Managing Sustainable Global Events: Sustainability Practices of Expo 2020

إدارة الأحداث العالمية المستدامة:
ممارسات الإستدامة في اكسبو ٢٠٢٠

by

SAMIH NABIH YEHIA

A thesis submitted in fulfilment

of the requirements for the degree of

DOCTOR OF PHILOSOPHY IN BUSINESS MANAGEMENT

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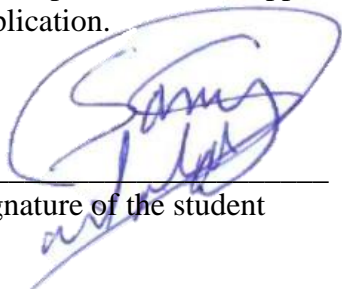

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ABSTRACT

There has been increasing international interest in the impact of hosting mega-events and the sustainability and legacy considerations during the Event Life Cycle (ELC). This research aims to understand the sustainability practices that a host city should adopt along with the legacy considerations. Hosting a sustainable mega-event requires attaching equal importance to the three pillars of sustainable development (economic, social, and environmental). However, focussing on these three pillars without having an extended legacy plan will lead to high spending on a short-term event. The empirical research for this thesis focusses on assessing Dubai's sustainability practices in different sectors, and evaluates how they contribute to the creation of a long-lasting, positive legacy in achieving the target to design and implement a sustainable mega-event.

The concept of the sustainable mega-event is growing with the global development of this type of events. Many developing countries have emerged as new players in this industry, which previously was confined to developed countries. Sustainability is a challenging concept for developing countries in general, as event design and implementation have to find a balance between development and sustainability. Hosting a mega-event brings many opportunities to the host city as well as many less desirable consequences. For this thesis, the research question concerns how a developing country can host a sustainable mega-event, formulate a legacy plan as part of the sustainability plan, and still create a long-lasting legacy. The extensive literature on sports events, mega-events and specifically Expo 2020 is reviewed, with the aim of

creating a sustainability framework and identifying the success factors of sustainability.

Three case studies are reported for the sectors intended to contribute to the sustainable hosting of Expo 2020: 'Construction', 'Utilities,' and 'Mobility.' The case study data are based on semi-structured interviews, field observations, and analysis of secondary documents. A sample of twenty-eight interviewees was selected from different sectors and authority levels, based on their contribution to the overall sustainability plans of Expo 2020 and the sector in which they worked. The interview topics addressed include the understanding of sustainability pillars in the mega-event, the drivers of sustainability, the changes happening in those sectors after Expo 2020 preparations began, and other potential pillars.

The analysis of the data identified two success factors that should be considered when managing sustainable mega-events: 'design' and 'leadership'. Moreover, it was demonstrated that a substantive and proactive legacy plan can contribute to the overall sustainability of the event, especially in the social and economic pillars. Results related to the three pillars and the legacy plan demonstrated an example of the potential contribution that developing countries could make when hosting mega-events which are designed and implemented within the Dubai framework of sustainability and legacy.

This research contributes to an understanding of sustainability and legacy when hosting a mega-event in a developing country, based on a holistic framework for managing sustainability pillars and executing the set plan for legacy. The framework is grounded

on the equal prioritization of the sustainability pillars, a leadership commitment, project designs that respect those pillars, and an on-going development plan that uses the mega-event as one of multiple mega-projects. Sustainability and legacy considerations should complement each other.

In conclusion, the findings of this research inform scholars and practitioners that mega-events should act as a catalyst for behavioural change, and not be used exclusively as a catalyst for development. The researcher recommends that a further study on the same case study should be conducted after the completion of Expo 2020 in order to discover the actual legacy and sustainability outcomes from the plans set in the preparation phase. In addition, the sustainability framework can be tested in other developing countries and compared with Expo 2020 in order to discover the extent to which similar plans can lead to the same outcomes.

ABSTRACT IN ARABIC

يبدو أن الاهتمام العالمي في دراسة النتائج الناجمة عن إستضافة أحداث عالمية يتزايد بشكل ملحوظ خصوصا عندما يشمل الموضوع مختلف إعتبارات الإستدامة والارث الذي تتركه هذه المناسبات . يهدف هذا البحث العلمي الى فهم ممارسات الإستدامة المطلوب تطبيقها من قبل الجهة المضيفة دون الإغفال عن مراعات أهمية الإرث المزمع إنتاجه. يتطلب إستضافة حدث عالمي مستدام الى موازات الإهتمام بين أعمدة التنمية المستدامة الثلاث (الإقتصادي، الإجتماعي، البيئي). ومع ذلك، إن التركيز المطلق على هذه الأوجه الثلاثة دون التخطيط المبكر لمرحلة ما بعد الإستضافة قد يؤدي الى تكليف الجهة المستضيفة أعباء إستثمارية عالية لخدمة حدث قصير الأمد. يُركز هذا البحث التجريبي على تقييم ممارسات الإستدامة في دبي في مختلف المجالات وتقدير كيف يمكن لهذه الممارسات أن تؤدي الى المساهمة في خلق إرث إيجابي طويل الأجل. لا يمكن تحقيق هذا الهدف اذ ما تمى إغفال دور التخطيط والتصميم في إستظافة أي حدث عالمي مستدام.

ينمو مفهوم الإستدامة في الأحداث العالمية مع تزايد أعداد المتابعين لهذه المناسبات في مختلف أقطار العالم. يتطور عدد الدول النامية التي دخلت سوق إستضافة الأحداث العالمية كلاعبين جدد في هذا المجال والذي كان حكرا للدول المتقدمة بشكل ملحوظ . يشكل مفهوم الإستدامة تحدي إضافي للدول النامية حيث يتطلب إنجاح هذه الأحداث الموازات بين التخطيط والتطبيق، تجذب هذه المناسبات مجموعة فرص للدول المستضيفة دون الإغفال عن أنها قد تنتج عواقب غير متوقعة. من أجل ذلك، تهدف هذه الأطروحة للإجابة عن أسئلة تتمحور حول كيفية إستضافة هذه الأحداث من قبل الدول النامية دون التضحية بالإستدامة وكيفيت تكوين إرث من هذه الأحداث. تدخل المراجعة الادبية واسعة النطاق في مجال الأحداث العالمية الرياضية مع التحضيرات لإستضافة إكسبو ٢٠٢٠ ضمن هذه الدراسة من أجل تقديم إطار علمي للإستدمة ومحاولت إكتشاف إمكانية وجود أعمدة اخرى لهذا الموضوع.

ترتكز هذه الاطروحة على ثلاث حالات دراسية في ثلاث قطاعات تساهم بشكل فعال في خطة الاستدامة المنوي تطبيقها في إكسبو ٢٠٢٠. هذه الحالات الدراسية هي ''قطاع البناء؛، ؛ قطاع الخدمات''، '' ،قطاع التنقل''. إن دراسة كل حالة تقوم على إستخدام مقابلات شبه منظمة، ملاحظات ميدانية، وتحليل للبيانات الثانوية.ترتكز عينة الدراسة على مقابلة ثمانية وعشرين شخصية مختارة بعناية من مختلف القطاعات والسلطات على مستويات مختلفة أخذين بعين الإعتبار قدرة كل جهة في التأثير على مجمل الإستدامة في إكسبو ٢٠٢٠ من خلال القطاع الذي يعمل به. تشمل مواضيع المقابلات نقاط تتضمن فهم

أعمدة الإستدامة في الأحداث العالمية، محركات الإستدامة، التغيرات الحاصلة في هذه القطاعات بعد البدء بالتحضير لإستضافة إكسبو ٢٠٢٠، وإمكانية وجود أعمدة إستدامة محتملة.

دل تحليل بيانات الدراسة على وجود عاملين جديدين أساسيين للتنمية المستدامة وهما "التصميم" و "القيادة". علاوة على ذلك، لقد تم إثبات دور الموضوعية والإستباقية في التخطيط لمرحلة الإرث في المساهمة بفاعلية في إعتبارات الإستدامة للحدث العالمي، وخصوصا في العامود الإجتماعي. إن النتائج المتعلقة في أعمدة الإستدامة الثلاثة وخطط الإرث تضع نموذج حول إمكانية الدول النامية في المساهمة في إستضافة هذه الأحداث من خلال التصاميم والتنفيذ عبر الإطار المطروح من تجربة دبي في الإستدامة والإرث.

يتمحور دور هذه الدراسة حول زيادة المعرفة العلمية في مواضيع الإستدامة والإرث الناجم عن إستضافة حدث عالمي في دولة نامية عبر بناء نظرة شمولية لإدارة أعمدة الإستدامة المختلفة وتطبيق مخطط التنفيذ الذي يهدف لخلق إرث. يرتكز الإطار على توازن الإهتمام لأعمدة الإستدامة المختلفة، إلتزام القيادة، وجود تصاميم تحترم هذه الإعتبارات، وجود مخطط تطويري قائم ويستعمل هذا الحدث العالمي كواحد من مجموعة مشاريع كبرى أخرى. إن الإستدامة والإرث هما عاملين أساسيين ويجب أن يُكمل أحدهما الآخر.

