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Introduction *Identification of a valid topic, research question and objectives framed to Masters Level standard with academic rationale developed, clear industry contextualisation of the research topic*	**Supervisor Comments:** **2nd marker Comments:**	**10%**	
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Supervisor's Name: DR. PAOLO TATTICCHI   **Signature:**

2nd Marker's Name: **Signature**

"Sustainability: A New element of Project Success"

A dissertation submitted in partial fulfilment of the requirements of the Royal Docks Business School, University of East London for the degree of MSC PROJECT MANAGEMENT

[MAY 2013]

WORDS [15,259]

I declare that no material contained in the thesis has been used in any other submission for an academic award

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"Sustainability: A New Element of Project Success"

Abstract

There are plenty of reasons for a project to fail. While all projects strive to succeed, many of them are either over budget or unable to deliver their objectives and sometimes coming to a premature closure at the end. That is the reason almost 90 % of all projects either becomes restarts or fail. On the other hand, project success is not impossible and there are essential criteria to accomplish that. For example, carefully planned scope, top management support and skilful staff will increase the possibility of creating a successful project. However, success is fluid and a subjective term, perceived differently from business, user and supplier points of view. All will have their say on the successful project based on their own needs.

In order to create successful projects sustainability becomes paramount for project management. The researcher proposes that project management has a lot to learn from sustainability. Especially, Velodrome Park and Wind Turbine projects represent great examples of success and failure, respectively.

Despite the pessimist argument that sustainability is vague, unsustainable and ambiguous, this researcher believes that it is a great way to sustain and maintain this unique planet. That is the legacy behind it, which will be taken over by next generations. If this positive attitude taken into consideration, it will be clearer why sustainability able to create a better project environment.

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Chapter 1:

1.1 Introduction

Great Britain had a fantastic opportunity to host a major sport event known as the London 2012 Olympic Games (L12OGs). In many ways, London and other cities of Great Britain benefited from the Games. For instance, the regeneration of East London, encouraging healthy living style, displaying an immense care for environment and one living planet principle were the main themes of L12OGs. These important events were not easy to prepare and deliver it. After winning the bid, headed by ex-Olympic hero Sebastian Coe, on the 6th of July in 2005, the London Organisation Committee of the Olympic Games (LOCOG) knew they had a long way to go in terms of delivering promises that were made for the L12OGs.

From that point of view, L12OGs focused on how to create sustainable games and set out many objectives and targets in order to accomplish and deliver the projects. They had to manage hundreds of projects, choose the right contractor, build new venues, restore and improve the urban infrastructures. In this process, the LOCOG was established in order to implement the games and also the Olympic Delivery Authority (ODA) was in charge of improving the infrastructures and construction projects. The projects, Velodrome Park and Wind Turbine, had a set of targets in delivering the sustainability ambition; were delivered but also some failed.

Velodrome Park, designed by Hopkins Architects **(See** B.2 Project Team**)**, with 6,000 seating capacity, an entirely permanent building from the outset, with the greatest sustainability features, contractor, ISG (Interior Services Group) and Project Manager, Geoff Grant, Velodrome Park's project aim was to host the Olympians and Paralympians` demand. Carefully planned details and

precautions were applied to create warmer environment for riders on the track with the right temperature. On the other hand, Velodrome Park cost was £20 million in 2004 and was to be completed by 2012. Ultimately, the cost was £105 million for the project. The project was completed in January 2011, (ahead of the original June 2012 schedule). It was the first venue to be completed at the Olympic Park site.

Velodrome Park received many awards, including from Building Research Establishment Environmental Assessment Method (BREEAM) praising, "excellent"; it is the greenest venue in the Olympic Park, delivered all sustainability promises or exceeded, it is one of the most efficient buildings in the history of the games.

There was another challenging venue, the Wind Turbine. During the bid process it was promised that 20% of the energy demand of the Olympic Park would be delivered from renewable energy resources. However, some part of this promise could not be delivered. Hence, failure was inevitable. A 120-metre wind turbine was proposed for Eton Manor, to the north of the park site. The project anticipated supplying energy to 1,200 homes over a year. At the end, there were many problems related to health and safety regulations and contractors also did not want to take the risk. After two years, there were complications between ODA and suppliers and the project was cancelled.

Understanding the details of these two projects helped to develop the research. The reason these two projects were chosen: firstly Velodrome Park was a great triumph in accordance with sustainability. Why this is important to talk about is because we can surely learn a lot from it in order to create a successful project. It also represents a prime example of sustainable building. Secondly, Wind Turbine project failed and the ODA could not deliver its promise and 20% of renewable energy demand. Consequently, understanding these two projects, whether success or fail, will provide a tremendous help in order to shed some light on project management literature and not to repeat the same mistakes

over and over. That is how the researcher came up with the idea of looking at one successful and one failed project. Here the question emerged, "Should sustainability be added to the criteria measuring the Velodrome Park and Wind turbine projects success or failure?"

The question appeared when considering whether success was possible or not in relation to implementing the projects. As literature indicated, 90% of projects fail. Hence, it was fundamental to understand the reason why. Managers do know and are aware of the criteria of successful projects. Yet, despite managers knowing the factors for failure and success and despite knowing the key success indicators (KSIs) and performance objectives, projects still fail. Why do projects fail then?

Performance objectives were another aspect of looking at successful projects. The researcher believed that there was a strong link between performance objectives and success and failure factors which helped to form the research. The target was to deliver the games on time and within budget constraints. The games delivered on time, but exceeded the budget almost fivefold. The same critique is applicable to both Velodrome Park and Wind Turbine.

While investigating the literature review, the research went into another direction: the stakeholders' perspective and essentials of sustainability. Here, three projects interests (Business, User and Supplier), mainly refer to as stakeholders, and from their points of view, success and failure were analysed and sustainability was proposed to be a new element for performance objectives.

In conclusion, the researcher proposed that success and failure are fluid and generic. But, by looking at successful key elements and failure factors, we can understand and create better environments for project management in order to deliver successful projects. Velodrome Park and Wind Turbine is ready to tell us about their experience and that will help us to increase making of successful

projects. Because a successful project needs a clear communication, top management support, warm work environment and experienced or expertise staff. On the other hand, lack of management and communication with stakeholders is a contributor to project failure.

In summary, sustainability point of view will help us to understand why Velodrome Park is the greenest venue and how they managed to accomplish it. There is an argument expressed which states that sustainability was vague and conventional wisdom wanted to manipulate or redirect society; therefore, it has not got anything to offer us. Is sustainability able to offer a new aspect to create a better project environment? Or, is it ambiguous and unclear and thereby, has nothing to do with project management? At the end of the research we were able to answer those questions and understand whether the asserted arguments are valid or not.

The first chapter gave us an overview of the research and the second chapter provides a literature review. The following chapter is based on methodology, data analysis and the final chapter discusses the conclusion and recommendations for the future projects

Chapter 2: Literature Review

In this chapter, a brief history was conducted of success and failure criteria in accordance with project management literature. Then, information on three project interests (business, user, and supplier) and their points of view was explained. The idea was to show that every interest has its own perspective according to their respective needs.

Finally, the crucial link to sustainability was described at the end. Sustainability has a motto and is an anti-thesis against exploiting environment. It also proposes solution and promise for a better planet for next generation. Supporting a conscious healthy life and makes human being to think why not to care about it. This idea of consciousness here makes a crucial link to project management and combine with performance objectives for a better project environment.

2.1 A Brief History of Success and Failure

2.1.1 Reasons for Project Success

Early evaluation of the factors of success and failure has been defined and carried out in many different ways and by many researchers. For instance, by investigating project managers' influence on projects, Rubin and Seeling were one of the first researchers to introduce success and failure factors in 1967. They used technical performance to measure success and agreed that project manager's previous experience has very little impact on a project's performance (Belassi and Tukel, 1996). Soon after, in 1969, Avots came up with project

success and failure criteria. He concluded that the wrong choice of project manager, unplanned project closure, lack of management support and inadequate personnel were the reasons that projects fail (Avots, 1969). On the other hand, in 1983 Baker, Murphy and Fisher recommended not to use performance objectives (Table-1) to measure success, but emphasized perceived performance (Belassi and Tukel, 1996). There was also a dispute of critical success factors (CSFs) as Leidecker and Brunu (1984) used critical success factors for strategic planning and business strategy.

