drastically because of the soldiers returning and needing jobs and housing.

After World War 2, the U.S.A. experienced the "baby boom" which of course led to the need for more schools and better social security because of this incredible "injection" to the population.

Infrastructure: Infrastructure is destroyed during war when the opposing side usually focuses on crippling the enemy by destroying their infrastructure, such as roads, railroad tracks, power stations dams etc.

But during a war like the Napoleon wars, the Thirty year's War, and World War 1 some countries didn't experience any damage or economic loss, because they didn't fight within their borders, and thus benefited from their isolation.

This can also be seen in the Iraq war, where Iraq suffered major damages to their infrastructure, but the USA had nothing to rebuild in their own country.

2.2.2 Positives

Although war is only associated with negative effects there can still be some positive effects after a war.

Positive Economic Effects: During an economic recession the spending that comes with war can stimulate the economy in the short term.

It reduces unemployment because of the people joining the army to fight for their country.

Infrastructure can be rebuilt, thus removing the old and replacing it with newer and more efficient systems. This is where the construction industry benefits the most, because of the increase in projects. "For example, after being set back by the two World Wars, French production grew faster after 1950 than before 1914. " (*Goldstein: 2003*)

The above mentioned can thus prove that war can definitely end economic recessions, like World War 2 helped to end The Great Depression.

2.3 The construction industry during a war.

According to UK statistics development of housing increased drastically after World War 1 because the government

introduced rent restrictions. In 1924, the Wheatley subsidy encouraged house building and private ownership.

After World War 2 construction of new housing increased again, but stagnated during the war. It can be seen in the UK housing finance review of 1999/2000.

According to figure 1 the construction of new houses was at 350 000 per year in the 1930's.

During 1940- 1945 new houses built decreased to under 50 000 per year, and drastically increased in 1950 to almost 250 000 per year, there after peaking at over 400 000 per year in the late 1960's. In 1945 the coalition government pledged 'a separate house for every family that wishes to have one'. (*UK housing finance review of 1999/2000*)

The figure supports the conclusion that directly after war the economy is stimulated and the construction industry booms because of all the infrastructure and housing that needs to be provided.

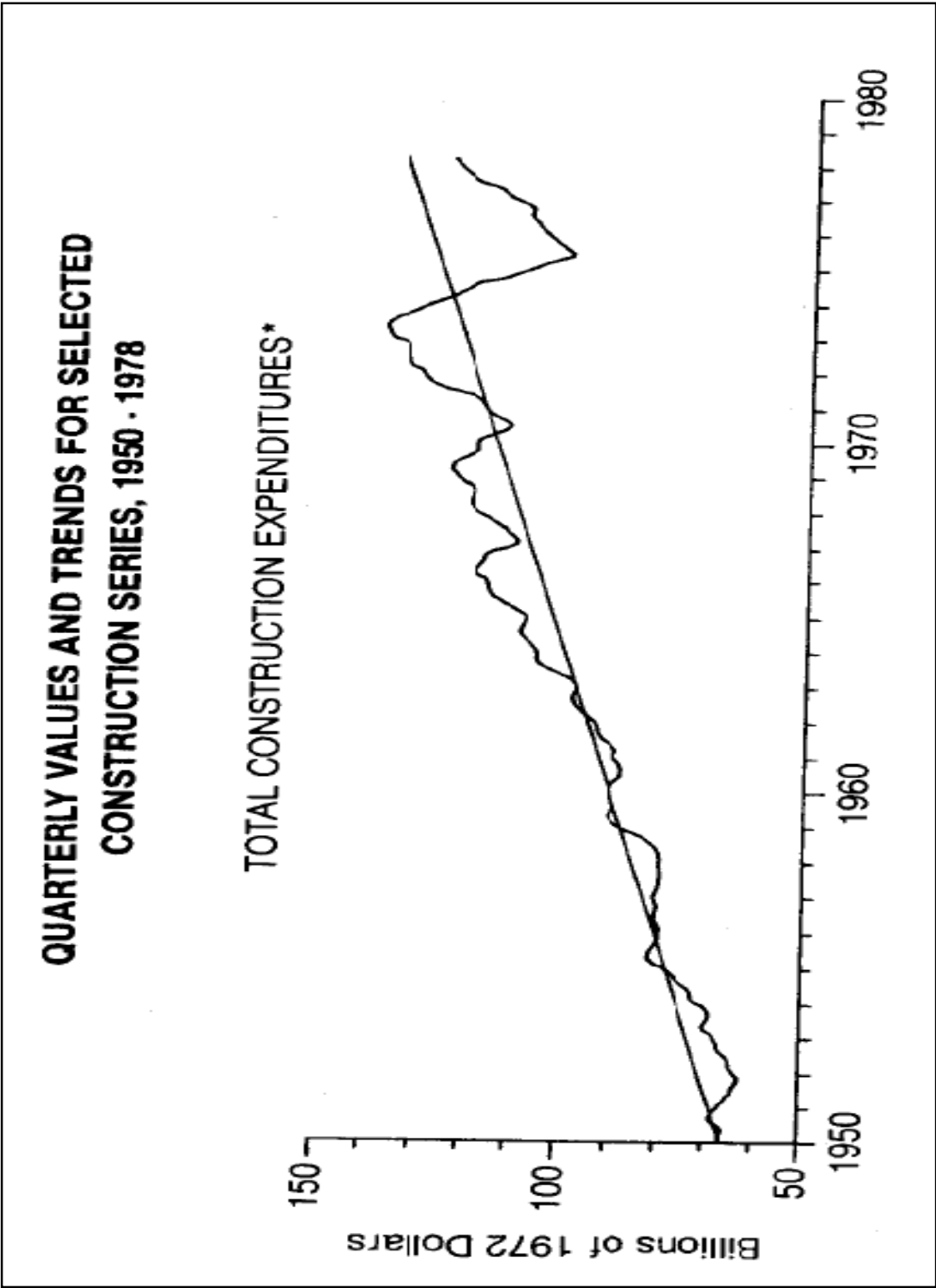


Figure 1: Total construction expenditures 1950 – 1980
(*Construction cycles in the United States Since World War 2.*
Grebler-Burns.)