في المحصلة، تبلغ نتائج هذا البحث العلماء والممارسين أن الأحداث العالمية يجب أن تُستخدم كمحفّز لتغير العادات وليس محفز للتطوير حِكراً. يوصي الباحث بإجراء دراسات إضافية بعد إكتمال إكسبو ٢٠٢٠ لإكتشاف حقيقة نتائج الإرث والإستدامة من الخطط الموضوعة في مرحلة التحضير. بالإضافة الى ذلك، إن إطار الإستدامة يمكن تقييمه عبر دول نامية أخرى تستضيف أحداث عالمية مماثلة في المستقبل ومقارنتها ب إكسبو ٢٠٢٠ لإكتشاف مدى إمكانية إستخدام خطط متوازية للوصول إلى نتائج مماثلة

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In the Name of ALLAH, the Most Gracious, the Most Merciful

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List of Abbreviations

ADDC	Abu Dhabi Distribution Company
ADEPA	Abu Dhabi Environnement Policy Agenda
ADIA	Abu Dhabi Investment Authority
APICORP	Arab Petroleum Investments Corporation
AQI	Air Quality Index
ASTM	American Society for Testing and Materials
BAV	Brand Asset Valuator
BIE	Bureau of International Expositions
BIM	Building Information Modeling
BNC	Building and Construction Network
BS	British Standards
CASS	Corporate Administrative Support Services
CCS	Carbon Capture and Storage
CES	Certification Event Sustainability
CEO	Chief Executive Officer
CER	Certified Emission Reductions
CFC	Chlorofluorocarbons
CSP	Concentrated Solar Power
CH$_4$	Methane
CO$_2$	Carbon Dioxide
CTSS	Corporate Technology Support Services
DED	Department of Economic Development
DEWA	Dubai Electricity and Water Authority
DSCE	Dubai Supreme Council of Energy
DSC	Dubai Statistics Center
DP	Dubai Port
DTC	Dubai Taxi Corporation
DWC	Al Maktoum International Airport
DXB	Dubai International Airport
EFR	Equivalent Fatality Rate
ELC	Event Life Cycle
EGA	Emirates Global Aluminum
EN	European Standards
EMS	Environmental Management System
EPS	Earning Per Share
EU	European Union
FDI	Foreign Direct Investment
FIFA	International Federation of Association Football
GCC	Gulf Cooperation Countries
GDP	Gross Domestic Product
GCR	Global Competitiveness Report
GESI	Global Entrepreneurial Spirit Index

GRI	Global Reporting Initiative
GVA	Gross Value Added
GWh	Gigawatt hours
HE	His Excellency
HH	His Highness
HNWI	High Net Worth Individuals
HVAC	Heating, Ventilation, and Air Conditions
IOC	International Olympic Committee
IOBC	Istanbul Olympic Committee
ISO	International Organization for Standardization
IPCC	Intergovernmental Panel on Climate Change
IRB	Institutional Review Boards
ITU	International Telecommunication Union
KSA	Kingdom of Saudi Arabia
LA	Licensing Agency
LCOE	Levelside Cost of Electricity
LEED	Leaderships in Energy and Environmental Design
LOCOG	London Organising Committee of the Olympic and Paralympic Games
MBR	Mohammed Bin Rashid
MD	Managing Director
MED	Multi-Effect Desalination
MENA	Middle East and North Africa
MoU	Memorandum of understanding
MOCD	Ministry of Community Development
MSF	Multi-Stage Flashing
MW	Megawatt
N$_2$O	Nitrous Oxide
NGO	Non-Governmental Organisation
NOC	National Olympic Committee
LOC	Local Organising Committee
ODA	Olympic Delivery Authority
OG	Olympic Games
OGGI	Olympic Games Global Impact
OECD	Organisation for Economic Co-Operation and Development
OWG	Open Working Group
OPEC	Organization of Petroleum Exporting Countries
PhD	Doctor of Philosophy
PLC	Project Life Cycle
PV	Photovoltaic
PTA	Public Transport Agency
RA	Rail Agency
RERA	Real Estate Regulatory Agency
RO	Reverse Osmosis Desalination

ROI	Return on Investment
RTA	Road and Transport Authority
SCG	Strategy and Corporate Governance
SDT	Self-Driving Transport
SDTBL	Sustainable Development Triple Bottom Line
SDG	Sustainable Development Goals
SED	Sustainable Event Alliance
SMEs	Small and Medium Enterprises
SMS	Sustainable Management System
SRRPD	Safety Risk Regulation and Planning Department
STBL	Sustainable Triple Bottom Line
SQKM	Square Kilometre
TRA	Traffic and Roads Agency
TEU	Twenty-Foot Equivalent Units
TOP	The Olympic Partner
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Program
UNGA	United Nations General Assembly
UPVC	Unplasticized Polyvinyl Chloride
USD	United State Dollar
VAT	Value Added Tax
VANOC	Vancouver Organizing Committee
VOC	Volatile Organic Compound
VP	Vice President
WAM	Emirates News Agency
WCED	World Commission on the Environment and Development
WC	World Cup
WSSD	World Summit on Sustainable Development

Chapter 1 Introduction

1.1 Research Overview

Many organised global events are mega-projects that have to be managed so as to be fully sustainable. A world fair or 'expo' (exposition) is one such category of event, requiring sustainability to run through project planning, preparation, execution and closure, as well as the management of its legacy. This thesis concentrates on the sustainability practices involved in preparing for a global event and planning for its eventual legacy. The empirical research examines one contemporary World Expo event and mega-project, based on a case study of the sustainability practices for Expo 2020.

The Sustainable Development Goals (SDG) Report (2016) for the Dubai Expo2020 commitment declares:

> Expo looks to create long-term partnerships through global collaboration. With a focus on sustainability, the United Arab Emirates (UAE) is developing its future access to clean water, actively encouraging renewable energy generation, waste management, energy efficiency, clean transportation, and technology development. (SDG Report, p. 33)

As Expo 2020 Dubai will be the first mega-event hosted not just in the Gulf Cooperation Countries (GCC) but in the Middle East and North Africa (MENA) region, research on sustainability practices and legacy considerations has to be intensive and reliable in order to provide a baseline framework from which to expand the benefits and reduce the negative impacts of such events on the MENA region as a whole, in addition to the host city and surrounding area.

There is a shared understanding among researchers as to what constitutes a mega-event: characteristics include a high-profile spectacle and event held over a limited duration and with repetitive time frequency, involving changes to the built environment,

attracting national and international interest and enthusiastic spectators to the city, and with international significance (Ritchie, 1984; Getz, 1997; Hiller, 1998). The foremost mega-events that share these characteristics are the Olympic Games (OG), World Expo, and The World Cup. ISO 201212 defines the event owner as the 'entity that commissions the event'. The Bureau of International Expositions (BIE), who are responsible for commissioning world fairs such as World Expo, and the International Olympic Committee (IOC), responsible for commissioning the OG, share many similar criteria that hosting cities should meet in order that their candidacy for one of these two mega-events be accepted. The International Federation of Association Football (FIFA), responsible for commissioning the World Cup, recently requested similar criteria; however, the FIFA world cup is hosted across many cities while Olympic and World Expo mega-events are hosted by one specific city, known as a 'solo site'. The BIE and IOC use the concept of competition between cities as leverage to secure the most favourable terms from the host city candidates and their governments (Hiller, 1998).

World Expo is 'a global event that aims at educating the public, sharing innovation, promoting progress and fostering cooperation' (BIE, 2015). This research considers World Expo as the most exemplary type of mega-event, due to the fact that BIE is the event owner for many other events such as *International Specialised Expos* (similar to World Expo but smaller in scale and usually lasting three months, between two World Expos), *The Horticultural Exhibitions* (specialising in improving quality of life within a green area by presenting developments in agriculture, horticulture and landscaping), and *Triennale di Milano* (focussing on the latest trends in architecture, fashion, film and designs, this event has taken place in Milan since 1933). These Expos are categorised as universal, international and specialised (Kulsariyeva et al., 2014), yet

none is considered a mega-event.

Hosting, or bidding to host, a mega-event is considered to help the destination improve its national image; create positive economic, social and cultural impacts; and expand the tourist industry through an increase in both domestic and international tourists. Getz (2008) defined a tourist destination as involving 'the systematic planning, development, and marketing of events as tourist attractions, catalysts for other development, image builders, and animators of attractions and destination areas'. Such activity affords an opportunity to enhance the country's image and brand value (Roche, 2000; Song et al., 2015). Further, Roche (2000) postulated that mega-events help to advance modernisation and globalisation on a wider scale. Mega-events have considerable significance in terms of the exchange, transfer and diffusion of information, values and technologies. They occur in multi-annual cycles, which helps people to periodise their lives in terms of 'life events'. Song et al. (2015) argue that mega-events are experiences likely to stimulate visitors' cognitive and affective responses, leading to visitor satisfaction. According to Roche (2000), the staging of mega-events is important in creating and sustaining the 'story of a country'.

The trend towards encouraging sustainable development in mega-events began during the 1990s with the onset of the concept of the international green wave, which was considered a significant victory for the growing environmental awareness movement. Expo 2020 Dubai is a golden opportunity for the entire GCC area to adopt further sustainability and environmental practices; the organisers can learn from overseas experts and encourage stakeholders to adopt sustainability practices. The challenges of achieving sustainability are not simple or straightforward; they are numerous and multi-faceted, and require major stakeholder management. The author of this Ph.D.

thesis is aware that 'sustainable development' and 'globalisation' attract considerable attention in public policy debates (Gaffney, 2013), and that hosting mega-events requires the application of both concepts.

The United Arab Emirates (UAE) is currently regarded as the pearl of the Arabian Gulf, particularly when considering the continuous and rapid development that started over 30 years ago. Along with the form of development adopted in the UAE, there is significant evidence that the development learning cycle can be sustainable, rapid and productive. Many of the initiatives and strategies applied were instigated before securing the hosting of Expo2020. Currently, Dubai wants to use Expo as one of the catalysts to progress the development of the Emirate and to create a long-lasting legacy. In wider terms, the UAE's leaders were adopting initiatives to become international players in green energy and a sustainable future long before bidding for any mega-event. Masdar, the Abu Dhabi Company for renewable energy and sustainable urban development established in 2006, is a reflection of the vision of the UAE's leaders for a sustainable future. Three decades prior to that, in 1976, the Abu Dhabi Investment Authority (ADIA) created investment funds to use the returns from oil for long-term value creation in order to sustain the progress of future generations in the country. The Dubai government invested in various sustainable sectors, such as air travel, by owning one of the largest and most competitive fleet operators (Emirates Airline). They also have substantial investment in the maritime industry, notably through Dubai Port (DP), one of the world's largest port operators. The new Dubai Industrial Plan 2030, initiated in 2016, aims to establish Dubai as 'an international hub for knowledge-based innovation and sustainable industrial activities'. Dubai Clean Energy Strategy 2050 has set targets to increase the clean energy mix to 25% by 2030 and to 75% by 2050.

Dubai is one of the seven emirates comprising the UAE. The current population of Dubai is now estimated at over 3.1 million people with 14-16 million visitors annually. In 2015, the Paris Agreement within the United Nations Framework Convention on Climate Change set a new pathway to low carbon and sustainable development goals (SDG), establishing a critical new framework for the Dubai government in terms both of domestic and foreign policy, and ensuring that Expo 2020 would be a showcase for the city's efforts in this direction. The event is expected to play a major role in the transformation of Dubai into what Friedmann (1986) conceptualised as a 'world city', as well as making Dubai more sustainable through its adoption of advanced city sustainability practices. Both outcomes are equally important: being a 'world city', 'entrepreneurial city' (Hall and Hubbard, 1998) or 'global city' (Sassen, 1991) will help Dubai address the challenges that many major cities face as a result of economic restructuring and power shifts through *place marketing* in order to win the *place war* (Kotler et al., 2002). Being a sustainable business hub among other competitive cities will ensure a sustainable future for Dubai.