Table-1 Performance Objectives

```
          ┌──────┐
       ┌─▶│ Time │─┐
       │  └──────┘ ▼
   ┌──────┐    ┌─────────┐
   │ Cost │    │ Quality │
   └──────┘    └─────────┘
       ▲            │
   ┌──────┐         ▼
   │ Risk │    ┌─────────┐
   └──────┘    │  Scope  │
       ▲       └─────────┘
       │            │
       │ ┌─────────┐ ▼
       └─│ Benefit │◀┘
         └─────────┘
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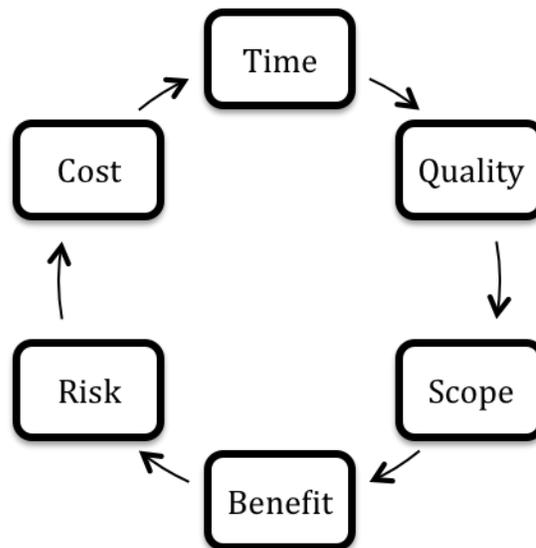
(Adapted from OGC, 2009)

Investigating CSFs in their research, Pinto and Slevin found that management support, planning and customer participation were the key factors to success (Zwikael, 2006). They categorized the factors as "strategic" and "tactical". The strategic group consisted of project mission, top management support and

project scheduling, whereas the tactical group included client consultation, personnel selection and training (Belassi and Tukel, 1996).

When analysing critical success factors, Cooper and Kleinschmidt (1997a), mostly focused on product development and strategy of the projects. They believed improving the strategy the product would get better results. Following, Lester (1998) discovered that new products' development, organisational structure and risk management were key elements to succeed. There were many reports and reviews about success factors. For instance, Oilsen recommended cost, time and quality almost 50 years ago as success criteria. Moreover, many others such as Wateridge, Turner, Pinto and Slevin and Mccoy, all agree upon: cost, time and quality should be used as success criteria, but not exclusively. On the contrary, Atkinson professed that it is time to accept other success criteria in addition to "The Iron Triangle" and define a new framework (Table-2). In conclusion, Atkinson adds the information system, benefit to organisation and stakeholders to the Iron Triangle and called it "The Square Route" (Table-15) (Atkinson, 1999).

Table-2 the Iron Triangle
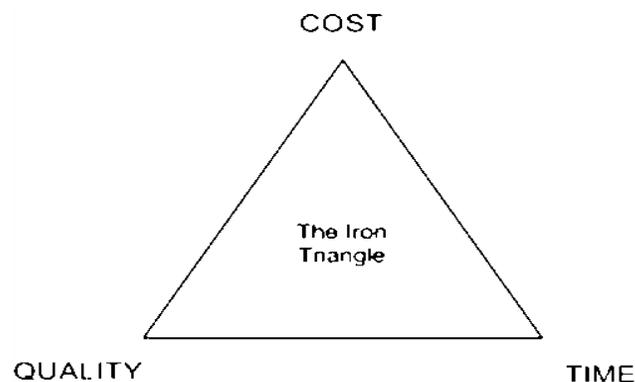
(Adapted from Atkinson, 2010)

According to the APM (2006), there are many techniques to create successful projects and most of them are generic. An instance of this, key success indicators and define user requirements, performance objectives, current

software technology, success elements (Table-3) and programmes. All of these techniques and investigations aimed to find how to make successful projects. For instance, anyone investigating the success would look at it in different perspective and based on his or her perception of success. Belassi is a good example for that matter. Belsassi made distinction between success criteria and critical success factors, and believed that there were things in control of project managers (PM) and out of control of PMs. On the other hand, Morris and Hough focused on human, politic and social factors of critical success criteria. They created a framework (Table-16) for critical success factors for projects, which took external factors influencing project success into account (Westerveld, 2003).

Table-3 Project success elements
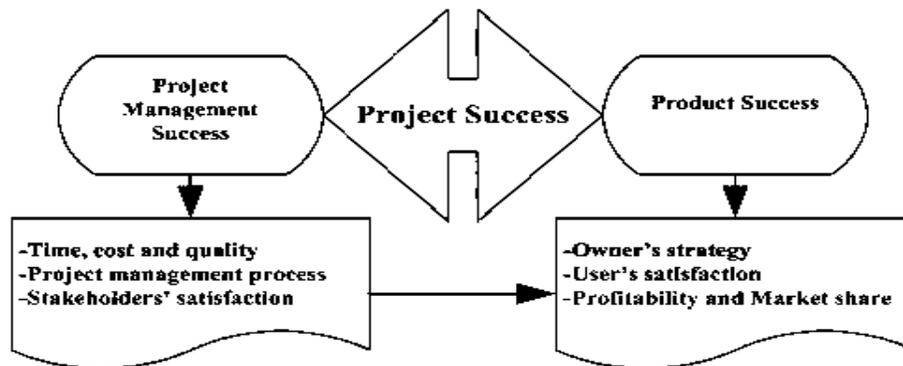
(Adapted from Harun, 2011, et al.)

From project managers' point of view, success is defined at the verge of the project with stakeholders. The criteria must be defined (Table-3), specific and clear, but it can be modified according to the project life cycle by requesting a change. By doing so, for example, key performance indicators (KPIs) will help to understand the nature of success in this situation; such as, accomplishing deliverables, quality in expertise and skills, on time and budget are great examples (APM, 2006).

According to Turner (1993) successful projects are on time and within budget, it provides a satisfactory benefit to the owner, achieves its objectives and targets, does value the project team and concern the needs of the users/customers and stakeholders (Toor and Ogunlana, 2010). Wateridge (1998) also concluded that the project meets its defined objectives, quality thresholds and profitable for the owner. On the other hand Kerzner (1992) proposed two different definitions; "Immature" in which the project is on time, within budget according to specifications and "Mature" minimum of agreed scope changes without changing the corporate culture. Lim and Mohammed defined success criteria based on Micro and Macro success. Micro success is (short term) on time and within budget and Macro success [(long term)] focus on business concept (Westerveld, 2003).

Table-4 Product breakdown structure for project success
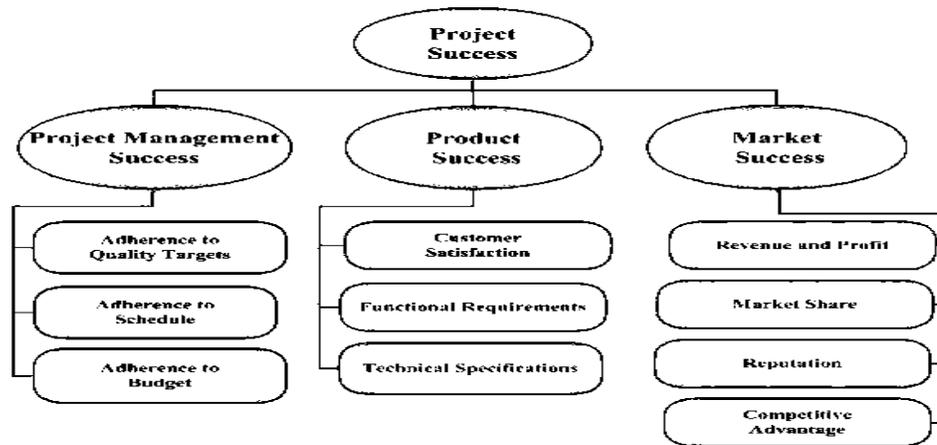
(Adapted from Harun, 2011, et al.)

Implementing IT projects, "The Standish Group" found that management support, customer involvement and project planning have a good influence for software projects (Zwikael, 2006, et al). Schwalbe (2001) defines success or failure criteria based on cost, time and scope goals if requirements are met. Another success factor is to satisfy the customer and the sponsor. You may have delivered everything on time and budget but users are not satisfied. That

would be hard to justify the success. The final success factor is the result of the project met its main objective. Saving money, return on investments or simply satisfy the sponsor's expectation.

The triangle (cost, time and quality) itself might not be enough to recognize the project success. Moreover, there are some other important things such as stakeholder satisfaction is also essential. Those stakeholders, either internal or external, have a strong link and interest in the project. If benefit and project success perceived together the potential success rate would provide a huge benefit to the stakeholders. Because project interest is the main point that brings all those organisations and communities together. When success criteria are measured, planned and prepared, at the outset of any project, it will ensure whether the project achieved its success criteria[1]; therefore, clearly defined objectives, deliverables and benefits, all of them need to, precisely and carefully, be defined in advance. Because there are many projects that failed to deliver its objectives but are considered successful, whereas a project finished on time and budget can be defined a mistake or failure. However, the legacy and benefit may not be visible at the beginning (APM, 2006).

All these criteria should be understood carefully as a guide or process and principles that help managers to find their ways. The project needs control, planning and delivering the objectives. The existence of those criteria will never guarantee to deliver a successful project; nevertheless, their absence will cause failure. Consequently, embellishing the project is paramount. Clear specifications, motivation and support form top management, comprehensible goals and objectives and carefully planned methodology will be very utilitarian (APM, 2006).

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[1] Terminology in this area is fluid and generic. Success criteria can be called many things in different environments including key result areas (KRAs) or critical success factors (CSFs).

2.1.2 Reasons Project Fail

It is quite ironic that, although many project managers are aware of why projects fail, knowing the success and failure factors and using project management method, project failure is still possible. For instance, Field mentioned that, mostly, the reason a project failed was by not taking the project scope into consideration. Leicht refers to high user expectation. In another article, Baker concludes that project failure is in a state of flux and O'Brochta says that project success is not precise. Based on Lewis findings, approximately 70% of all IT projects fail to deliver their objective that is why many projects fail (Frese, 2003).

When looking at post-industrialized societies deciding whether a project is successful or not is far more complex than it used to be. Maybe that is why almost 90% of project fails. Many studies have shown that most projects do not deliver time and budget objectives or fail to fulfil customers' or companies' anticipations. However, project success means more than just meeting time and budget targets. It requires additional success factors such as business results or future expectations. Some researchers point out that managerial process is the cause that a project fails (Sauser, 2009, et al). Whereas others believe that high cost, schedule overruns, poor quality or failure to meet project objectives and inexperienced project managers are the reasons that project fail (Avots, 1969).

Table-5 Classes of project fail

(Adapted from Harun, 2011, et al.)

According to "chaos report" (2001) one of the major problems of a project is that project's restarts. For every 100 projects that start, there are 94 restarts. Moreover, some projects have more than one restart; great examples of that would be the "Channel Tunnel" and the "Millennium Dome". It took nearly 200 years to build the Channel Tunnel. Another important fact by the Standish Group report presented that there was little change in making projects successful. For example, there were only 34% of IT projects delivered on time and within budget. On the other hand, 44% of IT projects were challenging. That meant they were either late, exceeded the budget or could not apply performance objectives. Furthermore, 24% of projects are failed, called off or never used. Jim Crear, Standish Group CIO, notes this is the highest failure rate in over a decade [1990-2000]. The waste on failed projects and cost over-run is estimated in the neighbourhood of over $150 (£97b) billion (Larson and Gray, 2011).

As Meredith (2012) explained, some common symptoms of a failing project are ill-defined initial requirements, constant changes in scope, excessive changes in resources and personnel, and extreme stress/tension over anticipated changes.

Harding (2012) believes that project failure – even partial failure - can be prevented. Poorly designed project scope is the reason that one project encounters problems and fails. The scope is the first thing that needs to be established in a project and every project needs a clearly defined scope definition in its details. Such as, what is going to be delivered? Consequently, scope should be defined comprehensibly. However, a change of scope during the project is more harmful than good. It is also detrimental to the project nature because every single change has a different effect on the project. Another fatal error in projects is setting the budget. It is not easy to estimate how much money it will be spent on a project. The cost becomes unpredictable and increases the budget when adding extra requirements to the scope. The only way to minimise the cost is to decrease scope; that must be well thought through the project and also well documented in the project is paramount. Harding points out many reasons that projects fail; poorly planned schedule, new or ill-defined technology, poorly selected manager and inadequate project support and risk management, lack of stakeholder consideration are the reasons that project cannot deliver its promises (Harding, 2012).

The Standish group also provided a list of failed project factors: incomplete requirements, lack of user involvement, resources and planning (Table-6). The list goes on and on, for instance, unrealistic expectations, lack of executive support and changing requirements and specifications are some of those factors that fail projects (Frese, 2003).

Table-6 Reasons for project fail

Major Causes Of Project Failure

Cause	Percentage
Bad communications between relevant parties	57%
Lack of planning of scheduling, resources and activities	39%
No quality control	35%
Milestones not being met	34%
Inadequate co-ordination of resources	29%
Costs getting out of hand	26%
Mismanagement of progress	20%
Overall poor management	17%
Supplier skills overstretched	13%
Supplier under-resourced	12%
Insufficient measurable outputs	11%
Supplier people not consistent	4%

(Adapted from Bull Survey, 1998)

On the other hand, Block (1983) believed that project failures stem from political problems. Over the years Block's experience identified categories of project failures and some of them are: goals, user contact, people management and methodology, planning, control and inability to communicate with users will cause to failure. When a project is poorly planned and controlled, the members of the system-building group are not sure what they are supposed to do. Work assignments often overlap, deliverables are ill defined and everyone feels vaguely messy.

2.2 From Stakeholders Points of View "Success" or "Failure"

Considering success and failure factors in mega projects one may argue that success and failure related projects are very subjective and cannot be generalized over the other projects. That is the reason every project has its own unique perspective and structure. However, is that in fact true? To understand whether it may be true or not, providing some information on "Business, User or Supplier's" points of views will be useful. For instance, the sponsor may view success as the project having achieved the stated benefits as defined in the business case at the outset. From the project manager's perspective, success may mean meeting agreed scope, time, cost and quality objectives as defined in the project management plan. Therefore, a stakeholder's point of view will always differentiate from one another (APM, 2006).

Every project requires potent direction, management, control and communication. Creating sufficient project management team infrastructure and systematic plan for communication at the beginning of the project and supporting these throughout project's life cycle are crucial elements in order to create a successful project. The PRINCE2 principle of defined roles and responsibilities states that a PRINCE2 project will always have three primary categories of stakeholder and the interest of all three (business, user and supplier) must be satisfied if the project is to be successful (Table-7). "For completeness of the project PRINCE2 recommends that the business, user and supplier interests need to be prioritised all the time" (OCG, 2009, pp. 31-32).

Table-7 Three Project interests
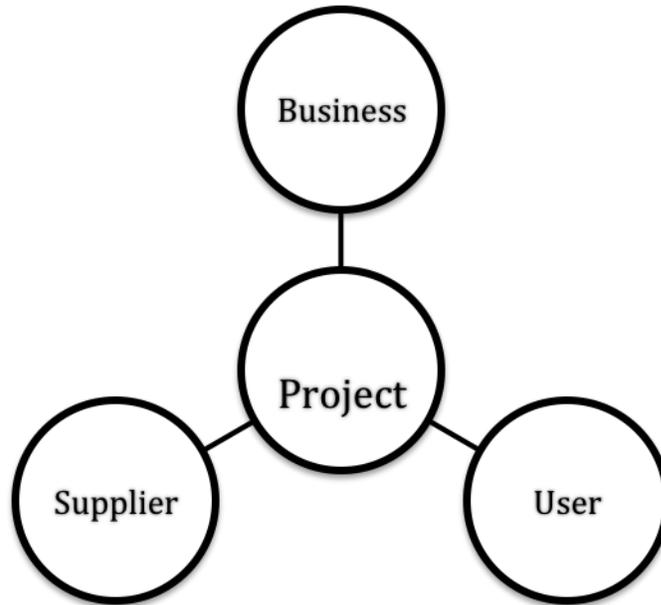
 (Adapted from OGC, 2009)

2.2.1 Business Interest

If a project is to be accomplished, it should meet business needs that will justify the investment in the future. Because, if it cannot be justified that means it will not be value for money and it will not represent any profit. The business standpoint must emphasize these two important prerequisites before a project commences. That is the only way a project can survive throughout the course of the project. Here, the Executive is compelled to ensure the business interests (OCG, 2009).

Business perspective values the impact of the profit and loss (also competition, profit expenses, sales and costs). Everyone in the project team or in the organisation should understand the business perspective. For example, how this project will be value for money and everyone will benefit from it. So, it is important to ensure the why and the how a project exists, from a business standpoint. Thus, the business perspective has a very significant role in any project and at any organisation (Berkun, 2008). In most organisations, management holds a strong link to control the project in order to generate profit, or manage the authorization and development of the project and also to decide whether project is valuable, viable or worthwhile for the sake of the business. That is the reason executives are in charge of the important decisions. For an example of that, how much money should we put out for the project X? What executives do, is that they always want cost-efficiency and minimal disruption to the rest of the functional organisation (Pinto, 2009).