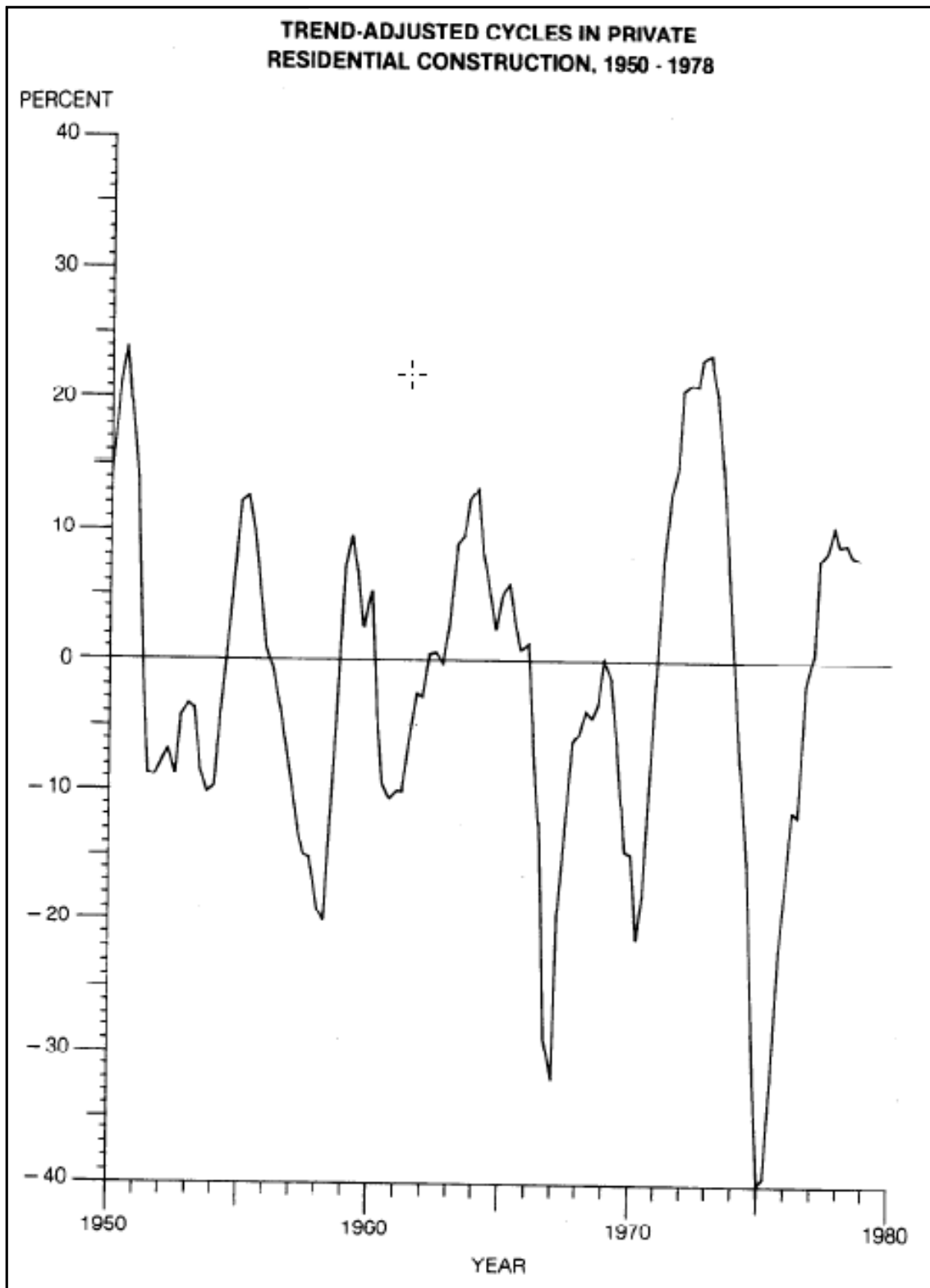


Figure 2: Trend- adjusted cycles in private residential construction, 1950 – 1980 (*Construction cycles in the United States Since World War 2. Grebler-Burns.*)

These figures show that after World War 2 the construction industry grew strongly, furthermore that private residential construction boomed just after war supporting the fact that war influenced the need for housing.

2.4 Summary.

War can have its positive and negative effects, especially in the construction industry. War affects the economy in such a way that money is only spent on trying to win the war or trying to survive it.

Ultimately during war the construction industry suffers, but this is only short lived, because after war there is the promise of new developments, huge infrastructure upgrades and housing projects for the victims of war.

Furthermore the increase in the labour pool ensures that labour comes cheap and willing, because of patriotic citizens wishing to help rebuild and improve their country at low wages.

During war as can be seen in the UK statistical report, construction comes to an almost complete standstill

2.5 Conclusion.

During war the construction industry suffers, because of a decrease in labour, a decrease in funds and a poor economy leading to almost no new developments.

During the time leading up to a war and after a war the construction industry booms, because of the rebuilding of infrastructure and the increase in demand for housing and facilities.

2.6 War does have an effect on the construction industry.

2.6.1 Can war influence the global construction industry?

War influenced the global construction industry by creating a demand for housing, jobs and security.

The UK statistics report proves that war does create a demand for housing, jobs and security. The same can also be said for the "baby boom" generation of World War 2 in the U.S.A. which created a need for more education facilities.

2.6.2 Does war have an effect on a country's construction industry?

War influences the economy both positively and negatively. The construction industry like everything else is very dependant upon the well being of the economy. Thus if the economy is positively affected by war, then the construction industry will also reap the benefits. The direct link between the effects of war on a country and the construction industry in that country is then establishes, therefore war does have an effect on the construction industry, the hypotheses was therefore correct.

CHAPTER 3:

HOW DID WAR INFLUENCE THE CONSTRUCTION INDUSTRY?

3.1 Introduction

The chapter will take a look at the influence that war had on the construction industry. The main focus will be placed on the development of social housing, construction during the war and then post war buildings and their influence.

The development of social housing is one of the most important things that happened during the two world wars. Social housing was revolutionized and is still used today where new innovative ways are being thought of to save construction cost and to utilize the space given.

The finer details and benefits of post war architecture and buildings will be discussed and why these buildings should not be seen as failures of war but rather as innovative buildings that helped the construction industry grow to what it is today.

3.2 The development of social housing

After World War 1 there was a considerable need for housing for people with lower income. This led to modernist housing estates, developed in Germany. These developments are examples of the construction movement that contributed to better housing solutions for the lower classes and improving the living conditions for these people. The main architects who influenced the design of these estates are Bruno Taut, Martin Wagner and Walter Gropius. (*Christensen, Levinson: 2003*)

In their design process the architects aimed to strip these now so-called machines for living of all the superfluous elements found in the old stately homes before the war started. This stemmed from the shortage of materials and the new found social improvement policies a lot of European governments pursued at the time.

Under such policies the government had taken on a “nanny” role and was responsible for the well being of all its citizens. This made the authorities provide services such as universal education, health care and housing to whoever might need it.

In Britain these policies came to a spectacular halt under the rule of Margaret Thatcher, although still liberal in its

generosity it has been scaled down immensely under the baroness's rule.

3.2.1 The development of social housing

Between 1925 and 1930 Germany was the site of modern and broad municipal social housing projects, mostly in Berlin, Hamburg, Cologne and Frankfurt. These settlements were made necessary by the dreadful living conditions of pre-war urban tenements. The right to a healthy dwelling was written into the 1919 Weimar Constitution, but few dwellings were built until economic stability in 1925. (en.academic.ru: 25 October 2010)

The social housing developments were low rise (5 stories or less). Their main focus was keeping the inhabitants happy. This was done by providing them with enough light and natural air. (en.academic.ru: 25 October 2010)

Germany and the city of Vienna in Austria was the influence in the design of the the size, shape, orientation and style of the housing. (en.academic.ru: 25 October 2010)

Martin Wagner the architect was in charge of the huge amount of developments for social housing built in and around Berlin in Germany, including the Horseshoe Siedlung ("*settlement*"). (en.academic.ru: 25 October 2010)

But Wagner wasn't as popular or successful as the city planner Ernst May in Frankfurt. May was responsible for the

construction of 23 separate settlements, 15,000 total units, in five years. He started his own research facility to investigate, different ways of optimizing various floor plan configurations and construction techniques.

(en.academic.ru: 25 October 2010)

Most of the German housing experts and developers were leaning more toward communism and socialism and the increasing pressure from the rising war brought this era to an end in 1933. These developers with their communist ideology were soon forced out of the country. (*Christensen, Levinson 2003*)



Figure 3: The Horseshoe Siedlung

(*www.photographersdirect.com: 26 October 2010*)

3.2.2 Present day social housing projects

In Singapore The Pinnacle@Duxton (previously known as Duxton Plain Public Housing) is a 2.5 hectare residential complex developed for social housing needs, although Singapore is one of the richest countries, there is still a need for social housing. The Pinnacle@Duxton is another breakthrough in construction.