The expectation is that hosting an event such as Expo 2020 will promote the economic competitiveness of Dubai and will be a showcase for place marketing. The expected outcomes of this mega-event include attracting inward investment and strengthening the future of the city, as Dubai's government and corporate managers have learnt many valuable lessons from the recent financial crisis of 2008–2009. The primary objective of initiatives such as 'Smart City' launched in 2014 was to provide seamless services to the public, with 1,000 government services transferred into smart services over three years in areas including transport, communications, infrastructure, electricity, economic services and urban planning (Government.ae 2013). In 2017, Dubai Plan 2021 was launched to develop Dubai as a smart and sustainable city. Many more

projects, such as Sustainable City, Dubai South District and Dubai Silicon Oasis (Government.ae 2017), have also been launched. Dubai, as a commercial and societal economy, is benefitting from the experience of constructing mega-projects like the USD 12 billion Palm Jumeirah project and the USD 7 billion Dubai Metro. Xing et al. (2008) have argued that 'The management of a mega-event can be treated as a gigantic project with numerous parts and pieces connected by many goals and varied objectives.' The Dubai government recognises that today's challenges are too complex and interconnected to be solved in isolation; for this reason, Expo 2020 is seen as a government-supported initiative to connect creative minds and forge new partnerships for years to come (Expo live, 2016).

1.2 Scope

The scope of this research is limited to the seven years of preparations for Expo 2020 starting from 2013, which will be examined and reviewed based on the sustainability commitments and anticipated legacy outcomes of this event. This thesis explores four propositions on sustainable mega-events, together with the legacy impact of those events.

1.3 Research Problem

A mega-event itself is an initiative that creates a series of unsustainable outcomes, and aiming to make such an event sustainable for the host city is always challenging. The most common understanding of sustainability is derived from assessment through the social, environmental and economic pillars. However, it can be very challenging to achieve and maintain balance and equivalent significance between these three pillars over the Project Life Cycle (PLC). This research seeks to understand the practices that help maintain a balance between the three pillars and to discover the success factors

that can influence sustainability. The author argues that the use of mega-events to trigger development could be the main reason for the unsustainable nature of many mega-events. This research explores how to avoid this problem and how to ensure that the mega-event is an integral part of the development plan for the city, with appropriate reparative action planned. Furthermore, as legacy and sustainability have been competing in importance during the last few mega-events, the author intends to demonstrate how these two concepts could complement each other rather than competing for priority. The rationale for this approach lies in the nature of mega-events, which require a long period of preparation but are implemented within a limited project period. While some people believe that the journey in its entirety has to be sustainable, others hold that the key objective has to be planning for the legacy of hosting these events. The final challenge addressed in this research lies in the overall goal of hosting a mega-event so as to create a positive legacy, and to advance sustainability by using such events to change the practices of the host city and country. In summary, mega-events should act as a catalyst for attitudinal and behavioural changes throughout the hosting country that lead towards a more sustainable model of development.

1.4 Research Aims and Objectives

This study aims to create a learning hub from different case studies of mega-events around the world, to gather the best practices of sustainability applied to those events, and compare these with the current sustainability practices of Expo 2020. This thesis concentrates on the literature on London OG 2012. This study aims to discover how hosting a mega-event can enable construction, utilities and transport to achieve greater environmental sustainability and meet international standards. Since Dubai has

achieved several milestones in improving sustainability practices in these fields, this research offers an opportunity to examine what was achieved in other venues compared with the contribution from hosting Expo 2020.

Dubai is progressing to achieve what Friedman (1986) calls 'world city' status through various initiatives including those of the 'smart city' and 'sustainable city'. Richards and Palmer's (2010) conceptualisation of the 'eventful city' is one that mega-event hosters can adopt in order to generate effective stakeholder networks. The concept encourages longer-term development by creating events with a long lead time, which align with the national strategic vision. The implicit assumption here is that there is capacity for sustainable progress, while stakeholder complexities will be minimal as the mega-event is likely to foster a sense of national pride and increased belonging which will contribute to a successful event.

This research aims to provide a list of recommendations for hosting mega-events that identify how to overcome the common shortfalls experienced in past events. The post-event period requires specific attention and recommendations for practice, as IOC, Expo and FIFA have no effective system to measure the post-event impact on urban planning, venue use and overall social equity.

Another important purpose of this research is to create a proactive framework for hosting mega-events in developing countries to be implemented before the event takes place. Through a review of the literature, this research assesses how far previous international sustainability practices can be applied in Dubai, by evaluating them based on the vision of how to obtain a sustainable future. In order to achieve this objective, the thesis undertakes a review of the literature on sustainability in sports and commercial mega-events, presents a log of the course of events and lessons learned,

and examines three cases that achieved the most effective sustainability outcomes to discover and shed more light on the practices followed by the hosting cities. Based on this analysis of the literature, the thesis identifies which practices are not yet deployed in Dubai Expo 2020 and examines their feasibility for the hosting committee.

In the review of the literature, this research examines how to achieve sustainability commitments during the critical stages of event planning, where the pressure of deadlines can lead to numerous compromises on environmental commitments. This research intends to develop an informed understanding of the impact of the social and economic pillars on environmental considerations. It is assumed that such compromises on sustainability goals are likely to appear more strongly in certain sectors than in others. For this reason, this research concentrates on the most pressurised sectors and analyses environmental sustainability alongside the overall changes in commitments to sustainable development over the project's lifecycle. One tentative working proposition of this research is that the mega-event should be used as a catalyst for change, where its sustainability practices can be communicated and diffused to create a higher level of awareness of sustainability throughout the host country and beyond. Thus, sustainability practices are explored and assessed in several sectors in order to gain a deeper understanding of some of these most pressurised sectors.

1.5 Research Questions

The central research questions addressed in this thesis are as follows:

- How can a developing country be sustainable across the ELC when hosting a

mega-event for the first time?

- How can a long-lasting tangible and intangible legacy be created from a mega-event?

- How can the mega-event legacy be included as part of the sustainability plan?

In order to answer the above questions, the author reviews and evaluates the opportunities and threats generated by mega-events, and explores the current and expected levels of sustainability in the UAE through examining stakeholders' readiness for sustainability. This problem requires an understanding of the overall sustainable development plan which prompts the first sub-research question:

• How can planners optimise the opportunities offered by the mega-event for long-lasting sustainability?

It is noticeable that many of the dossiers submitted by cities during the bidding stage attest that, if they win the hosting of the mega-event, they have planned commitments for sustainable urban development. Those dossiers are considered as actual plans only once the city wins the bid; many of these commitments are thus unlikely to happen if the city is not selected. This means that host cities initiate major construction and infrastructure projects designed to be built principally in order to host the mega-event which are unlikely be viable in terms of their execution costs after the event. Mega-events that lead to the building of structures which countries do not really require can never achieve a sustainable outcome, no matter how sustainable the method of project execution. Arising from this situation, the second sub-question emerges.

• What is the optimal level of 'hosting spend' compared to the event-related spending on the legacy and its sustainability? What about the intangible legacy? How should decision-makers ensure that host cities will not build what is not needed after the event?

Seghezzo (2009) complains that there is no common understanding or definition of the term 'sustainable development'. He relates the difficulty to the fact that sustainability is 'highly contingent and site-specific' (Seghezzo, 2009, p. 552). For this reason, this thesis seeks to develop an understanding of the following sub-question.

• What sustainability practices from previous mega-events are relevant to the context of Expo 2020 Dubai?

Gaffney (2013) states that mega-events are global consumer spectacles which fundamentally contradict the discourse of sustainability. In addition, much of the development surrounding mega-event locations and the stadium take place outside the overall concept of democratic practice and actual sustainable development. The mega-event's stakeholders usually finance the event and can be dramatically affected by its degree of success, yet still have a very limited contribution to or influence on many of the decision-making processes. This prompts the research sub-question on stakeholder management.

• How can a sustainable stakeholder management framework be created to reduce complexities and increase sustainable social practices?

Another fundamental phenomenon encountered by many mega-events is that stakeholders perceive sustainability practices to add expense to the project: the rule of thumb applied in project management is that sustainability practices add 10–15% over the execution of the project. As a result, sustainability commitments are relegated to a lower level during the PLC, generating the following sub-questions:

• How can a proper plan for stakeholder management be established to maintain the same commitment to sustainability during the project life cycle?

As transport activities are a major source of pollution, this research provides an important opportunity to advance understanding of the following sub-question:

• How can the impact of the transportation of building materials, workers, and spectators be reduced in the environment of the host city?

There are several important areas where this study makes an original contribution to environmental sustainability, including solutions to energy production and consumption; biodiversity protection; wastewater management; construction waste and event spectator-related waste and emissions; and environmental approval of suppliers' materials. Other areas discussed include compliance with the universal greenhouse gas reduction protocol; seawater desalination; using thermal solar panels instead of regular solar photovoltaic panels (further study still needed to consider the dust and dew impacts (Kennett, 2010)); environmentally friendly cooling technology and carbon neutrality strategy; transport challenges; and natural resources protection. The literature review of this thesis refers to London OG 2012 as an example from which to learn and identify how, despite the UK being more sustainable than the UAE in relation to the use of natural resources, the Dubai government can adopt appropriate practices in its programme management of Expo 2020 and ensure that sustainability practices and legacy creation are the concerns of all of the powerful stakeholders. To this end, the project management style is central, in planning, initiating, setting standards, managing and controlling stakeholders of the entire project. For this reason, this research sets out to answer the following environmental sustainability question:

• How can a city improve its sustainability practices during several hosting stages in a high resource-consuming mega-event?

Sustainability practices in the GCC area are essential, not an optional extra; several

GCC leaders have stressed this point on different occasions and claim that the future of the GCC in the post-oil era will depend on the region's current development and investment in sustainability. Qatar and the UAE have produced long-term strategies for achieving sustainability goals and they are not alone as the following visions are currently under execution or have recently been published: Qatar 2030, Abu Dhabi 2030, UAE vision 2021, Oman vision 2040, Kuwait vision 2035, Bahrain vision 2030, and KSA 2024. Some of those sustainability strategies are already partially complete, with significant sustainability milestones already achieved. However, those practices will be radically empowered through the experience of carrying out national projects in hosting mega-events. Ma et al. (2011) reflect that decision-makers are commonly considering mega-events as a means to initiate a development plan or regeneration strategy for their cities; such practice has been successfully adopted by two GCC cities so far, and significant developments suggest that more are yet to come.