As Berkun (2008) indicated, there are a few good business perspectives and questions that need to be investigated. For example, why is this project needed for our business? What unmet needs or desires do our customers have? On what basis will customers purchase this product or service and what will it cost? There is another important thing that Berkun (2008) points out; business standpoint or perspective isn't all about making profits, it is also improving business strategy. That strategy may be very important to a project but does not generate any profit. Hence, a business interest should fairly represent a holistic interest when making a project not only to support the sponsor but also the users and other external stakeholders.

In the press it appeared the business point of view that the mega project L12OGs (London 2012 Olympic Games) were "on time and within budget. The venues show off the best of British designed by best, built by best and used by the best. They were also built with sustainability in mind and this is a terrific success for UK PLC. It is triumph for the more than 46,000 workers who built

the Olympic Park. The UK has proved that it can compete with the best, win, deliver and do what it promised" (GOCN, 2012).

2.2.2. Customers Interest

Customers are the ones who will be able to try, benefit and use the product (OCG, 2005). It is the most important and critic perspective of a project interest. The reason is that when a project is made for customers' interest, it is vital to understand who those customers are and what changes or improvements will be valuable in order to satisfy their interest in the project. Without doing this, a project will not be considered successful (Berkun, 2008).

PRINCE2 methodology draws a strong line between the business interest and the needs of those who will benefit from project's output. Individuals or groups should represent the user's points of view. They are the ones who will realise the benefit after the project completed. They operate, maintain and support the output of the project because that output has connection to them. The customer's presence needs to be specified and elaborated in the project. It is the main point that it delivers those desired outputs and ensured by Senior User (OCG, 2009).

Most likely, the business case will be planned and defined by the business entity and approved by a project board and, at the end of the day, this process claims that they have completed everything. Is that, in fact, realistic? Where is user involvement then?

If a project is to be successful, the project team "must have" or "should have" a great link or a close partnership with project sponsors. Lacking in user participation or lack of user support in the project can lead the project team to the wrong direction and cause extreme scope creep (changes that cannot be easily handled or controlled). Hence, continuous partnership and

communication should be maintained throughout the project (Richardson, 2010). It has to be maintained because in many organisations customer perspective is quite weak. It is not well detailed, organised and, mostly, does not get enough support, budget or enough staff to deal with it. Poor requirements become fixed by contracts, and time pressures lead to compromised techniques; "take the money and run". The customer often receives a poor product that barely meets contractual acceptance criteria and it is difficult to change it (Block, 1983). Moreover, less staff will be trained to understand customers' interests and improve or help them with their needs. To understand that, there are two important customer points of view, which become paramount: request and research. Request revolves around customers' needs, questions or complaints. This part is quite important to understand customers' problems, because customers are able to identify and are ready to share with organisations in order to improve the product. As a result, the information or complain provided by users is quite valuable. Research helps project teams to understand customer interest. Important questions arise when analysing customers: what do they need or want to do but are not able to do? How to make things easier? What core ideas and concepts should the project use to express information to users? (Berkun, 2008, p.53).

In the planning phase, there were very important goals; for example, to realise a good understanding of the users and highlighting objectives and the important of requirements. These were absolutely necessary targets for both project managers and customers. If users are not clear and specific about their interests or what they wanted to be accomplished and delivered, as a project manager, the journey of planning a project seems to be quite blurry and laborious. Then the question is whether to proceed with the project or not. It is always important not to be manipulated by this view: "Leave the whys and wherefores to me, and just concentrate on delivering what I want." Therefore, checking key requirements will support and help to create a healthy project for users. At the end of the day, when project handover completed, it is the customer

expectation and anticipation of the project that has to be analysed and measured against its objectives. That is why it is important to check requirements and pin them down. In conclusion, if users aren't available to present what they want, the project is still doable; nevertheless, many do but some succeed Barker, 2007, et al).

2.2.3. Supplier Interest

Supplier is a contractor, consultant or any organisation that supplies resources to the project (APM, 2006). They provide resources, goods and services to the projects. Sub-contractors are also very important; they are the one who provide products or service to the suppliers (OCG, 2005).

Supplier most of the time provides raw materials or other resources that a project needs. When projects require a significant supply of external purchased components, the project manager needs to take every step possible to ensure steady deliverables. "Firstly, the project manager has to ensure that each supplier receives the input information to implement the project in a timely way. Secondly, managers must monitor the deliverables so they are met according to the plan. In the ideal case the supply chain becomes a well-greased machine that, automatically, both draws the input information from the project team and delivers the products without excessive involvement of the project manager. For example, in large-scale construction projects, project teams daily must face and satisfy enormous number of supplier demands" (Pinto, 2009, p.59). "Suppliers will provide the project product and that interest of project is critical because the project should need both in-house and external supplier team to construct project product. Then the Senior Supplier gets involved and represents stakeholder interests in the project" (OCG, 2009, p.32).

On the project board, three projects interests (business, user and supplier) have to be evaluated due to their effect on the entire project and importance of

internal and external stakeholders. An effective communication with business, user, supplier and stakeholders is an important sign of a successful project.

2.3 An Overview of Sustainability

In this section the idea was to look at whether sustainability could be part of success criteria in project management. If that is the case, then it can be concluded that project management will not fail to address sustainability. Then, it is also essential to ponder what is the link between success criteria and sustainability? Can sustainability add a new understanding or approach to project management?

"Sustainability" is a term coined in Brundtland report of the World Commission on Environment Development (WCED). "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Girginov, 2010, p.431). Operating the planet without exploiting, destroying and damaging resources. Therefore, sustainable development moves towards economic, environmental and social protection, but these dimensions should not be detrimental to environment (Silvius, 2012, et al). Meaning, to use available resources efficiently, do not deplete Earth's resources, sustain and maintain the planet so that next generations will be able to benefit from it. It is also the environmental concept that makes sustainability special. Hence, "sustainability is about the balance or harmony between economic, social and environmental sustainability" (Schipper, 2013).

The social and economic dimensions became essential since the Games bid won and slightly changed the attitude against sustainability. As a result, sustainability was placed in the heart of the Olympic park projects and the London Legacy Development Corporation (LLDC) created in April 2012: by securing high-quality sustainable development and investment, ensuring the long-term success of the facilities, assets within its direct control and

supporting and promoting the aim of convergence, emphasize on local communities (including all nationalities, all-inclusive, all ages, all religions. Thus, benefit to local and international business (LLDC, 2012).

The core of sustainability indicates a motion of economic prosperity, protecting environment and equity. The main concern of sustainability is that of protecting the Earth and its resources. In the business world that means "people, planet, and profit" (3Ps). The idea behind the 3Ps is that companies need to understand and think about people when making decisions. The primary objective for most companies is to produce profit and stakeholder value and that is well emphasized in business strategies and policies. There are financial advantages for business to have a sustainable policy. It can help to reduce the cost and be cost effective and eco-efficiency project (Silvius, 2012 et al). In today's world, the capitalist mentality way of producing products or materials, mostly taken from Earth's resources in an unsustainable way. "Take-Make-Waste" business model is no longer sustainable (Schipper, (2013).

The International Olympic Committee (IOC) formed the concept of legacy and sustainability that became an important motto for the London 2012 Olympic Games (L12OGs) which made the host city implement and undertake social, economic and environmental measures. Climate change, healthy living style, regeneration of East London, Biodiversity and Inclusion, encouraging people to think and support the idea of sustaining life and planet were the themes of the L12OGs. From tip to toe sustainability was at the heart of the L12OGs. This was the most ambitious project in the history of the Olympic Games in regard with its scope, level of change and this mega project had to deal with sustainability legacy in constructing and creating Olympic sports venues (Silvius, 2012 et al).

On its website, International Olympic Committee (IOC) emphasize on their organisation mission:

- A legacy that is left for next generations

- Supporting and promoting peace
- Encouraging people to have a better sustainable life, in sport and Olympics, awareness of environmental problems (IOC, no date)

In his speech, Jacques Rogge said, "The final Olympic games of my 12-year term as president of the International Olympic Committee (IOC) were received with great fanfare this summer in London. London 2012 was clearly an across-the-board success and the London organizers had a great deal to pass on to their successors. London managed to do exactly that in preparing for and delivering the Games of the XXX Olympiad" (Rogge, 2012). Moreover, sustainability was well received by ODA and other stakeholders. Although some projects failed, most tried to deliver their promises.

For many years, Olympic Games were criticised as being unsustainable, whereas, for L12OGs, sustainability was an ambitious goal. From that point of view, sustainability was linked to project management system. Sustainable Development Strategy was carefully put into clear processes by writing them into contracts, measuring, monitoring and rewarding them. As a result, they were able to put the team in to sustainability in order to train them with the knowledge of project management and project managers in good sustainability (Knight, 2013).

Now, let us have a look and see what the other opinions about sustainability are and whether everyone agrees that sustainability helps or not.

McNeil believes that the idea of "sustainable development" sought to widen and justify, instead of step-up-to-the-plate and challenging the established wisdom. Likewise, Simon Dresner argued that the idea of sustainability has emerged from pessimism and human beings being unable to cope with challenges of an uncertain future. Consequently, sustainability cannot be seen as a new concept or notion and, they believe, it is a new way to redirect.

Another opinion claimed that sustainability was seen as an oxymoron and as Tomi Kallio, Piia Nordgerg and Ari Ahonen explained that it was obvious that sustainable development was powerful and a vital notion; however, because of its ambiguity, sustainable development has no influence and impact to change. Olympic Games also have a sustainable legacy that is also a vague idea. "As it tries to satisfy the games' insatiable drive for faster, higher and stronger (growth) while delivering equality, solidarity and accountability across all sports and groups around the world" (Girginov, 2010, pp.430, 431).

Another strong argument, according to Eid, believed that project management has not achieved to address sustainability agenda (Eid, 2009). Silvius (2012) also said projects and sustainable development are probably not "natural friends".

From the Commission of Sustainability of London's point of view all the venues and the Olympic village were successfully constructed to the highest sustainability standards with unprecedented levels of energy and water efficiency, well-designed and constructed using sustainable materials.

Table-8 the concepts of sustainable development and projects

Sustainable Dev.	Project Man.
In the interest of this and future generations.	Interest of Sponsor/Stakeholders
Life cycle oriented	Deliverables and result oriented
People, Planet, Profit	Scope, Time, Budget
Increasing complexity	Reduced complexity
(Adaptod: Silvius, 2012)	

Sustainability has vital concepts in terms of the attention given to the environment. It also has legacy for next generations. Its focus is not only on stakeholders' interest as project management. Thus, sustainability is able to help project management. It is not only environment, but also people, that we need to look after. Sustainability addresses the 3Ps motto, "People, Planet and Profit," so it does not predominantly refer to interests like project management, because projects are based on deliverables, time, cost and quality (Table-8). In this context, human element and environmental concerns are lost in the projects.

Table-9 Sustainability and project interests
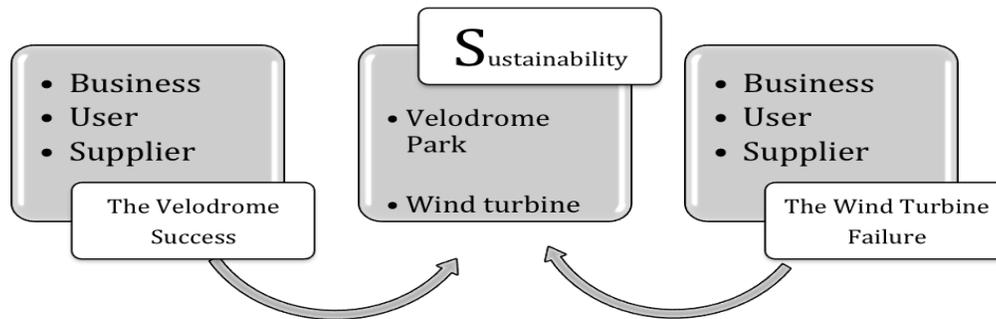
As some believe that sustainability and projects are not natural friends, that sustainability is ambiguous or there is hidden agenda behind it. While this is arguable, I believe a positive attitude towards creating environmentally friendly projects will have a massive impact on sustainability related projects (Table-18 the lifecycle of sustainability projects). Therefore, sustainability and project management have to understand that there is a strong link between them and that link is that sustainability does stand out and is able to create a better project environment. For example, more carefully designed materials and reducing carbon emissions are all great goals for projects to take into consideration. Consequently, there is a legacy and that legacy offers or promise to create better living conditions for the next generation. So, why refuse to miss that opportunity?

Chapter 3: Research Methodology

This chapter focused on the methodology used during the investigation. The most important thing at the beginning was to ensure the methodology was clear and specific. The research has mainly followed project management literature and other necessary resources.