The building consists of seven 50-storey connected towers, labelled 1A to 1G, with a total of 1,848 units. It is a very different and unique amongst developments that are of the same value and path, these units are designed as special types, S1 and S2, having altogether 35 different unit for potential buyers to choose from - with various combinations of qualities such as extended bays, balconies, bay windows or planter areas. (*www.straitstimes.com: 3 October 2010*)

"The Pinnacle@Duxton features the world's two longest sky gardens of 500m each, on both the 26th & 50th floor; and all seven towers represent the world's tallest social housing buildings." (*www.straitstimes.com: 3 October 2010*)

In figure 4 and figure 5 the Pinnacle@Duxton is illustrated. This evolutionary type of social housing is just a start of what can still be done in construction industry. To think that the developments started with less than 5 stories and then developed to this massive mega structure of seven 50 storey towers.



Figure 4: The Pinnacle@Duxton the world's tallest social housing buildings (www.myhometown.sg: 03 October 2010)

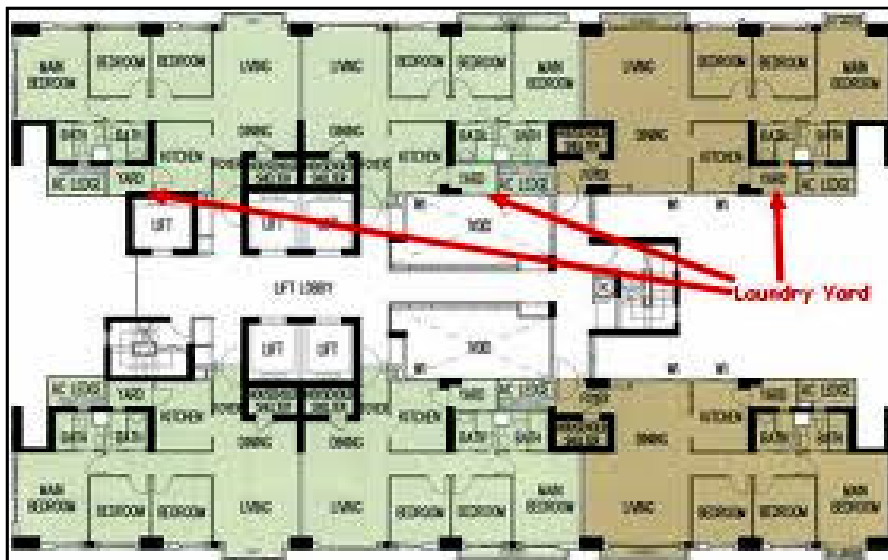


Figure 5: The Pinnacle@Duxton floorplan (www.scyscrapercity.com: 26 October 2010)

3.2.3 South African social housing

Today in South Africa social housing and affordable housing is on the rise. (*Engineeringnews.co.za: 3 October 2010*) states the following; from 2004, government's housing expenditure increased from R4,8-billion, to R9-billion, in 2007 and 2008, this shows growth of 23,2% a year.

"The housing budget is projected to grow from R9-billion last year to R10,6-billion in 2008 and 2009, and R15,3-billion by 2010 to 2011, at an average of 19,4% a year." (*Engineeringnews.co.za: 3 October 2010*)

The focus and aim of the government is the obliteration of all slums, "plakkerskampe" or informal settlements, by 2014. To reach this goal 500 000 units a year must become available by constructing new units or renovating old buildings, according to the Department of Housing's Strategic Plan 2008 to 2011. (*Engineeringnews.co.za: 3 October 2010*)

The original RDP housing schemes were flawed because of their poor placement and distance from infrastructure and jobs, because they were built on the edges of existing townships, or in totally new areas, still very far from any areas that can offer jobs, security, schools etc.

"Following Cabinet approval, the Breaking New Ground (BNG) initiative kicked off in September 2004. It was launched to establish integrated, sustainable human

settlements and is being implemented in all nine provinces.”
(*Engineeringnews.co.za: 3 October 2010*)

3.3 Postwar buildings and their construction:

3.3.1 Getting the buildings listed

After the Second World War came to an end the buildings constructed during that time in Britain was seen as beacons of failure and of war and only had negative associations. But there seemed to be a growing number of people concerned with the destruction of these fine examples of post-war architecture. It was only with the issuing of a Statutory Instrument by the Department of the Environment in 1987 that it even became possible to consider buildings built after 1939 for inclusion on the list of historic buildings, and it was not until August 1987 that the first post-war building was actually approved and listed. This building, Bracken House, a newspaper office in the City of London which was designed by Sir Albert Richardson and completed in 1959, has thereby become a milestone in the history of listing, a history which has only gradually been allowed to develop to include the architecture of the late 20th century.

(*www.postwarbuildings.com: 21 September 2010*)

The listing of buildings was first limited and controlled by the Ministry of Public Buildings and Works during the Second World War to buildings built before 1840. Until the 1970s only Victorian and Edwardian buildings were suitable for inclusion on the list. (www.postwarbuildings.com: 21 September 2010)

"The founding of the Victorian Society in 1958 and the public outcry following the destruction of the Euston Arch in 1962 began the change in public opinion in favour of the preservation of the architecture of the 19th century."
(www.postwarbuildings.com: 21 September 2010)

The 1987 Statutory Instrument developed a new system which allowed for the extension of the period within which the building had to be built to qualify for listing. This system, known as the 'Thirty Year Rule', allows for any building which was begun more than 30 ago to be considered for listing. (www.ihbc.org.uk: 21 September 2010)

At the same time the still 'Ten Year Rule' was developed, which allows for any building that's had its construction begun more than 10 years ago to be considered for inclusion on the list. But the building needs to have two qualities or must satisfy two conditions: 1) Threatened with alteration/ demolition and 2) it is an "outstanding" unique example of architecture.

The best known example of a building was the Willis Faber Building in Ipswich, begun to the designs of Foster

Associates in 1972, and listed at grade I in 1991.

(www.ihbc.org.uk: 21 September 2010)

Post-war listing has been part of a slow and steady process. It was developed because of the importance of protecting heritage of the buildings and to appease the outcry from the public. The present list includes over 350,000 entries, but there are only 315 post-war listed buildings or groups of buildings at present. *(www.ihbc.org.uk: 21 September 2010)*

3.3.2 The construction and fall of the Berlin Wall

The reason behind the discussion of the Berlin wall is to understand the speed and effort it took to construct such a huge structure in Berlin directly after a war and in poor economic times.

On the 13th of August 1961 construction started on the wall in the city of Berlin. It was a move by the German Democratic Republic to separate the East from the West quickly. They wanted to stop and control the movement of the soviet controlled East Berlin to the West, that was then occupied by the British, French and Americans. *(berlin-wall-germany.blogspot.com: 27 October 2010)*

In just 24 hours the streets of the city was closed off,

barricades were put up and military force was used to control the subways and railways. The people that were excluded from the West included the somewhat 60,000 commuters that went to work that day. Separating them from their families and homes. (*Buckley Jr: 2004 and Rose & Bailey: 2004*)

The space between the two fences was demolished and cleared to create a type of "death strip." The strip was covered with raked gravel, not covered, was mined and booby-trapped with tripwires and it offered a clear field of fire to the armed guards who were instructed to shoot on sight. (*Buckley Jr: 2004 and Rose & Bailey: 2004*)

"The final version of the Wall was constructed 45,000 separate sections of reinforced concrete, each 3.6 m high and 1.5 m wide, and topped with a smooth pipe, intended to make it more difficult for escapers to scale it. The Grenzmauer was reinforced by mesh fencing, signal fencing, anti-vehicle trenches, barbed wire, over 300 watchtowers, and thirty bunkers, just to make double sure that nobody escaped." (*Buckley Jr: 2004 and Rose & Bailey: 2004*)

In the evening of November 9th, 1989 Gunter Schabowski, Minister of Propaganda, made a speech that concluded that the wall has fallen, because of the allowance again for people to travel abroad. The following days and weeks citizens began physically tearing down the concrete division. (*Buckley Jr: 2004 and Rose & Bailey: 2004*)

3.4 Summary

The buildings discussed in this chapter shows that war influenced the outcome of some of these buildings and the development of new building techniques.