1.6 Research Propositions

The Sustainable Event Alliance (SEA, 2018) presents a number of aspects of how to achieve a sustainable event, stating that 'the host city, region, or country that an event is held in will have a significant part to play in the eventful sustainability performance of events held there'. Those aspects are categorised under four elements of the sustainability index: environmental, socioeconomic, event industry, and sustainable tourism. Those four aspects were assessed and evaluated in three case studies of the processes carried out in preparation for Expo 2020. This next section explains, and endeavours to justify, the methods employed in the three case studies and explains the theoretical rationale behind their implementation. In addition, the reasons for the

selection of these three case studies are explained, along with a brief account of the scope and relevance of the findings.

This thesis selects a qualitative case study methodology for its main research orientation due to the type of research questions raised. This also helps to ensure that the researcher has no control over the behaviours and events under study when investigating a contemporary event. Yin (2013) indicates that research questions including *why*, *how* and *where* are amenable to case study research strategies. In general terms, the main methods of empirical data collection include semi-structured interviews, semi-participant observation, field notes from sites visits to principal stakeholders, official releases by key stakeholders, and archival data. The central purpose of these case methods is to understand how sustainability practices develop or decrease during the PLC. Furthermore, reading about the practices of many ancient groups of people and the sustainability of their historic communities, along with reading about the positive and negative impacts of hosting mega-events helped the author to identify relevant theoretical and methodological issues for exploration in the thesis. The four theories explored throughout the research are addressed in the following propositions:

Proposition One. Allocating equal priority to the three elements of the Sustainable Triple Bottom Line (STBL).

Elkington (1997) states that the three dimensions of sustainability are the economic, social, and environmental dimensions and they should be prioritised equally in order to achieve a truly sustainable event. Prioritising one pillar over another will create an imbalance in the overall sustainability strategy. This research explores and assesses the

extent to which Dubai was able to maintain a sufficient balance between those pillars during the ELC, despite the challenges presented within each dimension.

Proposition Two. Event owners should create award systems for sustainability in mega-events. The author argues that the competitive environment created by event owners between candidates seeking to host the event is not healthy. The rationale for this assertion is that many cities propose development plans and upgrading of infrastructure without a real need for either, and they do so merely to comply with the event owner's competitive tender requirements. In order to avoid this negative scenario, mega-events should be awarded to cities or countries demonstrating an existing operational development plan, which are able to include the mega-event within the overarching plan as opposed to using the event to trigger development on a wider scale. Dubai is an appropriate place to justify the importance of this theory with an existing development plan under implementation over the last 20 years. Alongside this overall context, Dubai paid out a number of strategies ahead of the event. Jauncey and Nadkami (2014) indicate that the Dubai Department of Tourism and Commerce's marketing plan and increased visitor goal of 20 million by 2020 was set prior to the Expo 2020 bid. The infrastructure development plan for Dubai was set before securing Expo 2020, and the mega-event is intended to make an integral contribution to its realisation.

Proposition Three. The critical importance of balance between legacy and sustainability. Through the literature review, this thesis seeks to demonstrate the problematic relationship between the two terms and how they impact on each other. Legacy and sustainability in mega-events should complement each other as proposed

by Gold and Gold (2013), as pursuing legacy exclusively will break the sustainability system, while solely concentrating on sustainability will fail to create a long-lasting legacy.

Proposition Four. A mega-event's main mission is to be a catalyst for change.

Many mega-event hosts use the mega-event process as a catalyst for development. In line with many other researchers, this author argues that these events have to be used as catalysts for change (Schmidt, 2006; Deng & Boom, 2011; Dinnie, 2016; Zollner, 2016). China underwent major changes in its approach towards environmental concerns after Expo 2008 and OG 2010. Dinnie (2016) presents a striking example of the capacity of these events to change the perceived image of the host destination; for example, South Korea underwent a major change in global recognition and brand value after FIFA 2002 which boosted exports and raised the nation's brand image abroad. Today, sixteen years after this event, South Korean brands are internationally recognised and have a strong competitive edge over many older brands. Germany similarly used FIFA 2006 to change the image of Germany to a more friendly and welcoming country. Zoliner (2016) goes so far as to argue that this event was a catalyst to re-branding Germany as a hip and trendy place to visit and work. OG 2012 in London is also considered by many researchers to have been a 'once-in-a-generation opportunity' to refresh both the city's marketing strategy and its global positioning. These four propositions are examined through the following theoretical framework:
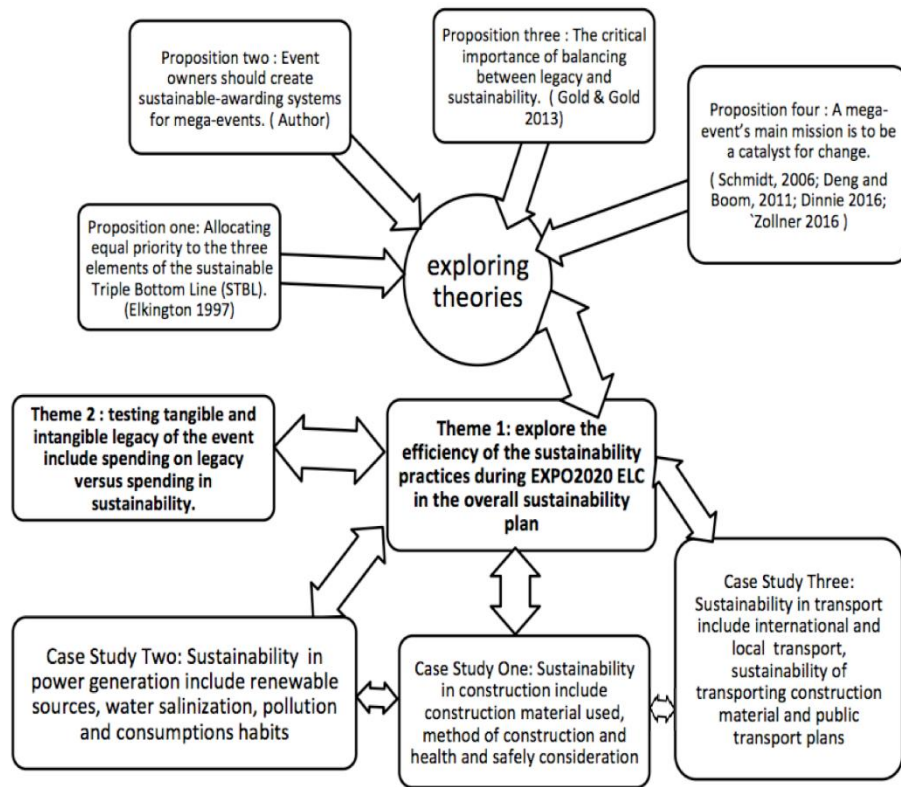
Figure 1.1: Research design

1.7 Significance

This research addresses the gap in the literature on the importance of the equal prioritization of the SDTBL for hosting mega-events in GCC countries and how to deploy such events in developing a sustainability model with long-lasting legacy. While the UAE and Qatar succeeded in securing two events that require some sustainability prerequisites, they so far have failed to host the OG where the sustainability requirements are much higher. Only a limited amount of research has examined mega-events in the GCC area and its sustainability practices (Kennett, 2010; Weber & Ali-Knight, 2012; Sofotasiou et al., 2014; Wittkunh & Reiche, 2015) and, to the best of the author's knowledge, none has yet investigated the different aspects of

sustainability practices in the post-hosting period of mega-events.

Xing et al. (2008, p. 332) stated that 'The management of a mega-event can be treated as a gigantic project with numerous parts and pieces connected by many goals and varied objectives.' Professional and efficacious project management practices are required and can mean the difference between merely hosting a mega-event, and hosting a successful mega-event with a long-lasting legacy. However, one has to bear in mind that mega-event projects create mega-complexity. Learning from previous mega-events and their stakeholder management strategy is made harder by the fact that the GCC countries share some unique cultural and environmental characteristics which differ widely, even from their close Arab neighbours. The successful project management of mega-events must involve complex systems that adopt the best practices in sustainability, yet apply them within the specific GCC framework. This research considers the GCC-specific project management practices of hosting a mega-event by reviewing and assessing the implementation of best practices in project management.

In order to cover distinct public and private sector issues, this research collects and analyses different governmental and private-sector settings and documents. To investigate the issues of transport, and the current capacity and efficiency of the transport system, the thesis must cover various modes of public transport, sea transport, infrastructure plans and airports, roads and metro railways. This research examines the sustainability of the current system, comparing it to international transport systems in countries such as the UK, Japan and China. The construction methods and standards employed are based on comparisons to several international standards, including LEED, ASTM, EN, and BS. The rationale for analysing current construction practices

is that this provides a clear indication of the extent of sustainability and unsustainability in relation to materials used, recycled content and the construction waste management system. The energy supply is another major subject that should be considered specifically in the UAE, which has made significant progress in the production of clean energy and a reduction in dependency on non-renewable energy sources. Government entities including QEWC, ADDC and DEWA play a major role in influencing the consumption habits of organisations and consumers in water and electricity, and this informs this research into finding the best stakeholder management plan to achieve increased sustainability.

This research is an important opportunity to advance understanding of sustainability practices across the project life cycle of hosting mega-events, and within different sectors for a non-sporting event. It studies sustainability practices by examining all aspects of hosting the mega-event as an overall programme; however, the specific focal case studies are generated from three principal sectors – construction, transport, and energy. This research offers some important insights into differences between sustainability practices as commitments and achievements over the different stages of the PLC., and intends to raise the level of awareness about sustainability practices and changes in the commitments to sustainability during the PLC. This research is based on one empirical case study of a mega-event to take place mainly in Dubai, although the data collection extends to many other locations across the UAE.