Firstly, a short summary of the literature review was provided to remind of the research's overview for the readers and followed by research objectives and aims. Here, the main question was how could we learn from different perspectives of successful or failed projects? Should sustainability be considered a new element? Secondly, after explaining how the research question emerged, followed by hypothesis, the researcher made a link to the theoretical part and the importance of interpretivist methodology and qualitative data. Furthermore, a brief reference to the sociological modernization theory was mentioned. Finally, sampling and limits of the research were described in order to understand why the two projects were selected and what the limits of the research were.

3.1 Evidence from Literature

The project management literature mainly focuses on delivering the project. The project should be on time and within budget, which refers to performance objectives: time, cost and quality, risk, scope and benefit. It is quite common to see that researchers are analysing from that point of view in order to define project success and failure. However, there is also something else to be taken into consideration: sustainability. Sustainability point of view has a great influence on projects. Both Velodrome Park and Wind Turbine were motivated to deliver renewable energy demand objectives. Despite ambiguity about sustainability, many believe that Velodrome Park is the greenest venue in the

Games, while others believed that sustainability would never create a sustainable project environment.

3.1.2 Research Objectives

The fundamental objectives derived from success and failure factors and from whose point of view those factors could be seen as success or failure in tandem with sustainability perspective. Therefore, those objectives are:

- To investigate why a project fails and what are those reasons;
- To prove that every project has its own perspective, every project's perspective is variable, open-ended and subjective;
- Performance objectives, themselves, may not be enough to understand the success or failure; therefore, sustainability points of view need to be considered; because nowhere in performance objectives the consideration of environment or using environmentally friendly materials is mentioned.
- To learn, from whose point of view, were the Olympics projects, such as Velodrome Park and Wind Turbine, deemed a success or failure;
- Improve my knowledge of project management literature and learn business, user and supplier connections;
- To indicate that success and failure cannot be generalized for every project, but are only an example;
- Sustainability is another measurable objective, or criteria, that need to be taken into consideration when conducting or evaluating a project.
- To indicate that Sustainability has a lot to offer for project management.
- To propose that sustainability should be a new element to measure projects.

3.1.3 Aim of the Research

The purpose of this research was to indicate and present two important cases; one successful (Velodrome Park) and the other one failed (Wind Turbine). Why do that? It was fundamental to realize there are successful projects; many lessons can be drawn from them at L12OGs. Velodrome Park is therefore a prime example of successful projects. Because many failed other projects, will be able to learn from Velodrome Park's success. The Wind Turbine project, also, is an important, but a failed example (That failed fact does not undermine the importance of the project). In any case, lessons to be learned are abundant and can help to prevent future mistakes. By investigating, the researcher aimed to indicate that success is possible and failure can be prevented, sustainability is a great concept to contribute to environmentally friendly and successful projects.

3.1.4 Research Questions

Another important point was the research question. The research question was derived from literature review, while investigating and reading academic journals. The projects that took place at London 2012 Olympic Games were great examples. For example, Velodrome Park has great sustainability features and that may shed some light on project management in terms of making more sustainable and environmentally supportive projects and here the question emerged in order to learn from them. These questions are:

- From whose point of view are the Velodrome Park and Wind Turbine projects considered a 'success' or 'failure?'

- How did sustainability contribute to Velodrome Park and Wind Turbine Projects' success or failure?

- Should sustainability be added to the criteria measuring the Velodrome Park and Wind turbine projects success or failure?

There were other sub-questions related to the research. What are the success factors? Why do projects fail? Why emphasize on sustainability?

3.1.5 Research Hypothesis:

- H1: There is not only one criterion to success, there are many criteria that can lead to create successful project.

- H2: Every project has its own perspective. Therefore, criteria cannot be generalized. It only can serve as a typical or a classic example for other projects.

- H3: Managing success is not all about time, cost and benefit. There are other components that promote the success, such as sustainability, which can serve as other criteria for performance objectives or as a new element.

- H4: Success will be perceived differently from business, user and costumer perspectives.

- H5: Sustainability offers a great environment for project management and should not be seen as neutral or ambiguous.

3.1.6 Theoretical Aspect and Qualitative Data

In this research, interpretivist theoretical perspective, qualitative data collection techniques and secondary data were used. The researcher found that it was the best interest to use interpretivist paradigm and sociological modernization theory, because the perspective-seeking methods tend to be more interpretivists and modernization theory is able to spot the current problems of the modern society. For example, using phenomenological perspective to generate inductive approach for qualitative data is the most commonly used method when the research focuses on the text and documents. The inductive approach is vital for qualitative data because the data can be extensive and put into a brief summary, plus, can be linked to research objectives so that the link becomes transparent and justifiable. It also has a tendency to work out the meaning of the collected raw data (Thomas, 2003). When looking at the cause and effect relation, qualitative data becomes paramount because that is how a researcher explores and finds their information. The communication between the researcher and the subject influences the research, but, in the end, it is the objectivity that makes the research coalesce.

Theoretical perspective is a fundamental guide for researchers to enlighten and strengthen the baseline of their research. The world is interpreted through the classification schemas of the mind. In terms of epistemology, interpretivism is closely linked to constructionism and it asserts that natural and social reality is different and therefore requires different types of methods. While natural sciences are looking for consistencies in the data in order to deduce "laws" (nomothetic), the social sciences often deal with the actions of the individual (ideographic) (Gray, 2006). In this approach, meanings are created (Scwandt, 1998). Those meanings, or interpretations, avoid researchers' perception or interpretation, only identify and define what is apparent in the data, only by this way phenomenologists remain objective. Whereas, positivists only remain

objective based on facts not values or philosophical speculation. In the research the phenomenological research becomes more visible than the others. The perspective simply does not need or use the structured data analysis because it emphasizes on large amounts of data and possibly suggests bold and descriptive statements; however, its importance comes from little cases of secondary data. Therefore, cases or projects here become vital to make general statements on the other projects (Gray, 2006). That what exactly defines the research aims. For instance, when investigating what to exemplify or show as great success, the thought of generalizing Velodrome Park's success in order to enhance other failed projects became essential, but only a representative or classic example, because one project's success criteria may not be applicable for the others or for all other projects.

Also to consider in the research methodology, whose point of view is being considered? This is important especially when looking at **success** and failure factors from business, user and supplier points of view. The link between the theory and the research was that the interpretivist theory believes that all the devoted and planned interests are subjective. The theory also points out that every single interest differs in its own perspective and understanding of phenomenon. The world cannot be perceived from just one aspect or perspective at all. Therefore, success and failure would be defined differently and perceived variably in this research. While the supplier would believe success was to deliver the product, the business perspective would focus on the profit and so does the user on quality. Hence, it is the researcher's understanding and perception that developed the research based on the theory.

There is another important aspect of theoretical perspective in this research that created a fundamental link to it and that was sustainability. How did sustainability theory form in this research and what was the importance of it? While it is a concern to mention sustainability theory, it also needs to be kept in mind that sustainability has a strong link to the projects of the Velodrome Park

and Wind Turbine. That is why the researcher referred to the sustainability. The link is that sustainability has an influence, effect or impact on successful projects and, thereby, can be part of performance objectives or can be a way of measuring such performance objectives. By doing so, project management literature gains another important aspect of making a successful project. How does that form or occur?

The main tenet of the sustainability is that the social world has a concern for the environment. The theories of sustainability try to integrate social responses to environmental and cultural problems. On a global scale, sustainability focuses on the ecological dependency of economic and social systems, environmental degradation caused by human activities. Thus, the questions arise, by intellectuals, "can human activity successfully maintain itself and its goals without exhausting the resources on which it depends?" Economic health, ecological integrity, social justice and responsibility to the future must be integrated to address multiple global problems within a coherent, durable, and moral social vision (Jenkins, no date). There is one significant link to modernization theory as well. It asked that what is impeding advance and what are the conditions and mechanisms social transition from traditional to modern? Here traditional societies are seen limited (Parson's theory) and modern societies perceived expansive and able to overcome wide range of environments and problems. The more structural specialization in the society the more a society could absorb change and develop the qualitative characteristics of the modern life such as rationality, efficiency (Peet, 1999). The reason I provided that part is that, it has an offer to the modern society in order to develop and make it more efficient.

3.1.7 Collecting the Data

So how did this research form? How was data collected and analysed? At the beginning of investigation the data collected was based on documents, journals, articles, newspaper, and websites provided by ODA. There were other documents, mostly provided by contractors, such as expedition, ISG for Velodrome Park. That is how the research was formed, basically looking at the Olympic Games in London and understanding those two important projects and provides information whether they can give us a new way of making successful projects, so that any lessons can be learned from.

The most important thing when conducting the research was to find out journals that were mostly available online: using UEL's library databases to find resources, journals, newspapers from EBSCOHOST or ABI and analysing e-journals. Therefore, resources were: textbooks, academic journals and e-journals, articles, newspapers and videos. Also, ODA, LOCOG and Olympic Park Legacy Research websites that provided company micro reports, business plans, projects, project product information. Most importantly case studies were a great help to develop this research.

The Wind Turbine project information was limited. The only crucial documentation or material was John Armitt's visual conversations, which were found on YOUTUBE, the others were on Internet and in newspapers. Those materials, journals and documents, were analysed by using content analysis. For example, videos of John Armitt were watched repeatedly to interpret the context and gather the data.

The researcher realised using two projects and answer how a project could strive to be successful was beneficial for the research. Thus, firstly, literature review revolved around history of success and failure factors. So that it would clear to understand why a project failed and learn, what those success, failure

criteria and factors were. Secondly, I have benefited from PRINCE2 projects interest idea. Project interests consist of three main stakeholders in the project: business, user and supplier. Every interest has its own perspective. Researcher believed that all these three perspective would look at projects differently based on their needs. Thirdly, by looking at the greenest project at Olympic Games projects researcher have also made a link to sustainability. Because it is the sustainability link made Velodrome Park a very successful project. Same importance is applicable to Wind Turbine.

Adding meaning to the text was the only way that I could derive assumptions as to whether the project was a success or failure. For example, if a project exceeded its promises in terms of project objectives, delivered on time and within budget, then the project could be deemed a success; if not, it would be deemed a failure. To decide and identify whether a project is a failure, I had to look at the same objectives that project success had. That is how the researcher benefited from the data.

3.1.8 Reliability, Trustworthiness, Validity

There was plenty of information about the Olympic Games in London. Most of the information was written by academics; taken into consideration carefully to see whether the information was valid, reliable and trustworthy. There were also newspapers and ODA's online resources.

The John Armitt videos of Wind Turbine were the backbone of this research: these are being available on YouTube. The character presented in those videos was a real person (John Armitt). If he were not in the videos, the materials would not have been used in this research. Also, another important consideration was referencing, by citing them correctly and providing a link in the references made the information easily available for other researches.

3.1.9 Sampling

There were many successful projects in the London Olympic Park. Many of them may contribute a great value to the project management literature. In this research, however, it was opted to only review successful and failed projects. It was not possible to look at all the Olympic venues, so only two of them were considered: the Velodrome Park and the Wind Turbine projects. By looking at Velodrome Park, a very successful project, the researcher applied that project to the other project as a comparison. Based on the overall satisfaction or dissatisfaction of Velodrome Park, there was much strong evidence for comparison when looking at the awards given to Velodrome Park, delivery of the project (on time) and the press, provided important information in order to analysis the projects.

3.1.10 Limits of the Research