Social housing was developed for the people left stranded by war and regimes. The improvement of these social housing developments further introduced a higher standard of living for people and had an uplifting effect on the cities.

Post war buildings were not looked upon with favour, but as time passed people started recognizing their importance and contribution to modern day architecture.

This could have indirectly contributed to the increasing need for the quantity surveying profession seeing as the trade started out as fairly simple, but with the increase in difficult and complex projects the profession grew and became more than just measuring and cost management.

3.5 Conclusion

The developments before during or after a war can sometimes be connected to negatives ideas, but the overall conservation of these buildings and structures are more

important for historical value than the emotions and memories that they personify.

The World Wars contributed directly to the increased developments of social housing and the advancing thereof.

3.6 Hypothesis

War contributed to the development of construction techniques.

Already this hypothesis is proved correct by the social housing developments that became more complex, seeing as they started as only 5 storey buildings the growing need after war for housing was the catalyst for the new high rise buildings used today such as the Pinnacle@Duxton buildings in Singapore.

Furthermore the focus that was placed during World War 1 and 2 on functional building such as the Bauhaus, developed a new trend in functionality over art. Later on architectural styles such as the European and Industrial will develop and lead to what we know as modern multi-purpose buildings today.

CHAPTER 4 :

CAN WAR CREATE CONSTRUCTION MEGALOMANIA ?

4.1 Introduction

This chapter will take a look at megalomania construction and if it was created by the influences of war and the aftermath.

Megalomania is defined by www.yourdictionary.com (3 October 2010) as "An obsession with grandiose or extravagant things or actions." A present day example of "megalomania construction" is the boom in construction activity in Dubai during the past few years.

The most famous example of planned mega construction is Adolph Hitler and his idea of a "super-city"

During this chapter three cases will be discussed to determine whether "construction megalomania" is caused by war or if other factors come into play.

The cases include, the Palace of Soviets in Russia, the "Volkshalle" in Germany and then the present day Dubai and post-war Singapore mega structures.

4.2 The Palace of the Soviets

Before the outbreak of the war there were several buildings planned in communist Russia and in Germany. These buildings were to be monuments of revolution and the "utopia" that was planned for these two countries.

In Russia the Palace of Soviets was to be constructed an architectural contest (1931-1933) for the building. A total of 272 concepts were collected, including 160 architectural works (136 Soviet, 24 foreign). The contest attracted international architects like Le Corbusier, Joseph Urban, Walter Gropius, Erich Mendelsohn, and Armando Brasini. It was won by Boris Iofan's neoclassical concept, that was later revised by Iofan, Vladimir Schuko and Vladimir Gelfreikh into a skyscraper. (en.academic.ru 3 October 2010)

This building was to be the largest in the world. The specifications for it are as follows.

- Floor area 110 000 m²
- Height 420m (higher than the completed Empire state building in New York)
- The concrete would have used 16% of the annual cement production in Russia.

The building was to be cake shaped, 6 layers standing and with a statue of Lenin, three times the size of the Statue of Liberty (90 m). The statue stretching upwards with a 35m arm and 6m fingers could have been seen 60km away. (Overy: 2004)

Leading up to this palace would have been a 250m wide road running through the centre of Moscow.

Construction started in 1937, and was terminated by the German invasion in 1941. The foundation was completed in 1939. The builders drove a perimeter of 20-meter steel piles, excavated the pit, demolished and hauled out the old cathedral foundations. The new foundation was a concrete slab with concentric vertical rings, intended to carry the main hall columns. By June, 1941, the steel frame for the lower levels was erected. Then the war interfered: the steel frame was cut in 1941 and 1942 and used for Moscow's defence fortifications and railroad bridges. The empty foundation stood unused, filled with seepage water, but well guarded, until 1958.

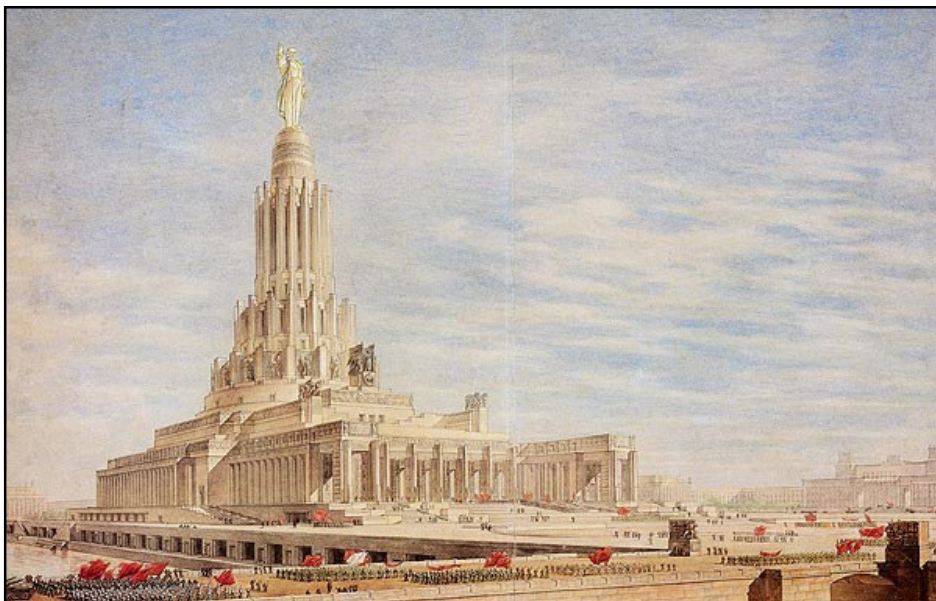


Figure 6 : Palace of Soviets. B. Iofan, V. Gelfreikh, Ya. Belopolsky, V. Pelevin. Sculptor S. Merkulov. Version of the approved project. 1946
(www. Muar.ru: 26 October 2010)

4.3 Volkshalle

The "Volkshalle" (People's Hall) was a huge monumental building planned by Adolf Hitler and the architect Albert Speer.

This huge building was, according to Albert Speer (Speer, *Erinnerungen*), inspired by the Pantheon.

The Volkshalle was a traditional gabled hall that was supported by ten columns, with a shallow rectangular intermediate block and behind it the domed main building (*www.german-architecture.com: 26 October 2010*).

The massive building designed by Speer was to be the capital's most important and impressive building in terms of its size and symbolism. It was to be the showpiece of Berlin as the new central city of the world. (*www.german-architecture.com: 26 October 2010*).

Its dimensions were so large that it would have made every other structure in Berlin look small and insignificant. The oculus of the building's dome was to be 46 metres in

diameter. The dome of the Volkshalle was to rise from a massive granite podium 315 by 315 metres and 74 metres high, to a total inclusive height of 290 metres. The diameter of the dome, 250 metres, was to be exceeded, much to Speer's annoyance, by the diameter of Giesler's new domed railway station at the east end of Munich's east-west axis. It was to be 15 metres greater in diameter than Speer's Volkshalle. (*Overy: 2004*).