Throughout this thesis, the term *sustainable development* was used to emphasise the relationship between social organisations, economic development and some form of resource preservation, as Hayes and Home (2011) identify. Gaffney (2013) argues that the concept of sustainable development disengages the concept of sustainability from

its initial subject matter and meaning: 'As the concept of sustainability became increasingly distant from environmental matters and extended to the realms of production and consumption, the term began to lose much of its early coherence' (p. 3927). To date, too little attention has been paid to this idea or to different implementations of sustainability, or to the impact of pursuing sustainable development on the overall outcomes of sustainability. A basic assumption of this research is that the introduction of the environmental concept of sustainability to mega-events in the 1990s was a victory for the 'green movement', and that the more comprehensive approaches to sustainable development surpass the concept of environment protection by creating a complete system that addresses social and economic considerations alongside the environment.

So far, there has been little discussion about how the 'environment protection' element of the concept of 'sustainable development' has been applied as a means of relieving public stakeholders from facing the real dilemma of how to host mega-events without contributing to the planet's major problems such as global warming. Gaffney (2013) asserts that, due to the current nature of the planning structures for mega-events, 'there is almost no way that a sustainable OG can be achieved' (p. 3928). The criticism around hosting mega-events is continually accumulating. Hall (1992) highlighted that a badly managed mega-event can generate catastrophic financial losses, with sometimes irreparable political, social or environmental damage. Toohey and Veal (2000) theorise that many mega-events share a common legacy of huge debt and under-utilised infrastructure. Kearnis and Pavlovich (2002) found that mega-events are 'inherently unsustainable' as the event's duration is short while the impact is long-lasting. Meanwhile, Death (2011) claims that the best way to reduce the ecological footprint of a mega-event is not to hold it. Hall (2012) expounds that the role of political and

corporate interests in promoting the economic benefits of hosting mega-events is a symptom of the complications caused by the contemporary neoliberal way of thinking about mega-events in general; they promote mega-events as a solution to problems of place competitiveness rather than place sustainability. Brown et al. (2015) argue that the vast expenditure on these events primarily benefits the 'elites in society' and that decision-makers should evaluate the cost-benefit analyses based on the overall worth of the event.

1.8 Research Strategy

The empirical research for this thesis has been designed to understand the overall concept of sustainable development in a mega-event, in a geographical context where only a limited number of related research studies have been conducted. An extensive literature review has been undertaken in order to understand the concept of sustainability and situate it in the context of the mega-event. This was followed by the analysis and development of a plan on how to deliver a mega-event sustainably, a specific case study on London OG 2012, and what practices the organisers were able to adopt in order to host a sustainable Games. Later, in the review of the relevant literature, the concept of the triple bottom line for sustainability is explained, along with discussion on who should be the key stakeholders in such cases and their respective roles in achieving sustainability. Furthermore, the literature review includes paragraphs dedicated to each sub-case on mobility, energy and construction in mega-events. Finally, the legacy considerations and the legacy plan for Expo 2020 are assessed.

The research adopts the concept of a multiple case study approach in order to achieve the research objectives, with three cases focussed on construction, energy and mobility

in mega-events. These three cases helped the author to gain an in-depth understanding of the sustainability practices adopted in those industry contexts and how each affects the overall concept of sustainability. Each sub-case study involved a set of interviews, some of which addressed more than one sub-case. The primary data were collected through a number of means, such as interviews, field observations and field notes, and investigation of archival records of published and unpublished documents. The collection of the data followed the principles outlined by Yin (2003) as based on 'multiple sources of evidence.' The three sub-case studies selected examine the same set of problems; each sub-case has its own distinct data and requires flexible methods of data analysis and interpretation to build the overall case study. A case study database was created, assembling the evidence for each case study report. The chain of evidence for each sub-case study was maintained and assessed for each case. The research reports on the UAE governmental and organisational practices on sustainability to the Global Reporting Initiative (GRI), which is frequently used in developed countries but is less often applied in GCC countries. The case findings and major themes identified contribute to the stakeholder management framework developed in this thesis. This framework consists of a set of observations and recommendations and is intended as a guide for practitioners hosting sustainable mega-events. The sampling approach for the case study research is based on purposive sampling and was implemented by selecting interviewees who represent the highly interested-powerful stakeholder type relating to sustainability issues in hosting mega-events.

This research relies on the results of qualitative case study methods since the main research question, which contains several sub-questions, seeks to answer questions about 'how' and 'why'. Inevitably, the researcher has limited influence or control over any of the activities and mega-events which will occur over the next few years. This

research addresses a contemporary phenomenon. In these conditions, Yin (2014) argues that the case study is more appropriate than many other alternative research designs. The thesis includes one major case study on the sustainability practices of Expo 2020 and three sub-cases that are interconnected through the case problems and themes of sustainability, legacy and mega-events. Those three case problems and themes were tested in different sites and with different stakeholders in order to triangulate the results and establish validity. All the case studies were conducted within the main case study protocol during the data collection stage and, accordingly, each sub-case contributed to the case study database which improves the reliability of the research (Yin, 2014). The purpose of the case study is to explore the research questions, analyse ideas and assess specific theories identified in the literature review as worth considering in the light of the research problem.

An important objective of this research is to identify the optimal sustainability practices for Dubai during its preparations for hosting its first mega-event. Despite the government's efforts to raise local awareness of the importance of sustainability practices, researchers have not given much attention to sustainability practices during any mega-project or mega-event in the UAE. Gaffiney (2013) argues that an obvious contradiction exists between the sustainability practices for hosting a mega-event and the event itself, as these events are high-consumption global initiatives to increase the host's markets, which often significantly challenge and compromise the sustainability practices of the host city. This research observes the overall sustainability practices and monitors how much is achieved during the PLC, although it does not include the event itself.

1.9 Design Limitations of the Study

The research is subject to constraints on access to and reporting of certain information which is considered confidential for different reasons. The Expo construction team operates a single point of contact strategy by referring all questions to one specific manager whom the author was permitted to interview. It is understood that many people involved in implementing mega-events find it challenging to be questioned and observed; moreover, the main stakeholder may not wish to communicate information about the project during the execution phase and may prefer to reflect on it after the project's completion.

The scope of this research omits many relevant fields of concern in mega-events, such as international exposure, political achievement, community impact, innovation and city branding. This empirical research study was also unable to observe the event itself in the final stages before completion and commencement, due to the timeframe of the PhD thesis. Likewise, since mega-events have the potential to exhibit a learning curve that improves from one event to another, it was not possible to assess the data gathered from the lead-up to Expo 2020 Dubai and apply it to WC 2022 in Qatar. Furthermore, whereas the research considers legacy as much as sustainability, most of the literature on legacy concentrates on the tangible legacy, such as transport systems, airports and event venues. However, the intangible legacy, such as knowledge gained, civic pride and international recognition, cannot be examined and explained as readily as can the tangible legacy, although the intangible legacy is often more important, particularly for first-time event hosts. Finally, the time constraints of the research led to some compromises in research direction and identification of flexible ways of moving forward with the available information and data collected at the time of the case study research.

1.10 Research Approach and Justification

This research examines the application of some of the best-applied sustainability practices in the world for a mega-project type that is being conducted for the first time. The United Arab Emirates (UAE) has witnessed the execution of various mega-projects, such as Burj Khalifa, Palm Jumeirah, Yas Island and Dubai Mall. Currently, a number of mega-projects are simultaneously in progress including Dubai Metro, Meydan area and Dubai Creek harbour. However, mega-events contain a cluster of mega-projects, and receive significant international exposure and influence from international bodies which apply different standards of project management practices to those common in the construction of mega-projects. Mega-projects usually generate strong stakeholder complexities due to the nature of the project which contains multiple levels and involves varied, powerful stakeholders. However, the paradox is that, while most mega-events are financed by and affect local stakeholders, local stakeholders often have limited influence over the decision-making process (Hayes & Horne 2012).

1.11 Overview of Chapters

This thesis contains seven chapters:

Chapter 1 – Introduction: this chapter gives an overview of the research, and elaborates on the research problem, scope, research aims and objectives. In addition, the chapter presents the main research questions along with the sub-questions and how these were formed, together with the significance, the research strategy, the research limitations, and the structure of the thesis. This chapter also includes the four propositions tested by the author.

Chapter 2 – Literature Review – Sustainability in Mega-events: This chapter presents

the literature review which is designed to give an overview of the mega-event and how concepts of sustainability have developed over the years. The discussion focusses on sustainability in general, sustainability in mega-events and sustainability in the context of hosting a mega-event. It explains the triple bottom line of the sustainability pillars, presenting the benefits and consequences of hosting the mega-event and how this will affect the overall sustainability concept. In this chapter, the four propositions are linked to the literature. This chapter also includes lessons in sustainability learned from London OG 2012 as a case study. The sustainable development triple bottom line is discussed in a separate section.

Chapter 3 – Literature Review – Legacy in Mega-events: this part of the literature review represents the role of legacy in the sustainability practices during a mega-event, and how such events can build a strong legacy. The mega-event legacy plan is discussed along with the social impact that such events can create in the overall legacy outcome.

Chapter 4 – Methodology: this chapter includes the methodology used in this research. The research philosophy, research strategy, and the methods of executing the case study are also presented. In addition, the limitations of the research methodology, and the validity, reliability and generalisability of the research were presented, along with the research ethics and other possible ways of conducting this research.

Chapter 5 – Case Studies – Data Context and Analysis: this chapter is divided into five main sections. The first explains the research context and background for the case studies by presenting the key stakeholders of Expo 2020, the principle of sustainable development, an overview of Expo 2020 and the sustainability practices in UAE through the three pillars beyond hosting the event. Then, the three cases are presented

in three different sections: first, construction, followed by utilities, and finally, transport. Following these four sections, a cross-case analysis is presented along with an analysis of utilities and transport only, as these two cases have more governmental involvement compared to construction. Finally, another cross-case analysis is completed between construction and transport as these two cases include construction methods and their sustainability. This is followed by a chapter summary giving an overview of the entire chapter.

Chapter 6 – Discussion of the results and the proposed Sustainability framework. This chapter discusses the results of the case study research by presenting the sustainability and legacy considerations for the mega-event: the economic, social and environmental pillars are presented along with the two sustainability success factors that impact on the study, i.e. 'design' and 'leadership'. The chapter also presents the answers to the research questions, along with the theoretical and managerial implications. The last two sections respond to the research objectives and present the research limitations.

Chapter 7 – Conclusions and Recommendations: in this chapter, the research results and the research recommendations present multiple recommendations to Dubai stakeholders, event owners, future bidders and academic researchers. The last two sections present the pattern for generalisation and the naturalistic generation.

In the following chapter, the author presents the literature review.