The research turned out to be descriptive, explanatory and contextual words. The plan was to interview people who were involved in making the Velodrome Park and Wind Turbine, sending emails to Expedition, ISG and other contractors. However, no company was able to offer an interview and answers questions (See,B.11 Interview Questions) only ODA's team replied to the emails about the inquiry. There was also a lack of information and resources because the projects were too new and not many articles have yet been written on them. Unfortunately, finding every single participant, individual or user of the venues was not possible due to time constrains.

Chapter 4: Data Analysis

In this chapter the collected secondary data, Velodrome Park and Wind Turbine, were presented, key findings and patterns defined under the discussion section. Based on two real projects it is important to remember the question "Should sustainability be added to the criteria measuring the Velodrome Park and Wind turbine projects success or failure? From whose point of view was Velodrome Park and Wind turbine projects considered a success or failure?"

Additionally, focusing on comparison of performance objectives the researcher aimed to compare both projects; Velodrome Park was on time but, exceeded the budget. There is also sustainability point of view. Sustainability can contribute great value to project management, in this section researcher explicates why project management needs sustainability as a component and other important views whether sustainability is ambiguous concept or not.

4.1 Velodrome Park Project

The world-class venue Velodrome Park is an engineering rigour of high design that encapsulates beauty, value, function and sustainability. A devoted, integrated design and construction team was a key element to success (Expedition, 2011). The elegant, unique and beautifully architected curves goes back a long way from Stonehenge to Celtic Stone Circles, The Velodrome **(See, B.1 Building a Velodrome Park)** has probably become the most important project of the Olympic Park. It is one the most efficient buildings in the history of the games (Grogan, 2012). The Velodrome will be operated after the Olympic Games finished and it won't only be in use of high-profile cyclists but also for local communities to encourage sport legacy (Douglas, 2010).

4.1.1. Project Technical Overview

4.1.1.2 The Design

 The main point for designing Velodrome Park was that to create an efficient team in all aspects. A can-do team attitude was the key to success. Making sure fully approach to design by the team to the venue's design, structure and its environment was a great motivation that project achieved **(See,** B.4 Project Technical Overview**).** The making of the building was not derived from a fanciful motion but from the considered process of connecting together all the necessary accommodation around the cycle track (Expedition, 2012).

4.1.1.3 The Track

There are many reasons why track is fast: "symmetrical circuit with two straight and two turns, in order to maintain speed on the turns they are banked and the relationship between lengths of straight/length of turn has many variations." If it's a straight line riders go faster; however, they also have to change direction and by doing this they also have to reduce in speed and that may require extra effort (Douglas, 2010).

4.1.1.4 The Roof

The roof of Velodrome Park with a double curvature, the shape often resembles "Giant Pringle". The cable net is double-curving which makes it very light structure and lighter than the one in Beijing (Douglas, 2010). The impact saved both money and time -£250m vs. £95m- and 3,000 steel at the same time (ODA, 2011).

4.2 A Sustainable Velodrome Park

The legacy of Velodrome Park was specified at the outset of the project and was not limited to the brief Games; and that put more emphasis on the long-term use of Velodrome Park. That is why Velodrome Park was designed to deliver its own legacy settings. There was a motto in the bid, to be the "greenest ever" and this was the trigger-point to the creation of Velodrome Park. The ODA realised that the venues fundamentally could contribute towards this motto: reducing carbon footprint, right environmental and carbon emissions targets. The delivery team had a burning ambition to deliver sustainable design. With the idea of the racing bike in mind, putting the right material in the right places and removing unnecessary "fat" (Expedition, 2012).

4.2.1 Environmental Concerns

The ODA was also interested in environmental conditions inside the Velodrome Park, such as thinning the air or setting the right temperature. That is what they believed to sustain track temperatures to allow riders higher speed. They also wanted to control and minimise the draughts and create natural ventilation at the seating level so that spectators won't be affected by hot temperature (Douglas, 2010).

In relation to quality, Velodrome Park is an environmentally friendly building rated "Excellent" by BREEAM and predicted CO_2 emissions reduction 32% forecast, reduction in potable water consumption 75%, recycled content 28.6%, sustainable transport 78% (Hartman, 2012).

Scope, The Olympic Delivery Authority (ODA) set a number of sustainability and material objectives (Table-19 ODA's Sustainability Objectives); through careful

consideration and integration of the architecture, structure and building services the design has met or exceeded these requirements:

- The ODA set a target for 20% of all materials to have recycled content. Velodrome Park project succeeds at 28%.
- The ODA target for key materials responsibly sourced was 80% the project achieved 98%.
- The ODA set a target of 50% of materials to be transported by either train or water. The project achieved 78% (by weight) of all materials transported by rail (ISG, 2011).

4.3 How did a successful project as Velodrome Park form?

At the beginning of the bid Ed Mccan and Chris Wise did decide not to enter to the competition. However, the idea of building a Velodrome Park in London the city where Olympic games took place, become seductive and that's how we decided to submit with Mike Taylor of Hopkins Architects, with whom we had an excellent background in the past and Klaus Bode, environmental designers BDSP with whom we had worked previously, was in charge of sustainability and environment (B.6 How did a Successful Project as Velodrome Park Form?) Here the key point was to have and enable a powerful team and more importantly they were all friends (Expedition, 2012).

The fundamental points and key elements, in order to succeed, were clearly planned objectives, extreme details, communication with stakeholders and an integrated team from the beginning and a good project team synergy were key elements of the project. Every single team member was able to work hard and volunteer to go beyond the limits and complexity of the project (See B.10 Project Strategy and Workforce Engagement of the Velodrome Park). Early

involvement of a committed contractor and a longer than usual gestation period meant that most detail design issues and specification choices could be largely resolved before the project went on site (Hartman, 2012).

4.4 The Wind Turbine Project

In this section information were presented on Wind Turbine project. Brief information on the assurance committee was explained. Followed by cancelation of the project and CSL's attitude against the cancelation created dis/agreement between ODA and CSL.

4.4.1 Project Assurance CSL (Commission for Sustainable London)

The Commission for a Sustainable London (CSL) 2012 is an independent body, which monitors and assures the sustainability of the London 2012 Olympic and Paralympics Games. The Commission was set up in January 2007 to fulfill this promise. It is the first time such a commission has ever been established[2] (CSL, 2012).

Shaun McCarthy, the head of CSL, said: "For us, a commitment is a commitment and we expect LOCOG to deliver the agreed 20% carbon savings. LOCOG have told us in theory how they will deliver these savings and we believe that this can be done. As an assurance body we need to see the evidence of how this can be achieved…" (CSL, 2011).

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[2] For other key stakeholders see Appendix, B.9 The Key Stakeholders and Table-17 ODA stakeholder map

4.4.2 The Cancellation of Wind Turbine

The commission reports directly to the Olympic Board and publicly via its website, on the sustainability plans, objectives and progress of the organisations responsible for building and delivering the L12OGs. The ODA has informed the CSL that the Wind Turbine project was no longer viable due to project constraints and it was unlikely that a supplier would take over the project to deliver. Consequently, the project was cancelled. CSL agreed and supported the decision taken by the ODA to cancel the project, on the other hand CSL professed that the ODA still has to deliver agreed commitments on carbon emissions: "Across the site as a whole, sufficient on-site renewable energy generation capacity shall be installed to meet at least 20% of the annual carbon emissions of the venues and other buildings to be retained within the Site in the Legacy phase, Planning Conditions, LTD1.3," (CSL, 2010). However, renewable energy promise was disqualified. LOCOG said they would deliver 20% of electricity during the Games from new local renewable sources, but have delivered very little. A Wind Turbine was scrapped and not enough work was done to find renewable bio fuels for running the site or to invest in solar (Gray, 2012). Later on Shaun McCarthy Head of CSL justified ODA's decision **(See,** B.5 Shaun McCarthy`s Article on Cancelling the Wind Turbine Project**).** "The problem with wind turbines is that they don't go round when it is not windy and if you put one in a place that is not very windy it will not generate the amount of electricity you need. You will only know this after you have collected extensive wind data over a number of years. This was the dilemma facing the ODA and they have made a good decision based on the information they have. The decision cannot be delayed any longer because equipment needs to be ordered and construction needs to start very soon" (CSL, 2010).

The ODA originally intended that a significant proportion of the target would come from a large wind turbine situated to the north of the Olympic Park. Plans for this were dropped after it emerged that new health and safety legislation

would impact on the preferred turbine and that it was not likely to be possible to resolve all the issues to allow for construction before the Games. The Commission supported this decision on the condition that we still expect the ODA to meet its overall 50% carbon reduction target The ODA will now deliver 9% renewable energy in legacy, coming from a combination of biomass boilers in the energy centre, solar photovoltaic panels on the Media Centre and Media Centre Car Park and a small contribution from micro wind turbines. This contributes to an overall projected carbon reduction of 43%, against a target of 50% reduction. To make up the shortfall the ODA are investing in energy efficiency schemes in boroughs surrounding the Park through the Mayor's RE:NEW and RE:FIT schemes (CSL, no date).

4.4.3 The Project's Objectives Failed

In the ODA's sustainable development objective it was presumed new renewable energy infrastructure will be provided for the Olympic park, providing 20% of the energy demand in the immediate post-games period in 2012 from renewable sources. A 120-metre wind turbine was proposed for Eton Manor to the north of the park site. The project anticipated supplying energy 1,200 homes over a year. Subject to planning permission, construction is due to start in spring of 2008, with the turbine being fully operational by 2012. The turbine will continue to provide power for an expected 20 years (ODA, 2011).

At the verge of the bidding process there was 20% of renewable energy target from renewable energy sources on the site; however, that target was not delivered. The first plan for L12OGs was to have a large scale 2-Mw wind turbine was cancelled in 2010 due to health and safety regulations. The ODA was unable to deliver 20% energy target (Jackson, 2012).

The park's legacy energy needs from renewable sources from 2012 onwards. Chief Executive of the ODA, David Higgins announced that the project is "no longer feasible "the wind turbine became unfeasible after new safety legislation forced substantial design changes under a "challenging" delivery timetable. After the preferred bidder's turbine supplier had pulled out – citing inability to comply with the new regulations in time for the opening of the games – there had been little commercial interest elsewhere (Hill, 2010).

As John Armit said, "We set out for ourselves a challenge in the beginning of creating renewable energy for 20% of the demand. That turned out to be quite a challenge and we failed pretty well by 50%. The reason we failed was that we put out the money essentially on a large 100 m diameter wind turbine. When it came to it, basically, commercial operators didn't really want to do it. After two years, toing and froing, it was clear they didn't want to do it. We were also running planning constraints" (CIOB, 2012).

4.5 Discussion of the Findings

At the verge of the research there was a question "Why does a project fail?" Although information about how to success projects abundant, why do 90% of projects still fail? In the old days, a prime example of a project would be the pyramids, lasting to present day; or the Millennium Dome (also known The O2); or the Channel Tunnel. Although some projects fail, projects, or are seen as a white elephant at the beginning. In modern days, despite modern tools, software and advanced technology, we still see failing projects. That was the reason why successful key elements presented to prove project success possible.

In this section, success criteria, reasons projects fail, whose point of view and sustainability were findings discussed based on the information provided. Adding value and profit, creating a better project environment based on the key elements and an accomplished fit for purpose project will always win, whereas, ambiguity, inability and lack of communication will cause a failure in project.

4.5.1 Key Elements of Project Success and Failure Factors

4.5.2 Successful Key Elements

Velodrome Park is a very smart piece of high design and engineering that encapsulates many success criteria in the design and that's what made the venue a most important and favourite project of the Olympic Park. It is sustainable, self-sufficient and was carefully planned, which was also delivered on time and exceeds its targets and objectives. The trigger was to create the Velodrome Park project, which was seductive and the idea of building a

Velodrome Park in London for L12OGs was worth of taking the risk. In this part readers will be able to understand what made Velodrome Park successful and findings of the research.

"A powerful team and strong communication skill" between friends were key points to success, professed co-founder of Expedition Engineering. They already had an excellent background with Mike Taylor of Hopkins Architects and also strong past with Klaus bode, environmental designers of BDSP and in charge of sustainability and environment. Those people already knew each other so that it was easy to communicate. The other important thing that the powerful team did to understand every single detail that the project had; external or internal factors were paramount. They planned to meet locals and their communities, cyclists and users for the sake of the project.

"Be passionate to put yourself in the mind of the users/customers and empathizing with the local communities" was a fundamental part of the project when designing out the details of the Velodrome Park. It is so important to understand customers' needs and beneficial for the sake of the project. Here users' points of view, again, convey many things and indicates how vital it is to think about their needs.