The three concentric tiers of seats enclosing a circular arena 140 metres in diameter. Other features of the Volkshalle's interior are clearly inspired by the Pantheon: the coffered dome and the pillared area.

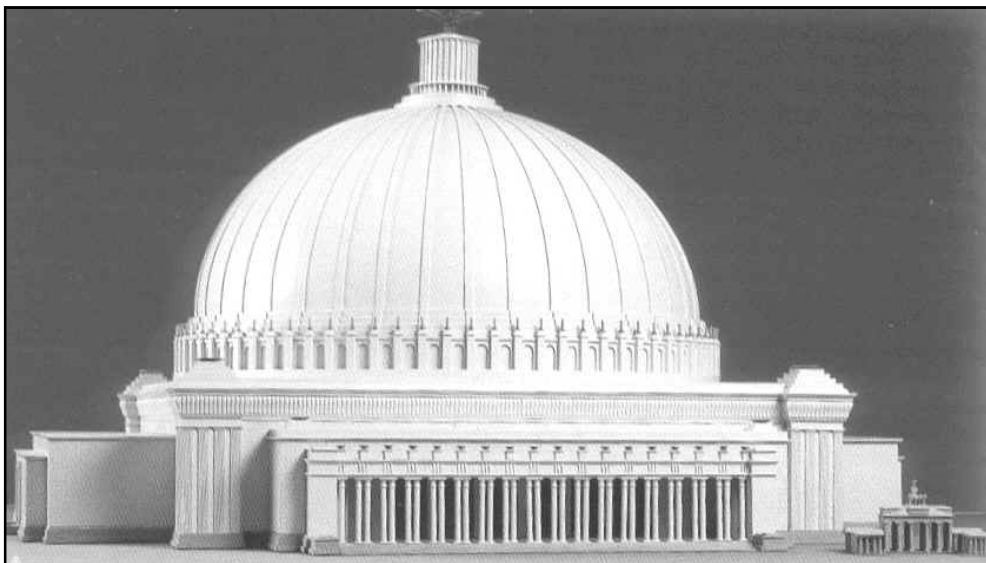


Figure 7: The Volkshalle's Great Dome can be seen at the top of this model of Hitler's plan for Berlin.
(*www.german-architecture.info 3 October 2010*)

The Volkshalle was also delayed by the war and planned to be built after the war by 3 million foreign forced labourers.

4.4 Dubai

Dubai is the most obvious example of modern day megalomaniac construction.

The most impressive building of all is the Burj Dubai a.k.a Burj Khalifa standing 828m tall. The "Burj Khalifa" has been designed to be the trademark or centrepiece of a new development that includes 30,000 homes, nine hotels, 3 hectares of parkland, at least 19 residential towers, the Dubai Mall, and the 12-hectare (30-acre) man-made Burj Khalifa lake.

A crew of +/- 2,000 people began in 2004 building one floor at a time, completing an average of one per week. When interior construction entered its final phase in the fall of 2009, there were +/- 14,000 people working on the project, people from 45 nations, speaking 35 different languages. (*www.spiegelonline.com 3 October 2010*)

Not only is it the tallest building in the world but the Burj Khalifa also holds 13 other world records (*www.Burjdubaiskyscraper.com 3 October 2010*) such as:

- Tallest skyscraper to top of spire: 828 m
- Tallest structure ever built: 828 m

- Tallest extant structure: 828 m
- Tallest freestanding structure: 828 m
- Building with most floors: 160
- World's highest elevator installation, situated inside a rod at the very top of the building
- World's fastest elevators at speed of 64 km/h or 18 m/s.
- Highest vertical concrete pumping (for a building): 606 m
- The first world's tallest structure in history to include residential space
- Highest outdoor observation deck in the world (124th floor) at 442 m
- World's highest mosque (located on the 158th floor)
- World's highest installation of an aluminium and glass façade, at a height of 512 m (1,680 ft)
- World's highest swimming pool (76th floor)
(*www.Burjdubaiskyscraper.com 3 October 2010*)

In comparison to the Volkshalle of Germany before the second world war the volkshalle pales in comparison to this magnificent building as can be seen in figure 8:

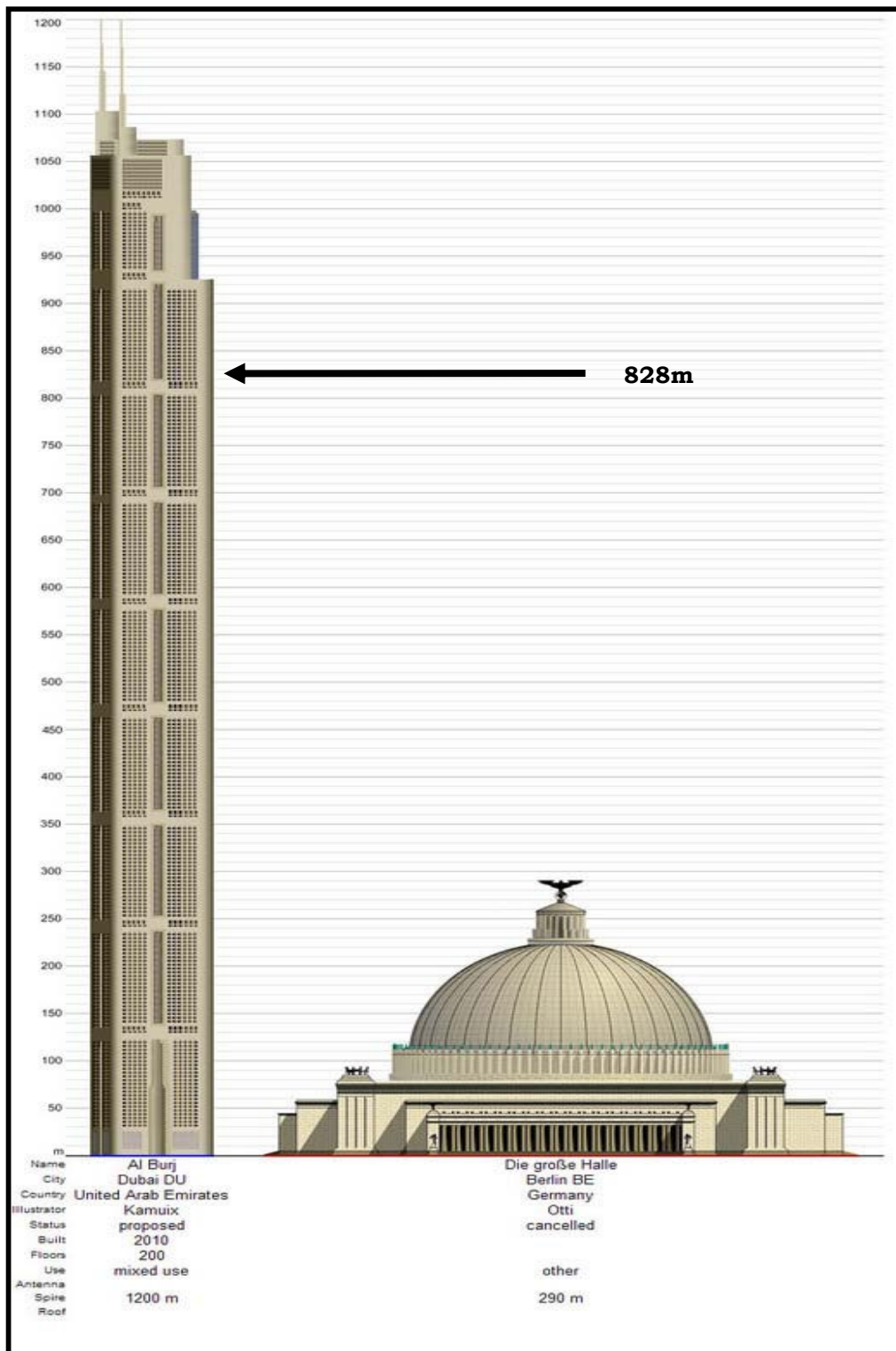


Figure 8: Showing the Volkshalle of Germany compared to the Burj Dubai, off course this drawing was done only on the proposed dimensions of the Burj Dubai.(www.german-architecture.info: 3 October 2010)

4.5 Singapore

After World War 2, Singapore was placed under British rule until the island country reached its independence in 1965. Singapore is the fourth wealthiest country in the world in terms of GDP (PPP) per capita, and the twentieth wealthiest in terms of GDP (nominal) per capita.