Chapter 2 Literature Review - Sustainability in Mega-Events

2.0 Introduction to the chapter

This chapter comprises eight sections structured to introduce relevant literature that supports the four propositions stated in Chapter One. The first section provides an overview of the mega-event and how this industry is growing along with the development of sustainability practices. An overview of the rationale behind Propositions One and Two is presented. The second section describes the route of sustainability into mega-events and analyses how it is garnering further attention along with explicating the importance of balancing different sustainability pillars. This section covers further issues relevant to Propositions One and Two. Section three reviews the practicality of the sustainability practices in mega-events and the standards that provide guidelines for this subject along with an iconic case study of a recent mega-event which adopted many of these practices. Furthermore, this section explains the TBL and how the event organiser should balance the sustainability pillars. Along with Propositions One and Two, this section provides relevant information for Proposition Four on how the mega-event can be a catalyst for change.

Sections four and five provide a balanced overview of the benefits and possible consequences of hosting mega-events and their overall impacts on the sustainability pillars. The two sections aim to widen the impact of those mega-events in multiple areas so equal priority is given to each sustainability pillar. In addition, the event owner will have to achieve a balance on what they will gain compared to what they are risking. By doing so, the author of this thesis challenges the opinion that hosting a mega-event is invariably an affirmative act.

2.1 Introduction

Leaders of China, South Africa, Brazil and Russia joined the convoy of those hosting mega-events as a strategy to achieve higher international exposure and develop and enhance their cities. Irrespective of the reality that such a strategy has to be justified in order to conclude whether it is desirable or beneficial (Ma et al. 2011), it cannot be denied that this hosting strategy is widely adopted and has reached the GCC area with two significant events – the World Cup and the Expo. However, it is important to state that in the last few years, many cities had withdrawn their bid plans of hosting mega-event like Rome2020, Stockholm 2022 (lack of political support) and Krakow2022, Munich2022, and Vienna2024 (public referendums) as indicated by Preuss (2015). Since those events are global, and due to the general requirement for them to be sustainable, we can see that four out of the top seven worst international CO_2 emitter/per capita countries are in the GCC. Referring to Table 1.1 (World Bank 2018), the UAE CO_2 emissions reached 23.4 metric tons per capita, demonstrating that the path of whether or not to follow the 'green strategy' path is no longer an option. The sustainable growth of the UAE depends on the sustainability considerations that the residences of the UAE and the government should pursuit. This augments the importance of hosting mega-event in the GCC region with sustainability commitments.

Table 1.1: CO₂ emissions (metric tons per capita).

The World Bank (2018)

	Country Name	2008	2009	2010	2011	2012	2013	2014
1	Qatar	46.7	43.5	40.7	41.2	44.6	37.8	45.4
2	Curacao					39.4	33.9	37.7

3	Trinidad and Tobago	33.7	34.0	36.1	35.2	33.9	34.5	34.2
4	Kuwait	31.2	31.0	29.9	28.5	30.1	27.3	25.2
5	Bahrain	26.7	23.8	23.6	22.4	20.5	23.8	23.4
6	United Arab Emirates	22.8	21.9	19.4	19.1	19.8	19.0	23.3
7	Brunei Darussalam	24.0	20.5	21.1	24.6	24.2	19.2	22.1

The mega-event became an international attraction with high participation and willingness shown by the majority of countries involved. Yan (2013) indicated that such an event serves as an instrument in facilitating community-building and fostering urban renewal in order to provide a better quality of life and environment. It helps in combining the collective efforts to face common challenges, or what Proposition One considers 'equal priorities'. Government bodies are more frequently using this event as a national or regional development tool as it serves in attracting more budgets for infrastructure development, branding and promoting the hosting city or country as a tourist destination, while emphasising environmental considerations and sustainability concerns as an essential cornerstone in tourism (Yan 2013). However, Pelhan (2011) indicated that the only barrier to the more extensive dissemination of sustainability through the mega-event industry is still the economic barrier which reflects why Proposition One is vital for sustainability.

2.2 Sustainability and Mega-event

2.2.1 Mega-events Overview

A group of researchers have argued that mega-events share the same features of the reparative nature with an international exposure that can offer fascinating spectacles for

a specific period, enhance the globalised built environment, and give the hosting city privilege and legacy (Ritchie 1984; Hiller 2000; Roche 2000). Mega-events are considered robust economic boosters and urban renewable tools (Roche 2000). Roche describes mega-events as a "large-scale cultural event of a mass popular appeal and international importance that are typically stage-managed by a combination of national governmental and international non-governmental actors" (2000, p.1). Earlier, Getz (1997) defined the mega-event as a planned occurrence of limited duration that has a long-term impact on the host area by increasing the tourist volume, the publicity and international exposure, infrastructure development and the organisational development, which in turn increases the destination's capacity and attractiveness. O'Reilly et al. (2008) have characterised mega-events as "global properties."

Historically, 90% of all the mega-events between 1896 and 1998 were hosted in countries from Western Europe, the US, Canada, Australia, and Japan. The main reason behind this could be the requirements of the hosting committees, security considerations, the proximity of the bulk of fans, and power influences. A quick overview of the bidding requirements of the latest updates released by the IOC for the Summer OG shows that the hosting city has to have a minimum of 40,000 hotel rooms available and an athlete's village with 15,000 housing units. Having the capability to bid itself is essential as it helps the bidder to attract media attention and critical economic resources which can be used to activate urban development (De Steffani 2011). Hosting successful mega-events requires comprehensive management of the ECL with long periods of urban planning stages, leading up to the shorter period of the event itself (De Steffani 2011).

In the last decade, China, South Africa and Brazil have emerged as the new significant players in the mega-event industry; those governments justify the cost of hosting such

events based on the long-term macroeconomic and sectorial gains that they supposedly bring (Cornelissen et al. 2011). Despite the fact that many developing countries actively entered the market of hosting mega-events in the last 10 years, including the UAE and Qatar, the requirement to host such events has evolved from them being essential products into strategic marketing tools intended to attract international tourists, branding the destination for attracting international tourists, and promoting the host country's position on the world stage (Sutton 2016). However, hosting mega-events with sustainability considerations is still the leading contemporary development. One of the main reasons behind this is the nature of the tourist industry. Most of the companies in this industry are considered to be environmentally sensitive and strongly benefiting from such actions as they are frequently under environmental scrutiny (Jenkins & Karanikola 2014). The second consideration is generated from the needs of having sustainable urban development, which hosting a mega-event can trigger. Singh (2015) estimates that, by 2050, 70% of the world's population will reside in urban areas, where cities occupy 2% of land, consume 75% of energy, and emit almost 80% of CO_2.

2.2.2 Growth of Mega-event Industry

To determine the effect of growth in the mega-event industry, Horne and Manzenreiter (2006) justified the three main reasons for this growth: the first one is the advances in mass media which help the sports and cultural events to reach large populations all over the world. The second reason is the business alliances behind the current mega-event, and the third one is the recognition of the mega-event as a powerful means for extended promotional benefits, which justifies why Proposition Four has to be the ultimate goal of the mega-event. In addition, the authors indicate that the mega-event gives the hosting city the power to attract global audiences, facilitate tourism, and attract global

investments.

Currently, there is no doubt that hosting a mega-event is used as a catalyst for initiating development plans which boost the GDP, increase local and foreign investment, reduce unemployment, and enhance the economy. However, those developments can be to the detriment of local society, which is affected by the increase in rates of inflation, relocation of the lower socio-economic groups, congestion, and reduction in governmental projects and government social aid. The author of this thesis indicates the importance of achieving Proposition One during a mega-event. The complexity of managing such mega-events is accompanied by the hazards of miscalculating the scale of the challenges, particularly in emerging markets (Lamberti et al. 2011). Hiller (1998) indicated that the two principal adversaries of the massive project are *complexity* and *interdependency*. The significant number of visitors in a short period also affects the sustainability of developing and running these events.

For this reason, the sustainable awarding system indicated in Proposition Two is dynamic for the overall sustainability model. Davenport and Davenport (2006) emphasised that the infrastructure and transport arrangements usually cause the main ecological threat of having mass tourism during a limited period. The rationale behind this is because such an event will require infrastructure which is not a necessity for the local community after event completion (hotels, buildings, roads, upgrading of the airport terminal for increased air travel, more taxis and cars on the roads, overuse of water resources, sewage facilities, and litter). This pressure on resources can lead to an increase in the carbon footprint, quick deprivation of natural resources, and disruption to the lifestyle of the local community and wider society. Some of those environmental degradation impacts are substantial and often irreversible and may also have social

ramifications. From this, the concept of hosting a sustainable mega-event that respects the equal priority of the SDTBL indicated in Proposition One emerged and is considered in this thesis as a necessity.

The Olympics and the World Expo were viewed by Roche (2000) as the most visible and spectacular examples of dense social eco-system and social calendars in modern societies for public cultural events. The World Cup is the third-fastest growing mega-event based on audience attraction. Those three events take place over a periodic multi-annual cycle and staging them will remain important in the "story of a country."

2.2.3 The Development of the Sustainability Concept

Understanding the sustainability considerations first requires a historical context on the development of this concept. During the 1970s, people suffered twice as much from natural disasters than they had in the 1960s; most of those disasters were associated with mismanagement of environment versus development. A UN conference on the Human Environment held in Stockholm in 1972 recognised the "importance of environmental management and the use of environmental assessment as a management tool". This is considered the first step toward promulgating the concept of "sustainable development" (DuBose et al. 1995). The term "eco-development," an original version of sustainable development, first appeared in the UN Environment Programme Review in 1978.

The World Commission on the Environment and Development (WCED) was formed under the Resolution 38/161 on 19 December 1983 in the United Nations Environmental programme with a target to report on the environmental and problematic global challenges up to the year 2000 and beyond (Sustainable Development Knowledge Platform). The United Nations Secretary-General invited Dr Gro Brundtland to establish and chair the WCED which was able to develop the broad political concept of sustainable

development. Gro Brundtland was Norway's Minister of the Environment 1974-1979, the Prime Minister of Norway 1986-1989 and 1990-1996, and a medical doctor with a Master's degree in Public Health who served for 10 years as physician and scientist in the Norwegian Public health system.