"Giving attention to project details" provided an opportunity to succeed in planning Velodrome Park; while extreme and complex details of designing the project was a big challenge. For example, wisely using the expertise and knowledge of world-class cyclist, Sir Chris Hoy, was extremely helpful. Extreme details and precautions were implemented in order to create a warm environment for cyclists on the track; temperatures had to be 26-28 C, creating 6,000 seating capacity **(See,** B.3 Velodrome Park in Numbers**)** or sustainability features were all planned and designed carefully. Giving attention to details made it win the bid.

"Creating a warm environment to work" was another aspect of success criteria. The ODA wanted to select a team who are open-minded and capable of delivering a quality building on budget. The ODA did not just want a scheme, but a team.

"Strong communication with suppliers", ISG initiated the SMS systems to communicate clearly and update important information for stakeholders. This made the project achieved an outstanding score of 38 out of 40 on Constructors Scheme report and won it a Gold Award.

"Knowing the details of the project" is another way that leads to success. Technical details were extremely important such; as the design, the track and the roof had to be managed carefully because of their complex engineering structure.

4.5.3 Failure Factors of Wind Turbine

Now let us have a look at the Wind Turbine project and investigate what made it fail or led to changes in the project direction. Sir John Armitt admitted that the planned project failed to deliver its promises: "we set out for ourselves a challenge beginning of creating renewable energy for 20% of the demand. That turned out to be quite a challenge and we failed pretty well by 50%. The reason we failed was that we put out the money essentially on a large 100 m diameter wind turbine. When it came to it, basically, commercial operators didn't really want to do it. After two years, toing and froing, it was clear they didn't want to do it. We were also running planning constraints" (CIOB, 2012).

"Not carefully planning the details" the ODA chairman explicitly accepted that they were running planning constraints.

"Inability to deliver the objectives" and "unrealistic challenges and expectations." They were challenging themselves by delivering 20% of the energy from

renewable resources. They ended up not delivering the promises and objectives, which were made at the outset of the bidding.

"Ambiguity of delivering the project by suppliers." Did John Armitt bring up the 100 m diameters requirement before agreements with supplier or after? Did the supplier have the information given to them? Why was a large diameter opted for, despite knowing that the turbine would be placed in the middle of the city? Such details showed how important it was to design everything carefully so that the project would survive.

"Long communication process" it took two years to finalise it and at the end the project had to be cancelled. This was for sure waste of time and money.

"Changing of health and safety regulations" that was an external factor that had an impact on Wind Turbine, because suppliers were reluctant to deliver the project due to health and safety concerns. However, the wind diameter could have been designed carefully, buying a less complicated turbine might have helped to save the project as well.

The ability to deliver 20% of the energy demand should have been carefully planned and analysed whether the project was viable or not. Consequently, not paying attention to details and a lack of planning caused to the Project failure.

4.5.4 Comparison of Performance Objectives: Velodrome Park Vs. Wind Turbine

Successful projects can be analysed based on time, cost and quality (also, it is quite common to add risk, scope and benefit as well). Simply, the project should not exceed its budget (-/+ 10%) and needs to be affordable; it also has to be on time because every project asks the same question "when will it be finished?" When completing these two important objectives, then quality becomes paramount and the project needs to deliver quality and has to focus on fit-for-purpose product. Nevertheless, one question shows up, "What is it that the project will be delivering?" If this is unknown, a project will be based on assumptions and that exactly refers to the scope of the project. For example, the user may presume that there will not be any other extra cost when asking for a new garage after the project commences. Therefore, there must be scope agreement at the outset of the project. Considering risk and benefit, there is no escape from risk. The important thing is whether the project considers it or not. There must be always plan "A," "B" and "C" if things get out of control. The other important thing that the project needs is to provide benefit. For example, if the new garage is not fit for a car, what is the point having a garage then? All those performance objectives are very important way to evaluate whether a project is successful or not. However, performance objectives itself may not be enough to consider environmental facts, because project management always neglected that part; therefore, it is possible to analysis Velodrome Park based on sustainability. Looking at performance objectives, explained above, now let us have a look at how Velodrome Park and Wind Turbine managed to progress.

Velodrome Park has a great success in relation to sustainability and project management objectives. Whereas, Wind Turbine was the kind of project that had no chance to be delivered, survive and failed at the end.

The Velodrome Park is deemed a success because it was on time by 2011 (completed seventeen months ahead of schedule). There were not any issues with the time, but budget may be debatable. The reason was that the estimated budget was £20 m in 2004. After five years, all the bills added up to a cost of £105 million. That would not fit the bill, considering stakeholders' expectations. There probably would be a legitimate explanation, such as VAT and inflation and so on, but it is certain that the project was over the budget. It was a bit surprising when Hopkinson Architect declared that it was not over the budget. When it comes to scope and quality, Velodrome Park has met or exceeded its targets **(See,** B.8 Performance Objectives for Velodrome Park**).** The strength of the project was the motto and the sustainability legacy; it was a great opportunity to show that London was ready to deliver its greenest venue. For example, the cable net was lighter than the one in Beijing, the Velodrome Park saved £95m- and 3,000 steel at the same time.

It took two years to deal with the Wind Turbine project and while it was ultimately decided to cancel it, the project took longer and the result was not desirable. It was not clear how much money was put into the entire project but it was obvious that they put a lot of money on the turbine; but, at the end, suppliers did not want to deliver it. That also applied to the scope, which was not clear at the outset, and in terms quality, the project showed that, due to health and safety concerns, the turbine would be dangerous to build. The result, the project was cancelled. The strength of the project was to deliver 20% of the energy from renewable recourses and ensure that the legacy of sustainability was kept. However, the weaknesses were long communication process and unwillingness of suppliers to deliver the project. Although there was an opportunity to build a wind turbine for Olympic Games, the threat from health and safety constraints made suppliers not to deliver the project.

4.5.5 From Business, User and Supplier Points of View

From whose points of view success should be measured or understood? The dispute will not have a clear statement because success is a very subjective term, and may or may not be generalized for other projects, as every project has its own unique identification, definitions and descriptions of what success means and what they make of it. For example, from International Olympic Committee the interest in the Olympic Games is linked to peaceful games. Consequently, all three aspects of project interest/stakeholders (business, user and supplier) have their own perspective, based on their respective needs and evaluations. Their perspectives and structures represent the industry in the business environment, but, at the end, value and profit brings them all together to a common ground.

In terms of a **business** perspective, success will always be related to the delivery of the project and whether that project is value for money or not. If the project does not represent business interests in the business case or value for money, why would you continue to proceed with the project? Thus, success will be analysed based on these factors; value for money, viability of the project, justified investment, meeting business needs, improving business strategy, benefiting the stakeholders and so forth. It will be the assigned executive who makes sure the project is valuable, viable or worthwhile for the sake of the business **(See,** B.7 Business Point of View**).**

In the **customers'** interest, success is something that satisfies the user expectations. If the product or project does not make the user happy, the project will be deemed a failure. Users are the ones who will be able to use the product and benefit from it. If the provided service is unsatisfactory, consumers' interest will not be visible. Thus, to understand customers' interests, projects must be able to understand who those users are and what is needed to satisfy

them, what improvements are required or changes need to be made. PRINCE2 draws a strong line between business and user interests, because the output of the project affects the users. Users' interest always refers to "must have" or "should have" if a project is to be successful. Senior User has a great impact and role in the project.

Finally, **supplier** interest revolves around materials. For a supplier, success is to provide desired resources, goods and services to the project. Here, Senior Supplier occupies a very fundamental position in the project.

Consequently, everyone's understanding of success depends on their expectations, and interests in the project. Consumers may want excellent facilities, business looks for profit and suppliers want to sell their stock or products.

4.5.6 Sustainability Point of View

The concept of sustainability was a victory for Velodrome Park. What made it special was that details collaborated with sustainability aspects. That is why, at the beginning, the bold statement was proposed by the researcher saying that emphasizing sustainability is crucial and project management (PM) will benefit from it. That is why performance objectives should also include sustainability. Projects such as Velodrome Park benefited from almost every aspect of sustainability development. Velodrome Park may not be the greenest structure in the planet but it was the greenest project in the Olympic Park. Why is the concept of sustainability that important then for project management?

Firstly, the concept of sustainability is a very important subject in order to protect the environment and use available resources efficiently and carefully. The idea here is to raise awareness, consciousness and healthy life style. Not only is healthy style the concern, but also respect for the planet.

Secondly, in relation to making projects, it is certain that projects can be more harm than good. Indeed, it did harm in terms of time and budget and Wind Turbine failed to deliver its sustainability objectives. Making projects that have no value or concern for the environment will fail in the future due to not having a connection to sustainability. Thinking about carbon emissions, footprints and unhealthy materials or not using environmentally friendly materials will make the point clearer. Using the right materials in the first place made Velodrome Park more sustainable. That is how environmental concerns emerged in the project. An instance of this: thinning the air, setting the right temperature for cyclists.

In summary, project management has got to understand all aspects of sustainability in order to create a better environment and sustainability related projects. Obviously, Velodrome Park project proved that a project has a strong link to sustainability and hopefully this will become more visible for other projects. That is the reason the research took place. However, there are many reasons that PMs need that aspect. Sustainability has a legacy for next generations, making environmentally friendly projects, helping people to live in a more sustainable way, raising awareness about environmental problems, healthy life style and climate change. It also has social and economic dimensions that society can benefit from. Corporate organisations have, also, a lot to learn and can help spread the word. Hence, sustainability offers a great environment for project management and cannot be seen neutrally or unsustainably.

One can claim is that the success of Velodrome Park cannot be generalized, which was the objective of this research. However, the researcher argued that there were many lessons, which could be learned from it. It is true that every project created has its own perspective, but it is also fundamental to understand that communication between projects is inevitable. There were times when cultures and societies were interacting, thereby, skills and learning

was gained from each other; the same example can be applied between projects.

But, what is the common sense to have sustainability related projects? In short, there are many opponents to sustainability. Although there was opposition and questioning whether sustainability adds value to project management or not, some writers and researchers believe that sustainability is unsustainable and that it is an ambiguous concept. According to McNeil, sustainability justifies the established wisdom. But, here the argument should be the other way around. Since sustainability is a new concept, it can appear to be against established wisdom because it offers a new way of understanding this planet that we are living on. Therefore, it stands out from traditional or conventional ways of thinking. It will not support established wisdom because established wisdom itself creates vague and ambiguous terminology. One can ask whose and what is this established wisdom? Who do you refer to then?

Similarly, Dresner argued that sustainability could not be a new concept, but that it is a new way to try to redirect. It might or might not be a new way of manipulating or redirecting; there is one thing that corporate organisations have to bear in mind is that they cannot exploit and damage to the earth's resources. They have to be considerate and it seems that sustainability can help them approach that new concept. Saying that materials should be environmentally friendly, reduce carbon emissions, reduce the affect on climate change and reduce carbon footprint and many others. If these are not satisfying, what are those other concepts that are available to us? It seems, not many. Consequently, either it is a new way of directing or not, for a little while, sustainability is the only concept that focuses on and can be used in relation to ethical and conscious consumerism.

The final argument comes from Eid, believing that project management has not evolved to address sustainability agenda and Silvius also believes that projects and sustainable development are not "natural friends". First of all, by explaining

the Velodrome Park project in this research, it is believed that PMs have the ability to understand and address sustainability. But, that, itself, will not be enough to spread the idea of how important it is to make sustainability related projects. Another example of whether PM concerns about sustainability L12OGs were a significant example. In many ways sustainability was at the heart of the games. That is why I also concluded that project management has a lot to learn from sustainability, maybe PM was not aware of it at that time but now it seems getting better, they may not be natural friends, but they are not enemies at all.

Chapter 5: Conclusion and Recommendation