Because of the high living standards in Singapore, the country's construction industry boomed, although from 2001 it has been on the decline, but turned around in 2005 for a steady rise. This can be seen in figure 9. Furthermore this country now has the famous Marina Bay Sands Hotel billed as the world's most expensive standalone casino property at \$5.7 billion US, including cost of the prime land. This fact alone makes this building deserve a place in the megalomaniac structures category.

According to Channel News Asia, (January 2010) Las Vegas Sands (the developer) committed to invest S\$3.85 billion in the project at the beginning which didn't include the fixed S\$1.2 billion cost of the 6,000,000 square feet (560,000 m²) site itself.

With the escalating costs of materials, and labour shortages owing to other major infrastructure and property development in the country, Sheldon Adelson placed the total cost of the development at S\$8.0 billion as of July 2009.

Two months after the initial phased opening, the casino attracts around 25,000 visitors daily, about a third being

native Singaporeans and permanent residents who pay a \$100 daily entry levy or \$2,000 for annual unlimited access. Half a million gamblers have passed through the casino in June 2010. (www.marinabaysands.com: 3 October 2010)

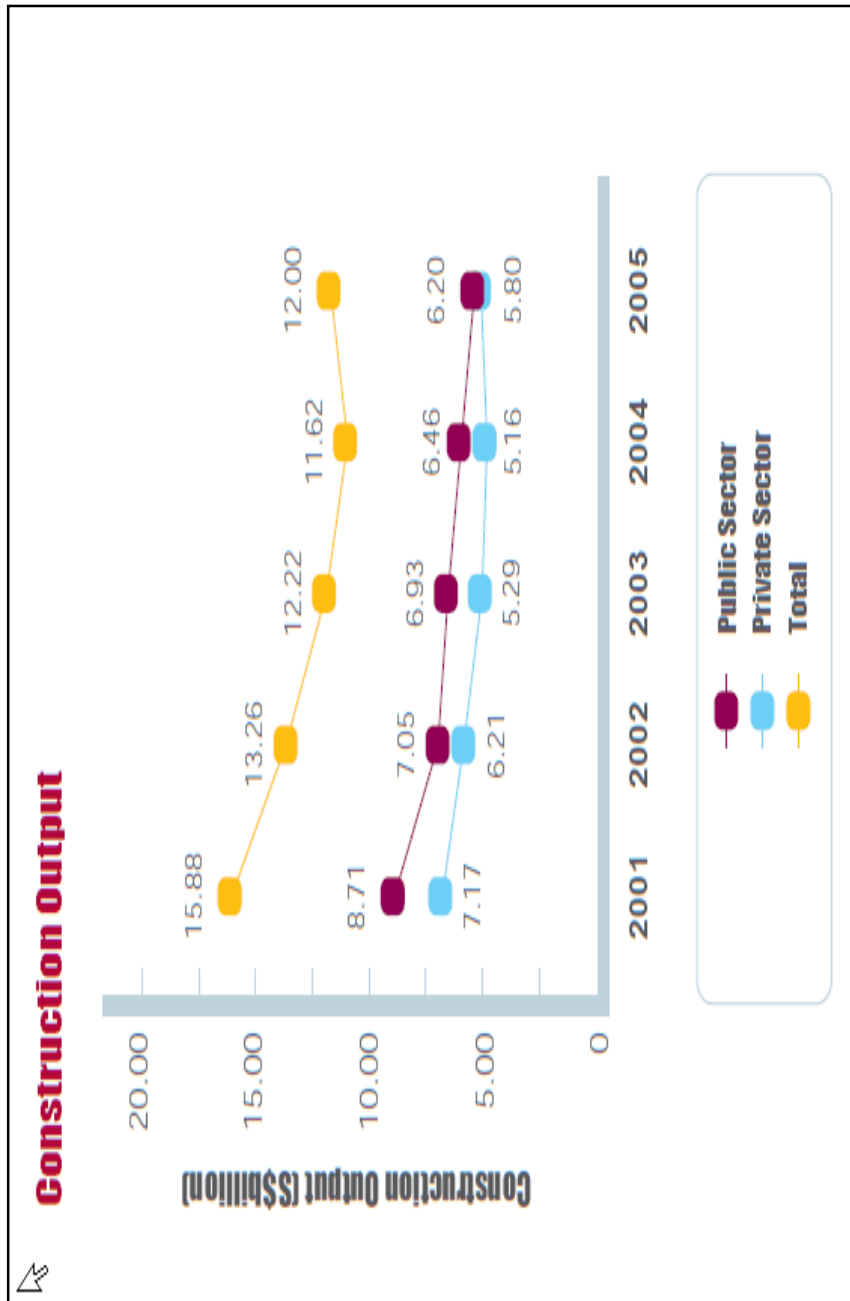


Figure 9: Construction output in Singapore
(www.bca.gov.sg; 3 October 2010)



Figure 10: The Marina Bay Sands Hotel and Casino in Singapore, (www.marinabaysands.com ; 3 October 2010)

4.6 Summary:

The planned construction of the Palace of Soviets and the Volkshalle could have been some of the greatest structures in the world, but because of the pressure of war the buildings had to be cancelled. The later defeats of the Germans and Russia's exit out of the war proved to be the final catalyst in the total stoppage of the construction of these buildings and their further demolition in later years.

Even before and after the Second World War the current megalomaniac structures would have been just fiction to the

public, but the extent of these buildings and the construction behind it is still mind boggling, imagine the type of construction that would be done in 20 years.

4.7 Conclusion:

Although it was planned to have the Palace of Soviets and the Volkshalle built, if the outcome of World War 2 were different maybe the whole landscape of the world would have been very different, but it still cannot be ignored that because of the eruption of war these two buildings were never completed.

The last two buildings were chosen because they were both completed and opened in 2010. These buildings have no history of being influenced or planned during a war.

4.8 Hypothesis:

War can create an increase in construction and in the building of mega structures so much that it can be stated as "construction megalomania"

This hypothesis was proven wrong by the two examples given, the Palace of Soviets and the Volkshalle, these

buildings were only planned and the introduction of war stopped both developments. These buildings were never completed, thus it can be said that war stops massive construction.

The last two examples the Burj Dubai and the Marina Bay Sands also proves this point again, that there was no recent war in these two countries.

CHAPTER 5: WILL THE SOUTH AFRICAN CONSTRUCTION INDUSTRY BE ABLE TO COPE WITH A WAR?

5.1 Introduction

When the question arises whether or not the construction industry in South Africa will be able to cope with war, or how it will be affected, the only way to answer it will be to take a look at the history of the construction industry in South Africa, and to examine how the construction industry of a country that is currently fighting a war is affected.