In the period between the first meeting in October 1984 and the publishing of the report in April 1987, many triggering events killed millions and put others at risk due to human activities related to development. These include the Bhopal disaster in India; the Chernobyl nuclear reactor explosion and its impacts on Europe; the drought-triggered environment-development crisis in Africa; a chemicals and mercury spill into the Rhine River during a warehouse fire in Switzerland; and diarrhoeal diseases and malnutrition which killed an estimated 60 million people worldwide. During a public hearing in the WCED, Charles Caccia, a Member of Canadian Parliament said:

> How long can we go on and safely pretend that the environment is not the economy, is not the health, is not the prerequisite to development, and is not recreation? ... We are now just beginning to realize that we must find an alternative to our ingrained behaviour of burdening future generations resulting from our misplaced belief that there is a choice between economy and the environment. That choice, in the long term, turns out to be an illusion with awesome consequences for humanity (Ottawa, 26 May 1986, House of Commons).

The target of the Commission was to seek ways to put global development on to a sustainable path during the 21st Century (Brundtland 1987). The WCED published its report, *Our Collective Future* in April 1987 which is best known as the commencement of the first broad political concept of sustainable development. Sustainable development in this report was theorised as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." In addition to that, the report stated that "A World in which poverty is endemic will always be prone to ecological and other catastrophes" (p.16). Those statements in the Brundtland report (WCED 1987) created a major turning point for many political strategies, which gave

the sustainable development concept substantial geopolitical significance (Holmberg 1994). Many other topical dilemmas like the "Food Security," "Degradation of Species and Ecosystem," "Energy essential," "Global warming" and "Urban Challenge" are considered under the "Sustainable development" challenges. The report *Our Common Future* is seen as the starting point for international discussion about the concept of sustainable development (Mebratu 1998). This report has five main basic principles for sustainability:

1. Holistic planning and strategy making which equalise environmental and social concerns with the economy.

2. The significance of preventing existing ecological processes.

3. Protection of human heritage and biodiversity.

4. Creating development where productivity can be sustained for the long term.

5. Achieving equal opportunities and a better balance between nations.

The Commission's recommendation of the WCED led to the Earth Summit in 1992. The UN Conference on Environment and Development (UNCED 1992) widely known as the "Rio Conference" 1992 was able to generate the Rio Declaration. This declaration represents the execution arms of the sustainable development plan of WCED which disseminated the considerations of sustainable development widely and created an international consensus that the world is facing an environmental crisis (Mebratu 1998).

Diesendorf (1999) considered "Sustainability" as the goal or the endpoint of a process called "sustainable development." Others looked to those two terminologies as perfect synonyms that include futurity plus environment plus equity along with public

participation (Palmer et al. 1997; Hall 2012). Sustainability is presently requiring broader considerations than just the environmental or greening aspects. The British Standards Institute (2007) defines sustainability as "an enduring and balanced approach to economic activity, environmental responsibility, and social progress." This author believes that the most important word in this definition is "balance" and intends to validate this through Proposition One.

Similarly, the Oxford English Dictionary defines "sustainability" as "the property of being environmentally sustainable. The degree to which a processor enterprise can maintain or continue while avoiding the long-term depletion of natural resources". The WCED (1987) describes sustainability as a way of acting which does not undermine one's ability to sustain one's activity in the future. Partasarathy (2002) noted that the definition of sustainability should not be inflexible; instead it should aspire towards a set of pragmatic practices or technologies that will incorporate complex environmental, social and economic phenomena, institutions and mechanisms.

Solomon et al. (2007) draw on an extensive range of sources to assess the human activities that are altering the concentrations of natural and chemically manufactured greenhouse gases like CO_2 methane (CH_4), nitrous oxide (N_2O), halocarbons, chlorofluorocarbons (CFCs), hydro fluorocarbons, perfluorocarbons, halons and sulphur hexafluoride, and aerosols. These gases are warming the surface of the planet and influencing climate change through 'the greenhouse effect.' The impact of those gases in cold, dry polar or dry upper atmosphere regions will be much higher than in the humid equatorial regions. The reason behind that is since water vapour in the air is the central element in the greenhouse effect, adding a small amount of CO_2 will have a limited impact on the downward infrared radiation. Alternatively, in other regions, a small

change of any concentration of those gases will have much more significant influence. Despite the fact that social and economic models of sustainability vary from one country to another depending on the wealth and development level of those countries, the above statement explains why the environmental sustainability models differ from one atmospheric region to another.

2.3 The Integration of Sustainability with Mega-events

As stated above, the concept of sustainability in mega-events is an evolving terminology and set of concepts that continues to evolve. According to the Expo Museum website, Spokane Expo1974 in Washington was distinguished as being the first Expo with an environmental theme. However, it was not until the 1990s that attention towards natural protection and cultural environments in mega-events began to gain popularity.

Sustainable development was progressively integrated along with the objectives of hosting mega-events (Hall 2012). The International Olympic Committee (IOC) led the mega-event industry to follow the sustainability path. The Olympic movements and the Olympic Charter initiated the first actual role of the hosting committee in promoting sustainable development through Agenda 21:

> … The IOC sees that the Olympic Games are held in conditions which demonstrate a responsible concern for environmental issues and encourages the Olympic Movement to demonstrate a responsible concern for environmental issues, takes measures to reflect such concern in its activities and educates all those connected with the Olympic Movement as to the importance of Sustainable development" (IOC 1996, p.7).

The Agenda 21 is a significant milestone in the path towards the sustainability of the mega-event. It is a document prepared by the IOC Sport and Environment Commission in consultation with the United Nations Environment Program (UNEP). The IOC adopted this agenda in its Seoul session held in June 1999 and it was endorsed in the *Third World Conference on Sport and the Environment* in Rio de Janeiro in October

1999. This conference course of action-outcome was included in the 'Rio Statement', an implementation tool for Agenda 21 which created a joint group of UNEP and IOC members to observe the implementation of this Agenda. The "Rio Statement" is a significant provision for the role of the global sports community in protecting the environment, and creates a model for sustainable development.

The spending levels for hosting mega-events are considered very high, and most of the spending is concentrated to serve a period that varies between four weeks and six months, which may leave an "economic gap" afterwards. For this reason, in Proposition Two, the author indicates how to change the mega-event awarding system in order to achieve sustainability. This activity falls under the responsibility of event owners. Furthermore, most of the mega-event initiatives towards better sustainability faced major criticism like The Olympic Partner (TOP) sponsorship programme established by the IOC in 1985. This programme aims to increase the funds that the OG generates through sponsorship by being associated with multinational companies like Dow Chemicals, McDonald's and Coca-Cola, which, arguably, have the lease environmentally sustainable businesses in the world (Gaffney 2013). The environmental defenders believe that stakeholder management approaches to such mega-events ensure that green waves will crash on to the shores of the OG. The IOC tried to market this programme differently by presenting the benefits of it as a mega-event stakeholder programme that creates an opportunity for spreading the message of sustainability to the bigger audience as well as using stakeholder power to be part of the sustainability project (IOC 2012). This thesis examines such phenomena and suggests some possible initiatives in testing Proposition Two that can be adopted in order to specifically improve environmental sustainability.

After her report – *Our Common Future* – to the General Assembly to the United Nations

in 1987, the presentation of Dr Gro Brundtland for the International Olympic Committee (IOC) in Seoul in 1988 contained a call for "an ethic of solidarity with our current and future generations, a responsibility to the global balance of nature and understanding of our role within it" (Cantelong & Letters 2000, p. 301). This report led the IOC to make an important change in the Olympic Charter in 1991 by stating that the OG should be held in conditions which reveal a responsible concern for environmental issues (IOC 1991).

Barcelona OG1992 and Seoul OG1988 were both distinguished for their ability to use mega-events in order to restructure space and social relations in their respective cities through an extensive programme of urban intervention (Gaffney 2013). However, the unexpected winning of the Lillehammer's OG1994 in Norway after a bid dossier which included 'green goals' was considered as the first mega-event with sustainability considerations (Gold & Gold 2013). The Norwegian government, with Dr Gro Brundtland serving as Prime Minister at that time, tried to make this event a showcase for its environmental policies which aimed to move thinking forward from the traditional view of environmental protection towards a proactive sustainable developmental plan. This event made the green proposal a key component for securing OG bidding as environmental considerations became vital (Fang et al. 2009). The IOC added the requirement to "demonstrate a responsible concern for environmental issues" in the Olympic Charter and incorporated sustainable development as a third pillar of the Olympics in addition to sport and culture, in the last amendment of the Olympic charter in 1996 (IOC 1996) which is considered as progress towards achieving the sustainability requirements presented in Proposition Two.

The IOC's own Agenda 21 document was published as a result of the increased attention given to the importance of the concept of sustainability. Sydney OG2000 was hosted

under the proposition to achieve "Green Games" with the bidding dossier containing commitments to energy conservation; renewable energy sources; water conservation; waste avoidance and minimisation; appropriate standards of air, water and soil quality, and protecting significant natural and cultural environments (Lenskyj 1998). Further, principal four in Rio Declaration 1992 ensures that achieving sustainable development shall include environmental protection as part of the development process, and cannot be considered in isolation from it (UNSD 1992). The Olympic Games Global Impact (OGGI) programme introduced by the IOC in 2003 (known in 2007 as the Olympic Games Impact Study) specified 150 indicators in order to achieve sustainable development, and these indicators were grouped into three major categories – economic, environmental, and social (Gold & Gold 2013). The host city now has to provide four reports over 12 years to the IOC in order to ensure the equal priorities of the SDTBL indicated in Proposition One; those reports include the city's situation during the candidacy stage, another report during the preparation, a post-game report one year after closing the event, and the final report three years later. These reports are intended to assure the continuous supply of information about the impact of the OG.

The publishing of International Organization for Standardization ISO 201212 (2012) is another breakthrough in the sustainability of the mega-event. This standard was initiated with the participation of 25 countries and 10 observer countries. Citing Fiona Pelham (Committee Chair), Hall (2012) stated that "the future ISO standard will make a great difference to the event industry… just imagine the change in thinking that could follow as the international event industry starts to systematically address their negative social, economic and environmental impacts" (p. 4).