Conclusion chapter mainly concentrated on the explained objectives, hypothesis and an overview of the project. The findings and work reviews standards for defining success of a project in this research: with introduction to sustainability as a new element to consider for more comprehensive evaluation. This is important because it gives a new understanding in creating a better project environment. They were few successful key elements and failure factors identified and flowed by recommendations at the end in order to prevent futures mistakes.

5.1 Conclusion:

5.1.1 "Sustainability: A New element of Project Success"

Early suggestions of success and failure factors concluded that the experience that project managers gained had no influence on success or failure. Similarly, unskilled project managers, unplanned project closures, inadequate personnel and lack of management could cause a project to fail as well. Although projects are being planned, adequate personnel available and top management support is there, project failure is still possible. Progressively there were many things has been improved, developed and changed in terms of project management. For example, nowadays, a manager with experience is a mandatory requirement, because it does not look like anyone will have a managerial position without experience or no matter how many qualifications they have.

Using performance objectives on the other hand is believed to be unnecessary. Whereas, some others strongly recommended that performance objectives are a

crucial way to measure project's success. Additionally, many researches believed that management support, carefully planning objectives and costumer's participation, were keys to success. It is clear that success is independent from one criterion. That is how the argument has progressed and created a massive knowledge. Thus, many diverse and different arguments occurred over success criteria and all of them have important contributions to it. While some researchers concentrated on critical success factors, others focussed on key success indicators and, at the end, when it came to it, all of these recommendations and discussions could not agree upon one particular criterion. Consequently, many different approaches emerged but those differentiations are helpful, important and useful to develop a project. Moreover, those notions, approaches and ideas created techniques to evaluate the success and failure. They are also helpful to identify the failure. Without looking at those previous failures, we cannot learn from the past. By looking at those success and failure factors, managers, supervisors or tomorrow's leaders will make or create a better project and successful environment. In the research there were some successful key elements identified:

- Powerful Team
- Strong communication skill
- Be passionate
- Attention to details
- Warm work environment
- Communication with suppliers

There were also failure factors:

- Not enough attention to the details and scope
- Inability to deliver the objectives
- Ambiguity of the project
- Vague, long communication process
- Changes in regulations

If these elements and factors applied project will gain a better perspective. If that is the case and intent, then, from the business perspective, success means delivering the project, on time and within budget but, at the same time, to consider other important factors and influences on project. Basically, project interests are important; when looking at the Velodrome Park they see a successful project but when it comes to Wind Turbine, it will differ. The reason is that The Velodrome Park has exceeded its targets and objectives, and used sustainability features. From ODA's point of view Velodrome Park, of course, is a success; however, the same ODA will have to accept that the Wind Turbine could not applied these success elements. Why did that happen? They could not agree because of the requirements, health and safety reasons and disagreement between suppliers. If the project was carefully considered sustainability features could have been great advantage for it and the business point of ODA would successful and add a great value to Wind Turbine project in terms of sustainability. When it comes to costumer's/user's satisfaction, the most important thing is to understand the business point of view. Here the project will try not to fail, and make sure costumer's satisfaction is superior. It has been concluded that many details were pondered to consider and satisfy the users (seats, ventilation and lighting of Velodrome Park). At the end, many project interests made the standards above the par, except Wind Turbine. As John Armitt pointed out, there were problems with supplier and after two years passed, the project still was not clear. In conclusion, the one develops the business in order to deliver the project, is also the one who ensures that requirements are satisfactory for stakeholders. The business will ensure everyone's expectation is well thought and considered. Therefore, the business point of view is vital and worth understanding.

Another point was to understand the objective of this research that every project has its own perspective. Projects may not be generalized, but it may provide a great source of information for future projects. Of course, all not the

same, one project convey many different things, for example IT projects are distinguished from construction projects. Especially "Standish Group Chaos Report" was based on IT projects, Velodrome Park and Wind Turbine project important for that matter and they have link to construction and sustainability related projects.

When managing a project, performance objectives are great of use and help but by looking at only those criteria PMs and projects may fail. The traditional way of making project focus on time cost and quality and does not have concern about other important aspects. That is why sustainability becomes vital in the research. Because sustainability offers a positive attitude and a legacy for next generations and that will add value to the project. Consequently, sustainability offers a great environment for project management and shall not be seen as neutral, ambiguous or unsustainable. Thus, in this research performance objective needs "sustainability" as a new element.

When looking at modernization theory, success and failure changed a lot from traditional to modern. The more specialization we create the more change and development in terms of a modern society. That is what exactly I am trying to propose for project management literature "development and efficiency by using sustainable features". This way of thinking of the planet, caring about environment, using environmentally friendly materials and protecting it will be more visible than it used to be in the project management literature and this is one or another way of making a successful project. It is obvious that "the modern way" is unsustainable –considering mass consumption– and as unsustainable projects, but, this reality should not prevent us from making or creating a better environment for next generations.

Furthermore, in relation to sustainability, Velodrome Park proved that successful projects are possible. An accomplished project can be on time, satisfying the users and be sustainable. It might be too soon to say that but, it

is obviously one of the greenest venues that have been built so far at London 2012 Olympic Park. Its design, the roof, the track and all the other little details made it very unique and successful project. That is why project management has to learn from it in order to prevent future project failure. Specifically, when considering environmental concerns, Velodrome Park becomes more significant. That is why ODA asked for responsibly sourced materials, reduction on CO_2 emissions, carbon footprint and potable water, recycled materials and sustainable transport. Those numbers of sustainability targets indicated that projects could be more responsible when making or delivering a project. A project without considering its effect on environment will not be desirable anymore, especially not on this day and age.

5.2 Recommendations

- Project managers always need to agree on the rules in tandem with stakeholders. If criterion is well embellished, then project will deliver its objectives. But, that does not mean PMs and stakeholders will not be able to request a change, if wanting to modify anything they want. Thus, it is possible to make minor changes to suit it to the project's environment. By doing this, projects will be beneficial for the owner, value project team, stakeholders and care about users' needs.

- Performance objectives, themselves, may not be enough to understand the success or failure; therefore, sustainability points of view need to be considered; because nowhere in performance objectives environmental concerns or using environmentally friendly materials are mentioned.

- Project management departments need to find a better way to make the best fit for purpose project. The old fashion ways of making projects are unsustainable. Therefore, it is recommended that sustainability will help be very helpful. It is neither vague nor ambiguous. My suggestion is that it has a lot to offer and the PMs must be able to understand its concept. Hence, optimism about sustainable projects is inevitable.

- Good and customer-related decisions improve the perspective of a project. In any company or organisation, there must be people to be able to help others and understand customers' points of view; call it expert or designer or interaction designers. If your company has those people, get in touch with them and benefit from them and their knowledge of expertise in order to satisfy your customers. If there is no one to help, then the project manager has to make those decisions by themselves. In conclusion, ample support, either by a project board or corporate management, needs to be placed and invested in the project; otherwise,

customers' interest will not be credible and accountable. And at the end, project failure is inescapable.

- The Velodrome Park has been delivered and well received by the client, the ODA, and by the legacy user, the Lee Valley Regional Park Authority. The lessons the team has taken on-board were: an increased use of testing, both physical and computational, provides confidence to the wider team when working.

- External factors are the most important element when creating a project. They are quite treacherous, because the project is unaware of the external factors. For example, changes in health and safety regulations had negative effects on the Wind Turbine project. Could this have been predicted? It was not known and not easy to predict. Those factors may be quite challenging. However, it is possible to conduct some research into external factors, if there are any, so that no harm comes to the project, or at least can be prevented it at the end.

- If top management is to be successful, they need to understand successful key elements, at this point; "Chaos Report" is very helpful to look at it.

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Appendix A: Models: PBS, WBS Gantt chart
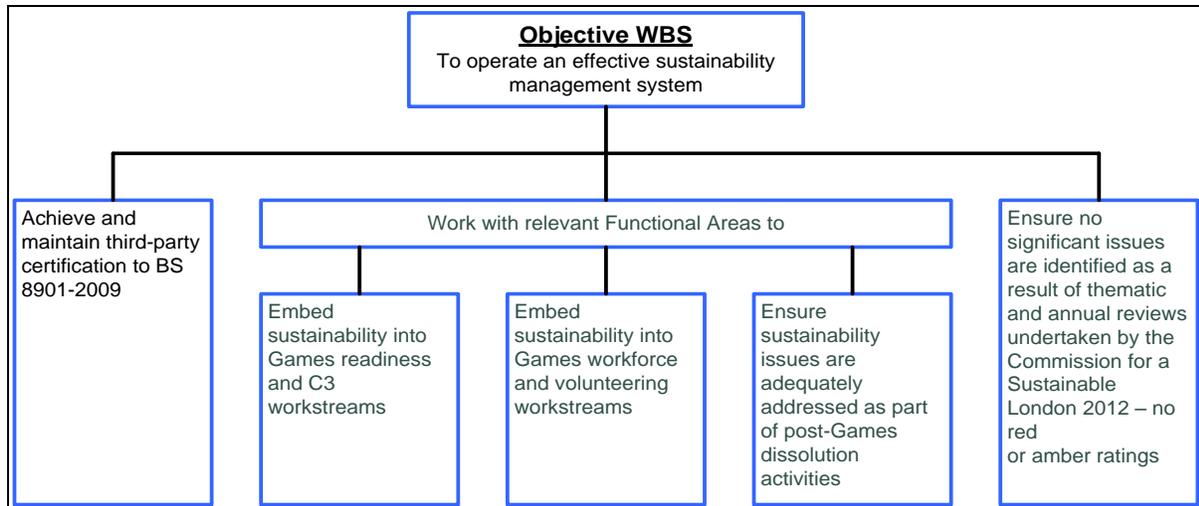
Table-10 WBS, Effective Sustainability Management system

This highlights the two main organisations responsible for the operation and delivery of the London 2012 games as LOCOG and the ODA. LOCOG defined its main sustainability objective for sustainability management "To operate an effective sustainability management system" (LOCOG, 2011, p.36).

The ODA believed the best way of delivering a sustainable programme was to include established standards into the development and delivery of the London 2012 Olympic programme to use a set of "tried and tested" tools/standards to measure performance. These standards include ISO14001 and British Standards on sustainability (ODA, 2007, p.55).

Table-11 London 2012 Olympic games Gantt chart
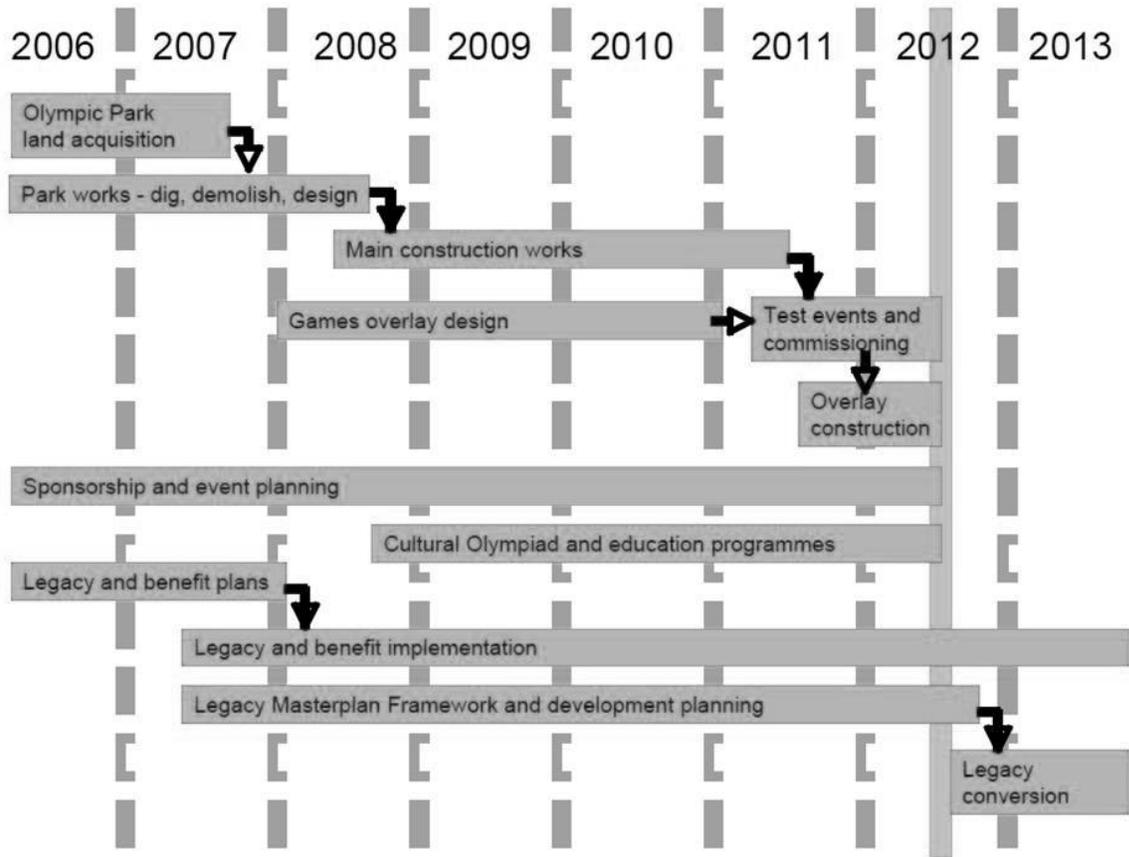
Table-12 Velodrome Park, product breakdown structure
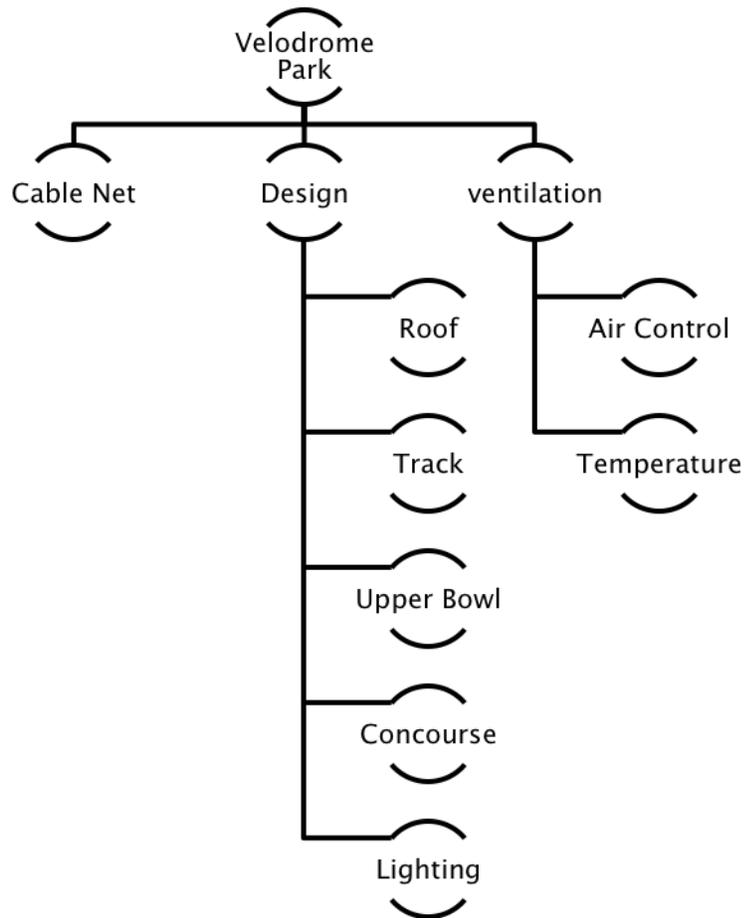
Table-13 Work Breakdown Structure of the Olympic projects

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                              ┌─────────┐
                              │  L12OGs │
                              └────┬────┘
              ┌────────────────────┴────────────────────┐
         ┌────┴─────┐                              ┌─────┴────┐
         │ Velo Park│                              │  Wind T  │
         └────┬─────┘                              └─────┬────┘
    ┌────┬────┼────┬────┐                    ┌────┬──────┼────┬────┐
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│Business││User││Supplier││Sustainab││      │Business││User││Supplier││Sustainab│
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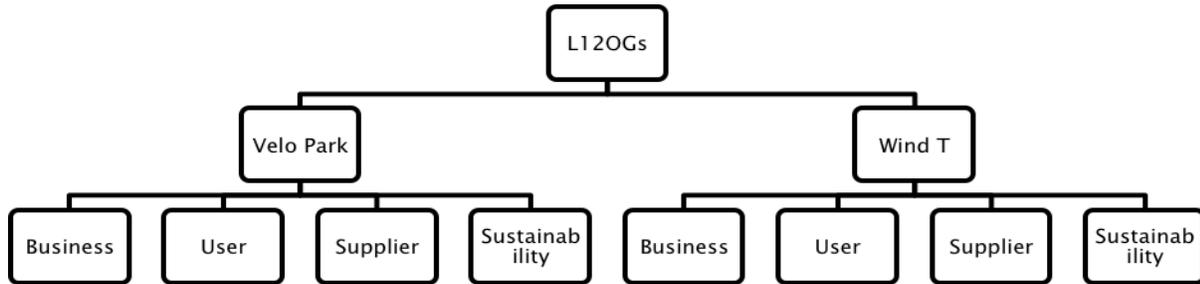
Table-14 Time Table of the Dissertation

	February			March						April		
	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10	W-11	w-12
Literature Review												
Research Methodology				■	■							
Data Collection & Analysis						■	■					
Conclusions								■	■			
Recommendatioins												
Introduction			■							■	■	
Formatting and Editing											■	■
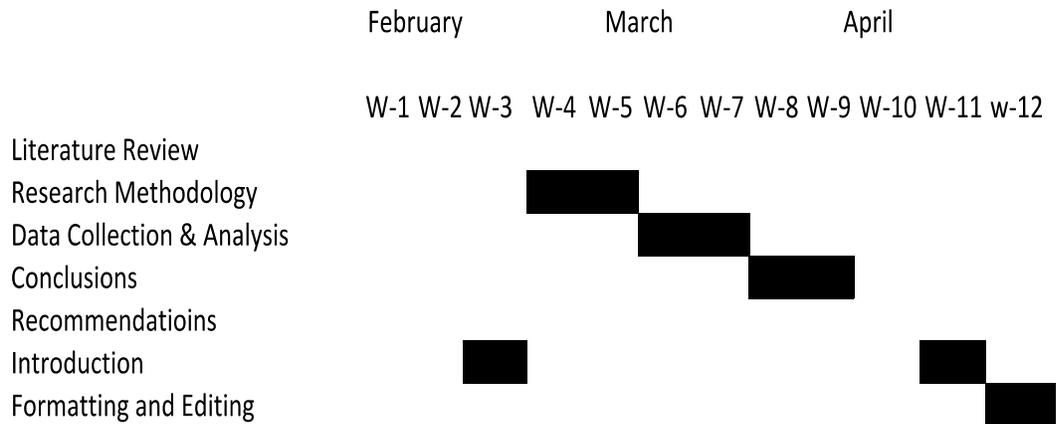
Appendix B: Supporting Information

B.1 Building a Velodrome Park

The Velodrome Park was built on the old home of the Eastway Cycle Track – a facility steeped in cycling history. The surrounding landscape was industrial, heavily polluted and home to a 100-year-old landfill site. Before construction began, the site was decontaminated and 48,000 cubic meters of materials were excavated. More than 900 piles were driven up to 26m beneath the ground to complete the foundations of the venue, and around 2,500 sections of steelwork were installed to complete its steel structure. Meaning that no waste material was generated and the risks and costs associated with handling contaminated soil were eliminated. It was the first venue to be completed on the Olympic Park (ODA, 2011).

Regeneration of East London, cycling fans had many choices in the Olympic games; BMX circuit, the road cycle pursuit, the mountain bike course, but the main events setting in the Velodrome Park. The construction was quite challenging and there was a huge waste site to be cleared at the beginning. Building a Velodrome Park isn't easy and mostly problematic because they are dark, the step prevents spectators to see the players and the design of it should also be a good one. (Douglas, 2010)

Gustavo Brunello of BDSP won the bid for the Velodrome Park, the building has been awarded many times and most efficient venue in the Olympic park. They had to concentrate on how to reduce energy, which was not that easy. Under normal circumstances, the best environment for cyclists is between 24 and 28 C this condition produce minimal air movement, hot and humid, good for riders, on the other hand, for spectators this condition is not favourable. Nevertheless, at the end they created natural ventilation to solve the problem. So how does the heating and ventilation system work? Brunelli explicates: we did a lot of

simulation to work out how we would mix the two air temperatures up and initially we were going to store and release the heat, in the end, what we did was use the upper tier as natural ventilation plenum, so the air can come in through the heating slots and out under the seats, and then back out through the top (Grogan, 2012).

B.2 Project Team

Architect: Hopkins Architects

Structural Engineer: Expedition

Services Engineers: BDSP

Landscape Architect: Grant Associates

Contractor: ISG

Concrete: FDL

Steelwork: Watson Steel

Cable Net: Pfeifer Group

Roof and External timber Cladding: Wood Newton (Lap Land, a2012)

B.3 Velodrome Park in Numbers

- 6,000 capacities, 3,500 around the track and 2,500 in upper tiers suspended within the curves of the roof.
- 48,000m^3 of material excavated to create the bowl – enough to fill 19 Olympic-sized swimming pools
- 2,500 sections of steelwork form curves steel structure
- Rises in height by 12m from shallowest point to the highest
- Roof has 16km of cabling and covers an area of 5,000m^2. It took eight weeks to lift into place.