Firstly the economy of the post World War South Africa will be examined. The profitability of the countries economy will be discussed, and the possible construction that took place during the war.

The construction industry in the United States will be examined; The cost of war to the U.S. and the military bases that are still under construction.

To understand how the construction industry will be affected during a war in South Africa, the previous chapters will be

taken into account. How will the economy react and is megalomania possible in South Africa?

Hopefully this chapter will be able to shed some light on the ultimate cost of war, and if it has a negative or positive effect on the construction industry.

5.2 Impact of the war

When the Great Depression started in 1929, there was a significant political change with Hertzog winning the election, because the country blamed the Labour Party for the terribly negative impact on the economy. In 1933 the United Party (UP) was established which won the general election.

There was a lot of political discourse, with D.F. Malan who declared himself as a "fighter" for the poor white Afrikaner. This appealed to the people, because of the economic crisis.

The outbreak of the second World War in 1939 was a turning point in the world of politics in South Africa, with Smuts who wanted to fight on the British side, Hertzog who wanted to stay neutral and then Malan and his supporters who wanted to fight on Germany's side. This was because of the national socialism policies of Germany that captured the attention of many Afrikaner people who shared this view of the "master race" and using state socialism to benefit them.

On 7 December 1941, the Second World War escalated dramatically when the Japanese launched a surprise attack against the American naval base at Pearl Harbour Hawaii and declared war against the United States of America and the British Empire. The South Africa government acted swiftly and on Tuesday, 9 December 1941, a proclamation was issued, stating that, as from 8 December, South Africa was at war with Japan. (South Africa and the War against Japan 1941-1945, Andre Wessels)

Economically and socially the war affected South Africa overwhelmingly. Gold and white gold which is still our top export today, provided two thirds of South Africa's export earnings. (<http://workmail.com>; 05 Sept 2010) The manufacturing of gold during the war grew immensely to meet the war time demands. Between 1939 and 1945 the percentage of women employed in the manufacturing industry grew up to 60 percent. This led to urbanization, people moving from townships closer to their work, often residing in squatter communities outside of Johannesburg and Cape Town. These settlements contradicted the segregation policy, but was necessary for the war time production of gold.

5.3 Profitability in the post war South Africa

After the war ended South Africa continued to experience a boom in construction, but in the 1980's entered into a economic slump.

According to Natrass the rate of profit fell across every post war economic cycle, except for the 1975 to 1981 period. South African manufacturing net rate profit was in 1948 48% and in 1986 was only 9%. This was because of the decline in profit share between the community. Between 1960 – 1970 the surplus available for distribution rose from 2,2% pa worldwide, but in South Africa it rose to 3,9% and 4,3% pa respectively (Natrass: 1989)

In 1970 the rate of profit in South Africa fell to 8.3%pa, but in the ACC by 9.7%, and between 1973 and 1975 the rate fell only 12.1% pa compared to the ACC's rate of 23.6% pa, this was due to the rise of the gold price which had a cushioning effect on the economy of South Africa. (Natrass: 1989)

Between 1981 and 1986, the South African profitability was distinctly poor compared to the ACC rate. South Africa fell by 9.7% pa whilst the ACC rose by 3.7%. The main reasons for this was due to the disastrous government economic policies, and the turmoil the country faced during the Apartheid regime.

Presently in South Africa the construction sector when compared to the rest of the industries in South Africa always stands out when it comes to contributing to the GDP. In a

survey in 2008 the construction sector contributed roughly 4% of the GDP in South Africa. There were also 470 900 people employed (roughly 6% of the labour force) in the construction sector. (<http://www.statssa.gov.za>; 5 September 2010)

In 2008 the gross domestic fixed investment in the construction sector topped R5 billion. According to [statssa.gov.za](http://www.statssa.gov.za) (5 September 2010) the most sustained period of growth for investment was 1970-1976 (10% pa) but investment in construction has grown by 4.65% pa over the 1990-2008 period. Since 2000 investment in the construction sector has improved by 9.2% annually. But the peak was in 2006, thereafter the amount of building plans approved declined again.

In 2009 an investment programme of R787 billion from 2010 to 2012 has been announced. This means that civil and public construction will be on the incline, although the housing and private might suffer because of the economic recession. (www.info.gov.za; 5 Sept 2010)

5.4 Construction during war

During World War in 1941, when Japan entered into the war it posed a threat to South Africa because of the weakness of the defence of the harbours and coasts. The country's coastal defences had been planned to meet simple hit-and-

run raids by enemy surface vessels and submarines, limited attacks by aircraft, and raids by small parties of enemy soldiers or marines. (South Africa and the War against Japan 1941-1945, Andre Wessels)

The Japanese war machine was formidable. In December 1941, the Japanese army had some 1 400 000 men, and the country possessed a total of about 2 400 aircraft. It was the Japanese navy, however, that posed the greatest threat to the Allies. The navy consisted of some 325 000 personnel with ten battleships, eight aircraft carriers, eighteen heavy cruisers, twenty light cruisers, 108 destroyers, 67 submarines. (I Mantanle, World War II (Godalming, 1989)

By December 1941, a variety of coast artillery guns were installed at Walvis Bay, Saldanha Bay, on Robben Island, at Cape Town, Simon's Town, Port Elizabeth, East London, and Durban, but these were not enough if the Japanese decided to invade South Africa. (South Africa and the War against Japan 1941-1945, Andre Wessels)

The Japanese capture of the British bases in the Far East, especially those at Hong Kong (25 December 1941) and Singapore (15 February 1942), had an immediate effect on South Africa because new bases were needed and this country was the obvious choice. Cape Town was the most sufficient harbour to use as it was able to handle the battleships and huge aircraft carriers. (Pearson, 1992)

During the war there was decided to build a new military base at Salisbury Island in Durban. The construction cost £2

million, included the building of a causeway to link the island to the mainland; raising the level of the island by some 3 metres; the building of wharves, workshops, barracks, a hospital, training and other facilities; and the acquisition of a floating dock and a floating crane. The new base was only completed after the war against Japan had ended. (Pearson, 1992)

South Africa's geographic position protected the country against any attacks during the war and thus the development of the industrial sector was unrestricted. By 1942, the country's war economy was running smoothly. Industrial employment increased by more than 50% during the war. (Basingstoke, 1986)

Although South Africa was protected during the war, there were still problems that arose. Petrol was restricted, this caused a problem in the transport of building materials, rubber, wood, paper and agricultural implements. The heavy demand of the travelling soldiers also did not help the pinch that South Africa was feeling during the war.

In present day the obvious choice will be to take a brief look at the economic giant the United States of America, who is currently trying to withdraw out of their war with Iraq.

Before 2007 there was a planned 14 military bases under construction in Iraq. This was to house up to 110 000 American Soldiers who had a planned stay in the country up to 2007. (www.atimes.com; 6 Sept 2010)

This need to be build bases for the massive amounts of soldiers fighting in war proves the point that the construction industry is still needed and very active during a war.

5.5 Cost of war

The best case study to examine is the cost of war in Iraq for the United States of America, according to www.nowpublic.com (6 September 2010) there were many things that went wrong in Iraq, but the most expensive mistake was that of the reconstruction of some of the infrastructure.

The following structures were built, but is not in use:

- \$40 million prison in the desert north of Baghdad
- \$165 million children's hospital
- A \$100 million waste water treatment system in Fallujah

It is estimated that more than \$5 billion in American taxpayer funds has been wasted (more than 10% of the some \$50 billion the U.S. has spent on reconstruction in Iraq)

5.6 Summary

The information gathered in the previously mentioned topics will be used to make an assumption of how the construction world in South Africa was affected during that time.