- At 30kg/m^2, the roof weighs roughly half that of any other covered Velodrome Park includes a 20m track and 100m (Lap Land, a2012)

It was the first venue completed, engaging sub-contractors with proven expertise ensuring this complex and fast structure was completed on time and within budget (Expedition, 2012).

B.4 Project Technical Overview

The Design: the most important thing/hope/desire for the team was to be efficient in all aspects of the venue's design including structural and environmental performance. The whole design team believed that this could be achieved by making sure a fully integrated approach to design. The form of the building is derived not from some fanciful motion but from the considered process of connecting together all the necessary accommodation around the cycle track (Expedition, 2012).

The resulting building surpassed the ODA targets to be the most sustainable venue on the Olympic Park. With the idea of the racing bike in mind, the design approach followed the desire for lean design throughout, putting the right material in the right places and removing unnecessary "fat" (Expedition, 2012).

The Velodrome Park is the most energy efficient and greenest building on the Olympic Park. The walls and roof are highly insulated and the concrete structure acts as thermal mass.

The Roof: of the Aquatic centre and Velodrome Park has same features and size. However, the former contains 3,000t steels whereas the new design had only 100t. This has a massive impact on cost and makes a huge difference on budget (£250m vs £95m), (Lap Land, a2012). The roof weighs only 30kg per m2, roughly half that of any other covered Velodrome Park. This is a key

component in making the Velodrome Park the greenest venue on the Olympic Park. The cable net roof (12,000sq m in size and uses 16km of cabling) also made the building safer to construct as it meant minimal working at height and virtually no temporary works. It also improved the programme by three months and significantly reduced the overall cost   of the build (ODA, 2011).

B.5 Shaun McCarthy`s Article on Cancelling the Wind Turbine Project

Gone when the morning comes…

Like a bat out of hell it was gone when the morning comes. On 3 June 2010, the ODA announced the cancellation of their proposed wind turbine for the Olympic Park. With it came a little media storm with headlines such as "what hope now for the Green Games?" and "Olympic chiefs scrap wind power plan". The first question I was asked by one journalist was "What other environmental targets are the ODA going to ditch?" Words like "scrap", "ditch" and "abandon" appeared in most headlines.

The fact is, the ODA are ditching nothing and we expect them to honor the commitment they made to deliver 50% carbon reduction and 20% energy from renewable sources. In the face of increasing challenges with wind power, they have now chosen to deliver their 20% renewable energy commitment using biomass Combined Heat and Power (CHP) system and other renewables, not a wind turbine.

Biomass is the ugly duckling to the wind Turbine's beautiful swan. Whether you like them or not, wind turbines take a great picture against a background of a crisp blue sky, a spectacular sunset, or even a thunderstorm. They look good in PowerPoint presentations, on websites or in glossy CSR reports. A biomass CHP is a collection of unattractive machines hidden away in an unglamorous plant room.

The problem with wind turbines is that they don't go round when it is not windy and if you put one in a place that is not very windy it will not generate the amount of electricity you need. You will only know this after you have collected extensive wind data over a number of years. There were also health and safety issues to deal with such as new regulations requiring exclusion zones around wind turbines.

This was the dilemma facing the ODA and they have made a good decision based on the information they have. The decision cannot be delayed any longer because equipment needs to be ordered and construction needs to start very soon.

Wind Turbines are easy for people to understand. CHP based on biomass sounds like a complex dish to serve up to the public. This technology is not new. It has been in use in Scandinavia and other countries for more than 30 years.

The Commission will expect to see the detailed plans for the solution now favoured by the ODA. But from what I have heard to date, I am confident that this is being done in a professional manner. We will continue to hold the ODA to account to deliver on this important commitment.

B.6 How did a Successful Project as Velodrome Park Form?

At the beginning of the bid Ed Mccan and Chris Wise did decide not to enter to the competition. However, the idea of building a Velodrome Park in London the city where Olympic games took place, become seductive and that's how we decided to submit with Mike Taylor of Hopkins Architects, with whom we had an excellent background in the past and Klaus Bode, environmental designers BDSP with whom we had worked previously, was in charge of sustainability and environment. Here the key point was to have and enable a powerful team and

more importantly they were all friends. We were also able to add Ed McCann, engineers with philosophical bent, Ed and Mike did their best to understand everything about the project such as meeting communities, cyclists and users. Generally speaking, Velodrome Park has important audience/user groups the world class cyclists and the spectators, world wide television audience, member of public and amateur cyclists who will be effectively main users of the project (Expedition, 2012).

The Velodrome Park is an embodiment of Vitruvius' "Firmitas, utilitas, venustas" meaning that firmness; commodity and delight; however, "venustas" referes to love, beauty and fertility. In this context, we had passion to put ourselves in the minds of the customers or users when designing out the buildings. It was easy to imagine being in the crowd, or watching on the television, or taking our family up to the Olympic park, nevertheless was not easy to see it from users' and cyclists' points of view; therefore, we were extremely lucky to have world-class cyclist Sir Chris Hoy and also representatives from British cycling and local cyclist from the Eastway Cycle Circuit, and Lee Valley Regional Park Authority who would take over the venue (Expedition, 2012).

"They wanted to choose a team not a scheme," Chris Wise said. The ODA wanted an open-minded team capable of delivering a quality building on budget and quickly despite a constantly changing brief. The judges also liked the team's ideas. The key factor in winning the competition was the idea of providing the entrance and exit concourse halfway up the building. Not only does entering the seating halfway up the bowl speed up access, it also means spectators get good views over the Olympic Park. (Lap Land, 2012a)

Work on the competition scheme began in May 2007 with announcement of the results made in August 2007 and was completed ahead of programme and on budget on 13th January 2011 (Hopkins architects, 2011). Earlier in 2011, the Olympic Stadium and Velodrome Park had been delivered on time and within

budget, with a safety record far better than the industry average, and setting new standards in sustainable and accessible design. (ODA, 2012)

B.7 Business Point of View

An example of the business point of view could be Olympic Delivery Authority (ODA); it was the public body responsible building new venues and infrastructure for LO12Gs. The ODA`s work had six priority themes: design and accessibility, employment and skills, equity and inclusion, health, safety and security, sustainability and legacy. It was led by John Armitt (Chairman) and David Higgins (Chief Executive). The responsibilities were building new permanent venues, planning and delivery on both transport infrastructure and services to support the games projects. Ensuring the Olympic park for long-term use after the games and making sure the projects sets new standards for sustainable development. The ODA had legal status to buy, sell and hold land. Make arrangements (building, develop transport and infrastructure) and local planning authority for the Olympic Park Area (National Archive, 2010) The ODA's mission is to "deliver venues, facilities and infrastructure and transport on time and in a way that maximises the delivery of a sustainable legacy within the available budget " (ODA, 2007, p.5).

B.8 Performance Objectives for Velodrome Park

The Velodrome Park project would be deemed successful because the time it took to construct was ahead of schedule by 2011; the final budget at £105 million: the quality of construction was both innovative, using high-tech solutions (as a roof that weighs a half of more traditional designs) and green technology. The Velodrome Park initially was estimated in 2004 to cost £20 million and to be completed by 2012. After 5 years all the bills are added up to a cost of £105 million. Completing The Velodrome Park ahead of the schedule was a success, on the other hand the budget significantly increased. Starting up with £20 million budget in 2004 and ending it up with £105 m would not fit the bill considering stakeholders' expectations. It was a bit surprising that Hopkinson Architect declare that it wasn't over the budget. "Work on the competition scheme began in May 2007 with announcement of the results made in August 2007 and was completed ahead of programme and on budget on 13th January 2011" (Hopkins architects, 2011). In terms of scope and quality, Velodrome Park has met or exceeded its targets. It is an environmentally-friendly building, rated "Excellent" by BREEAM and predicted CO_2 emissions reduction by 32%, reduction in potable water consumption by 75%, recycled content at 28.6%, sustainable transport at 78%. The ODA set a target of 50% of materials to be transported by either train or water. The project achieved 78% (by weight) of all materials transported by rail.

B.9 The Key Stakeholders

ODA: Olympic Delivery Authority, building the Olympic and Paralympic venues

LOGOC: London Organizing Committee of the Olympic and Paralympic Games

GOE: Government Olympic Executive, overall responsibility of the Games

GLA: Greater London Authority ensuring the Games ready

OPLC: Olympic Park Legacy Company responsible for management and development (CSL, 2012)

B.10 Project Strategy and Workforce Engagement of the Velodrome Park

ISG instigated workforce engagement via SMS. Suppliers were able to sign up and receive updates on travel, weather, Olympic Park information, safety bulletins, sustainability initiatives and positive feedback from site management. Suggestions for improvement were invited with all issues promptly addressed by site management and the outcome written on the board for all to see. The project achieved an outstanding score of 38 out of 40 on a Considerate Constructors Scheme report. This put it in the top 10% of all monitored sites and it achieved a Gold Award at the CCS National Site Awards (ISG, 2011).

B.11 Interview Questions

Could you please tell us about your role in the Velodrome Park project?

When did the project start and finish?

How did you get involve with the project and what was your position?

How would you describe the Velodrome Park from your personal experience?

What makes Velodrome Park special and unique? Why?

Did you use PRINCE2 Methodology to suit the project environment?

Did you have any software or methodology used in the project?

Velodrome Park got many awards and what do you make of this success?

The project was delivered on time but budget were not exactly the same has changed over the time, from £20m to £105m, what were the reasons that made a massive difference in terms of budget?

Can you please tell us about success factors of this project what made this project special?

Have you ever thought of failing, if so, what were they failures in the project?

If you would require using performance objectives as success criteria how would put them in order of importance?

Could you please tell me about the most challenging situation in terms of delivering a mega project?

Table-15 the Square Route
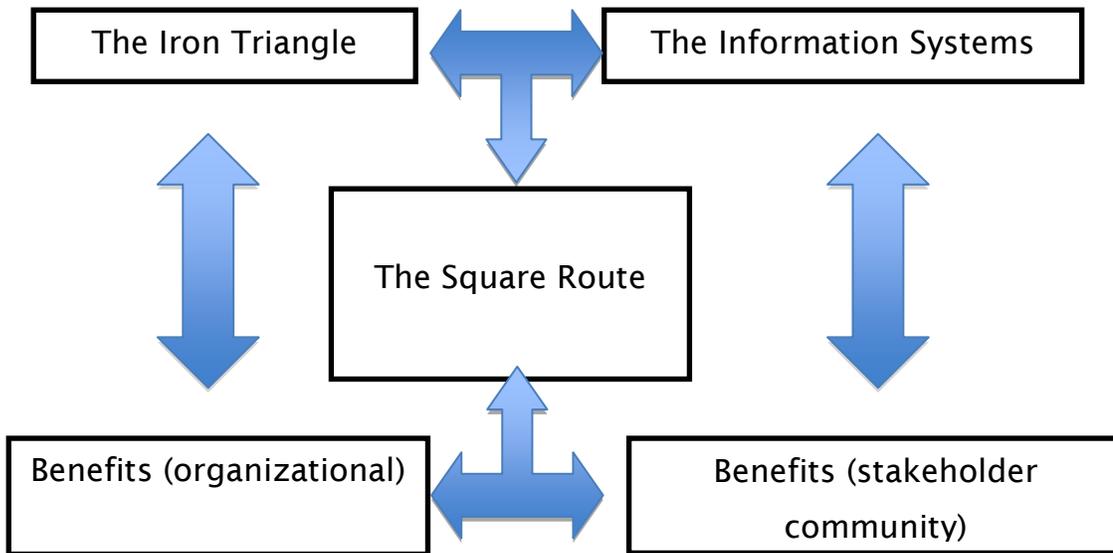
(Source: Atkinson, 1999)

Table-16 Critical success factors framework

Result areas 'Project Excellence Model'	Morris and Hough (1987) [11]	Munns and Bjeirmi (1996) [13]	Belassi and Tukel (1996) [14]	Pinto and Slevin (1988) [12]
Leadership and Team	Human factors	Human Parties	Use of managerial skills	Personnel recruitment Trouble shooting
Policy and Strategy	Project definition		Control and monitoring	
Stakeholder management	Politics and social factors	Relations with client Politics		Client consultation Communication Power and Politics
Resources	Finance		Use of technology Preliminary estimates	
Contracting	Legal agreements	Legal agreements Contracting		
Project management	Scheduling, design	Project Administration Efficiency	Scheduling and scheduling	Technical tasks Monitoring and feedback
Success criteria		Profit		Client acceptance
External factors	Schedule urgency Schedule duration	Objectives	Factors related to project manager Project team members Factors related tot the project Factors related to the organisation Availability of resources External environment	Top management support Characteristics of project manager Environment events Urgency

(Source: Westerveld, 2003)

Table-17 ODA stakeholder map
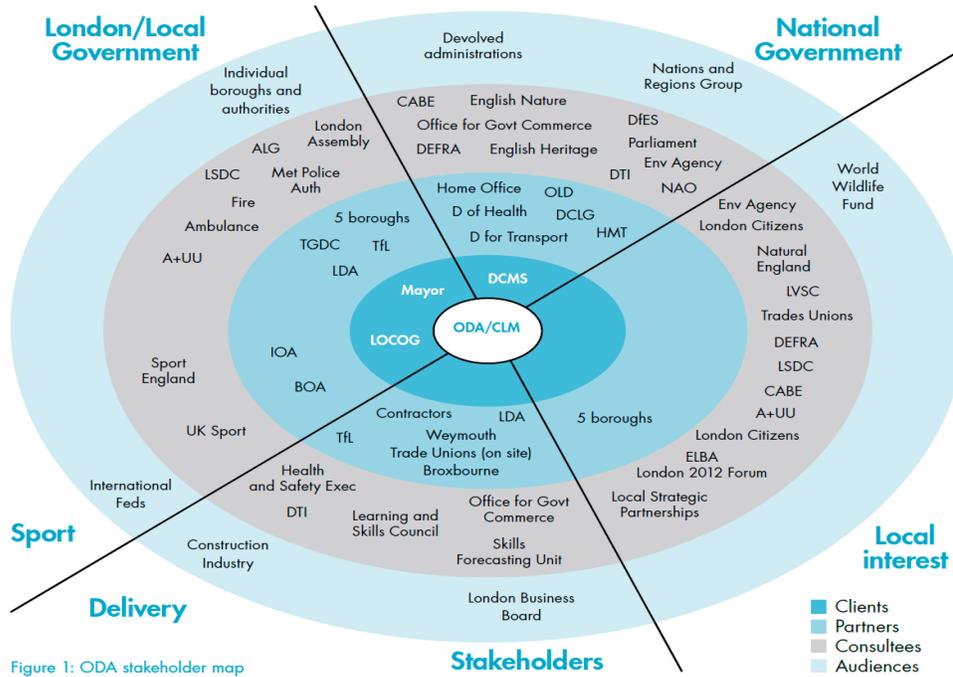
Figure 1: ODA stakeholder map

(ODA, 2011)

Table-18 the lifecycle of sustainability projects

(ODA, 2011

Table-19 ODA's Sustainability Objectives

London 2012 Headline Themes	ODA Sustainability Objective Areas January 2007	ODA Sustainability Principles August 2006	One Planet Living Principles	BREEAM
Climate change	Water	Global, Local and Internal Environments		Water
	Carbon	Energy	Zero Carbon	Energy
Waste	Waste	Waste	Zero Waste	
	Materials	Use of Materials	Local and Sustainable Materials	Material and Waste
Biodiversity	Biodiversity and Ecology	Biodiversity and Ecology	Natural Habitats and Wildlife	Ecology
	Land, Water, Noise and Air	Land, Water, Noise and Air		Land Use
				Pollution
			Sustainable Water	
Inclusion	Inclusion	Inclusion		
		Culture, Heritage and Built Form	Culture and Heritage	
			Equity and Fair Trade	
	Employment and Skills	Education and Employment		
	Transport and Mobility	Transport and Mobility	Sustainable Transport	Transport
	Access			
	Supporting Communities			
Healthy Living	Health and well-being	Health and well-being	Health and Happiness	Health and well-being
		Housing and Amenity		
			Local and Sustainable Food	

(ODA, 2007)

Table-20 Gantt chart for Dissertation Plan

Task Name	Duration	Start	Finish	18 Feb '13							25 Feb '13							04 Mar '13		
				S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W
Preparation	7 days?	Mon 18/02/13	Sun 24/02/13																		
Find Resources	1 day	Mon 18/02/13	Mon 18/02/13																		
Collect Materials	1 day?	Tue 19/02/13	Tue 19/02/13																		
Brainstorming	1 day?	Wed 20/02/13	Wed 20/02/13																		
Outline the Research	1 day?	Thu 21/02/13	Thu 21/02/13																		
Draft	1 day?	Fri 22/02/13	Fri 22/02/13																		
Introduction Baseline	1 day?	Sat 23/02/13	Sat 23/02/13																		
Litr. Rev. Readind Starts	1 day	Sun 24/02/13	Sun 24/02/13																		
Week 1 Reading and Planning	12 days	Mon 04/03/13	Sun 17/03/13																		
Week 2 Literature Rev Reading	5 days	Mon 04/03/13	Fri 08/03/13																		
Week 3 LT writing starts	6 days	Mon 11/03/13	Sun 17/03/13																		
Week 4 Research Mtd Draft	6 days?	Mon 18/03/13	Sun 24/03/13																		
Week 5 Research Mtd Writing	6 days?	Mon 18/03/13	Sun 24/03/13																		
Week 6 Data Analysis	6 days?	Mon 08/04/13	Sun 14/04/13																		
Week 7 Secondary Data	6 days?	Mon 08/04/13	Sun 14/04/13																		
Week 8 Introduction completed	6 days?	Mon 15/04/13	Mon 22/04/13																		
Week 9 and 10 Conlusion	6 days?	Mon 29/04/13	Sun 05/05/13																		
Week 11 Edtng and proofreading	5 days?	Mon 06/05/13	Fri 10/05/13																		
week 12 submitting	2 days?	Mon 13/05/13	Tue 14/05/13																		