Impact of the war: If South Africa has to experience a war in the near future, then if the research is to be applied; during World War 2 manufacturing increased, this will lead to a high demand in labourers, which will lead to an increase in urbanization. This will result in a higher level of housing demand and off course means that the construction industry will benefit from this.

Profitability in the post war South Africa: The economy as previously stated will receive a sudden rise, because of the reconstructing of infrastructure and the increase in manufacturing and high increase in job availability. The problem will however arise when the economy will stagnate as in 1980. This will result in a stand still in the construction industry.

Construction during war: Military bases (like the one in Salisbury Island Durban and the 14 that had to be built in Iraq for the U.S.A.) are costly and will benefit the construction industry during war. New bases, hospitals, schools etc. would have to be built.

Cost of war: one of the most expensive expenditures of war is construction, in other words rebuilding what was destroyed during the war. The first target of a country during war is usually to attack the infrastructure to weaken the country this way. Unfortunately for the country but fortunately for the construction industry the buildings will need to be rebuilt. In South Africa this industry would only benefit from this.

5.7 Conclusion

While war is a destructive and expensive endeavour it benefits the construction industry. There are some problems such as building material scarcity etc. but the end result is that the construction industry always survives during a war and even prospers after it.

5.8 Hypothesis

South African construction industry will be able to cope with a war.

The South African construction industry will be able to cope with a war, and can even benefit from the after effects, just like the economy always benefits from a war, the

construction industry will follow in it's footsteps. The Hypothesis is therefore correct.

CHAPTER 6: SUMMARY AND CONCLUSION

6.1 Summary

6.1.1 Introduction

The main purpose of this research paper was to gather enough information to be able to understand if it is possible for war to have an effect on the construction industry.

The four sub problems were:

- 1) Does war have an effect on the construction industry?
- 2) How did war influence the construction industry?
- 3) Can war create construction megalomania?
- 4) Would the construction industry in South Africa be able to cope with war?

By using these problems as guidelines it was determined that war affects the construction industry in more ways than one. It can stop production cycles, war can cause a boom in construction, and war can influence new ideas by globalization.

Here will follow a short summary of what the focus for research was within each sub problem.

6.1.2 Does war have an effect on the construction industry?

This chapter focused on the financing of a war and the economy during a war as well as the different aspects of war which creates globalization and new technological advances.

When history is examined it always shows that after a war the victorious parties influenced the economy, the culture, the language, trade markets and even changed the future of that country. This effect is also known as globalization. Kofi Annan a Ghanaian diplomat, seventh secretary-general of the United Nations and the 2001 Nobel Peace Prize winner said the following: *"We must ensure that the global market is embedded in broadly shared values and practices that reflect global social needs, and that the entire world's people share the benefits of globalization."*

In this chapter it is found that ultimately during war the construction industry suffers, but only for the period of war. There will still be some construction taking place during, because of the necessity for military bases and infrastructure that was destroyed. It cannot be said then that construction comes to a complete standstill during war as proved in the chapter 5, which will be discussed later.

Furthermore after war there is the promise of new developments, huge infrastructure upgrades and housing projects for the victims of war, and the returning soldiers. This will lead to construction industry boom.

6.1.3 How did war influence the construction industry?

Only the major influences were discussed in this chapter. These topics were the development of social housing and the post war buildings and their construction. The post war buildings are important to discuss because of their major influences in the world that we know today as well as the construction methods that were used.

After World War 1 the need for social housing grew immensely because of the returning soldiers and lack of any lower income housing for them. The architects Taut, Gropius and Le Corbusier were the major influences when it came to the design of a more functional type of residence. All the pointless decorative features were stripped and the buildings became practical, cheaper and could be constructed more rapidly than before.

Present day social housing was also examined to establish if the same principles are still used after the development of the enhanced social housing between World War 1 and 2.

The conclusion was that the fundamental principles remained the same (even though it was developed almost half a century back) and the only difference in design could be found in the number of floors used in present day developments, as it can be seen at the Pinnacle @ Duxton.

Post war buildings were considered to be depressing reminders of the after effects and poverty that is found in every country after a war. There was however a post war building listing to help understand the architectural knowledge gained from these buildings as well as to protect them from demolition.

The most famous post war structure is off course the Berlin wall that was constructed after World War 2. This was to divide the east and west Berlin to ensure that World War 3 would not break out.

6.1.4 Can war create construction megalomania?

Megalomania is the obsession with grand and extravagant things. To build mega structures today isn't out of practicality but more of a competition of sorts for each country to reserve its right at the forefront of construction and to show off its status as a rich prosperous place.

According to the research it proved that war did not create construction megalomania, but nipped it in the bud. The reason for the cancellation of these projects being the start of a war.

During the dictatorship of Hitler in Germany and Stalin in Russia, these men planned super structures and buildings to show their grandiose and extravagant nature. They wanted to prove that their country's worth by transforming the skyline with landmarks, (the Volkshalle and the Palace of Soviets) that will forever be associated with their rule. However by the time the Second World War erupted the buildings were stopped and were never finished, had they been it would have surely proven the fact that war can create megalomaniac construction.

Now during the present day the two cities that immediately stand out when mega structures are mentioned is Singapore and Dubai. The massive skyscrapers are also just egotistical point to be proven that these cities are prosperous and way on the forefront when compared to the rest of the world in construction.

6.1.5 Would the construction industry in South Africa be able to cope with war?

Researching this question demanded that a lot of assumptions should be made. The research mostly focused

on historical data on how South Africa's construction industry survived through World War 1 and 2.

During World War 2 South Africa had a unique and advantageous geographical position. This was a benefited the country with defending its shorelines and being able to manufacture supplies to the rest of the world.

However the problem was that South Africa had a poorly defensive shoreline and the only way to improve this was by building new bases and upgrading the harbours. The construction industry therefore was still active during war.

6.2 Conclusion

The main theme of this research paper was to examine whether war can influence the global construction industry.

To prove this point there needed to be looked at four sub problems. These problems all supported the fact that war definitely influenced the construction industry worldwide not only in some countries.

Firstly the economy of a country before, during and after a war was examined. The economy is the role player when it comes to the construction industry, it is usually one of the

sectors to suffer first and carry the effects long after the economy has started to restore to health.

In Chapter 2, it was proven that even though the economy effect the construction industry, a war can serve as an injection into the economy. This is because of the destructive aftermath of war that creates a need for the construction industry to rebuild and restore the infrastructure of the country. This ensures that all the previous rules of bad economy equals poor construction industry are disabled and the industry thus helps nurse the economy back to health.

In Chapter 3 the influences of war on construction and the advances in it were researched. It can be seen that social housing would not have been the same if war didn't create the need for it to be re-examined in the 20th century.

War is always about expanding the boundaries of a country, wanting to take what is not theirs. This can even be called an egotistical thing, and that is where megalomania comes in. The most visible way to prove your worth and importance is by building a structure to outshine all other structures. This is what was planned during the dictatorships of Germany and Russia. War did create this need for a country to show it's independence by building magnificent structures, like in Dubai and Singapore.

Finally by studying the past influences of war on the construction industry in South Africa it can be said that if

there were to be another war involving South Africa, the defensive structures would have to be upgraded again and this means the construction industry would possibly not stagnate during such a time.

The only conclusion therefore is that war influenced the construction industry in more ways than one, ensuring that the industry that is known today came into existence and is continually growing.

Thus the main problem of : "Can war influence the global construction industry?" is solved, war did influence the global construction industry.

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