London OG2012 is the first mega-event endowed with certification event sustainability (CES) while the first Expo with CES was the recent Milan Expo2015. This World Expo

obtained CES because of its environmental management system (EMS) which complies with the International Standard of ISO 20121 (Guizzardi et al. 2016). Getz and Page (2016) stated that despite the fact that literature on sustainability in the mega-event has grown exponentially over the past 25 years, a review of 85 event-impact studies shows the increasing importance of mega-events in our society with only a minimal focus on the environmental impacts of those events. These findings are one of the leading reasons why the author elected to examine Proposition One in this research. A review by Mair and Withford (2013) proposed that the literature of mega-events focuses on three main topics: (i) event impacts, (ii) the link between events and tourism, and (iii) the event types and definitions. They concluded that the socio-cultural and environmental impacts of hosting mega-events are under-researched in the account of economic impact which strongly questions Proposition One's outcomes. Henderson (2011) indicates that the term "sustainable" is currently considered alongside many other similar terms like "greening", "environmentally friendly", "corporate social responsibility", "ecology" and "eco-friendly". These terms are used interchangeably with "sustainable" when taking a stand against the abuse of our surroundings in the pursuit of commercial activity.

From the above review of sustainability in mega-events, it can be seen that the OG entrusted by the IOC to the National Olympic Committee (NOC) for the elected hosting city, in general, pursued a long path in generating and including sustainability considerations in mega-events. Although the OG is leading the sustainability considerations for mega-events, it is not alone since FIFA and the BIE adopted the concept of sustainability as well and took considerable steps to assure further sustainability achievements in mega-events. FIFA 2014 targeted "minimizing negative impacts of the world cup" which Gaffney (2013) viewed as recognition of the significant adverse impacts that the World Cup can have on the environment, while at the same time

it makes a definite movement toward achieving the requirements of Proposition Two. The FIFA's sustainability directives aimed at accountability, ethics, and anti-corruption, transparency, respect for stakeholders' interests, and respect for rules and laws. Those aims were achieved through the following Five Keys Action Plan: (i) community involvement and development, (ii) fair operation practices, (iii) consumer issues, (iv) labour practices, and (v) human rights. This action plan supports the need to examine and justification for Propositions One, Two, and Four.

FIFA2002 in Korea and Japan had around 20 stadia that were built or remodelled to host the event; however, the majority of those stadia are not in use today as they exceed the football stadia requirements of these two countries. Simultaneously, the FIFA2010 in South Africa was widely criticised for human rights' and labour practices' violations; also FIFA2014 in Brazil attracted a number protest movements against the high and unfair amount of government spending, and several reports suggested that the committee organising the events violated several of FIFA's sustainability directives (Gaffney 2013).

The mega-event opening day is the deadline of the mega-infrastructure and the development plan which is mainly initiated seven years ahead of the event. This process is highly resource-consuming, requires substantial investment in several fields, and brings significant risks that hosting cities may not be able to accommodate. As this thesis focuses on the sustainability and legacy of hosting such events, it examines the practices that have taken place after winning the bid for Dubai Expo2020. These practices are compared to previous sustainable international practices to explore how they are developing during the ELC, and to learn how to improve and balance sustainability pillars for sustainable mega-events. The 1993 Sydney OG2000 bidding file contained the first bidding dossier with environmental concerns in the specification; in addition,

Lillehammer OG1994 was the first game to receive the award from the UNEP for setting new environmental practices and standards during the staging of the OG (Cox 2012).

The World Summit on Sustainable Development (WSSD) raised the issue of sustainability in the transport sector since the United Nations (UN) considers transport as a critical sector for sustainable development (UNCSD 2012). Pitts and Liao (2009) stated that hosting the OG leads to massive consumption of resources and energy which mainly comes as a result of travel. Even so, transport is not the only concern in sustainable environment practices; Ma et al. (2011) consider the sustainable environment in mega-events as a holistic system that has to consider the protection of natural resources and cultural heritage, building facilities and infrastructure development, energy production, saving and consumption sustainable techniques, water, wastewater, and waste management methods. All these points and more should be taken into consideration by every successful environmental sustainability plan. However, it is widely debated that achieving sustainability is actually not commercially viable as it costs the hosting city much more to achieve it. Kim (2013) indicated that Beijing OG2008 Committee committed to a 'zero net emissions' games yet ended up by paying more than US$40 billion which strongly defeated the concept of balancing the importance of sustainability pillars given in Proposition One. Greece OG2004 eventually spent around US$16 billion over a bidding budget of US$1.6 billion; clearly this was not a sustainable event, and actively fails to achieve the requirements for Proposition Three.

Stubbs (2004) highlighted that the London OG2012 team mainly focused on environmental quality and sustainability as critical aspects of London's bid with a target to reach 70% of the spending on the legacy which is considered by the author of this thesis as a significant step toward balancing spending between sustainability and legacy,

in support of Proposition Three. However, in the later stage, the coalition government elected in May 2010 revised the legacy promises by limiting the expectations. They removed the word 'sustainability' from their reports and replaced it with economic growth and regeneration, which led them to consider themes like sustainable living, sustainable games, and sustainable communities rather than sustainability in its entirety (DCMS 2010).

2.4 The Application of Sustainability Practices in the Mega-event Context

Achieving a sustainable mega-event is a challenging goal that requires interdisciplinary action which has to be constructed on multiple perspectives and employ interrelated science. Pelhan (2011) clarified that hosting a sustainable mega-event will require responsible sourcing, solid waste management strategies, event legacy projects and a vision to use the mega-event as a catalyst for behaviour change. Dodouras and James (2004) suggested that the path to achieving the set sustainability agenda requires strong integration on both horizontal (cooperation between sectors) and vertical (cooperation between levels) dimensions. Sustainability is a mutual goal which requires the collaborative engagement of project stakeholders. Dodouras and James (2004) argued that the challenges of sustainability should be considered in both the long term and the short term. The significant challenges to achieving such a goal commence with changes in attitudes and practices in the hosting society, and shifting how economies are operated, which contributes to the rationale for assessing Proposition Four in this research.

Pelhan (2011) drew attention to distinct categories of critical recommendations to change the business model in the mega-event industry toward better sustainability. The first recommendation is for the industry practitioners whereby Pelhan believes that they

have to take the initiative to move toward more sustainable products instead of waiting for the demand for this to occur. Failure to do so will place local brands at risk for the event attendees, which can lead to irrevocable damage. Second, the governments and the corporate clients should lead the collective effort in asserting the need for achievement of a sustainable event as this will strongly impact their reputation and improve their global potential to attain their economic goals. Third, industry practitioners should focus on targeting clients who report on their sustainability practices. Doing so will increase the number of aligned companies and corporations and will result in an increase in the overall necessity to consider sustainability in mega-events. Pelhan's fourth recommendation is to use the mega-event to spread the message on the importance of sustainability which will cause business opportunities for the sustainable sector to surge, and increase demand. Fifth, Pelhan believes that business and industry should be prepared for further regulation on sustainability which will significantly move the event industry towards further sustainability. The last few recommendations fall under categories like transparency, the creation of an atmosphere of enthusiasm around sustainable mega-event management for practitioners to learn and update their knowledge on sustainability and to secure budgets and time for educating industry practitioners on sustainability. Those recommendations will reduce the economic costs related to training that currently act as a barrier for the event industry to learn how to change the business model.

2.4.1 ISO 20121 Pillars for Sustainable Mega-event

ISO 20121 identifies the pillars that the mega-event has to embed in order to comply with this mega-event sustainability standard. The first one is the *environmental* pillar which the hosting committee must include in resource allocation, selection of the

material used by encouraging use of local materials, and adapting designs that reduce material wastage, resource conservation, emissions reduction, biodiversity and natural preservation, and also reduce toxic releases to land, water, and air. The second is the *social* pillar which considers the labour standards, health and safety issues, civil rights, social justice, local community role and involvement, indigenous rights, cultural issues, accessibility, equity, heritage, and religious sensitivities. The third pillar is the *economy* where the hosting committee has to seek a likely return on investment, improve the local economy, increase market capacity, maintain the shareholders' value and achieve innovation, direct and indirect economic impact, economic performance, fair trade, and profit sharing. These three pillars along with the sub-issues should be comprehensively addressed in order to comply with ISO 201212. Following this standard represents a significant step towards the justifications for Proposition One and Proposition Two. In addition to these sustainable development issues, the hosting committee has to control the direct and indirect factors that can influence the overall sustainability of the event.

The criteria for evaluating compliance of the event with ISO 20121 have to include documentation of the process, as well as consideration of feedback from interested parties as part of the stakeholder management process. This process will help in anticipating any new issues that may emerge, and setting out a plan for these in advance. The final outputs of these procedures should be documented, kept up-to-date, and shared with relevant interested parties. ISO 201212 has many distant interconnecting subjects which cut across the three pillars like the governance, transport, venue selection, supplier selection, accessibility, animal welfare, corruption, product responsibility and many more. Those issues are not isolated, they have to be addressed primarily in countries where the implementation of law does not secure the minimum environmental, social or economic safeguards and requirements. The international best practices may become an

organisational target so long as this does not conflict with national law.

ISO 201212 set the event sustainability objectives to be consistent with the sustainable development policy of the hosting destination. The objectives have to be measured, updated and monitored, and communicated throughout the ELC. In addition, the set of event sustainability objectives has to take into consideration the applicability requirements of those objectives based on the hosting destination conditions. The targeted further requirements are a valid statement of purpose and values, the legal considerations of the hosting destination, the available technological options, and what the hosting city is aiming to adopt. Nevertheless, as well the financial and the operational capabilities, the business requirements include the legacy issues and how much the city is planning to spend on its legacy compared to overall spending on the event. The ISO201212 event sustainability objectives also have to be based on consideration of alternative options to achieve simple sustainability goals for the specific hosting city as these will vary from one city to another. The hosting destination has to aim to achieve the entire development as far as is practicably possible, and this has to be within the local companies' capacity and timescale to address it. The last two objectives are the stakeholder feedback on those objectives and the relevance of the supply chain issues. A good example of this is the Forest Stewardship Council (FSC) requirement which many companies require as a certificate for any wood supply to ensure that the wood is coming from sustainable resources; however, without the Chain of Custody (COC) certificate, the FSC certificate can be manipulated and misused.

2.4.2 Application of Sustainability Practices during a Mega-event

Iraldo et al. (2014) remarked that the Milan Expo2015 in Italy is the world's first mega-event with a design deemed to meet ISO 210121 compliance with the event sustainability

management system. This Expo also conforms to the European Regulation n.1221/2009/EC for objective input. The Expo theme *Feeding the Planet, Energy for Life* considered the methods which humanity will use to feed itself and the planet, which includes research and joint efforts to share sustainable models of production and consumption, following a multidisciplinary approach. Iraldo et al. (2014) contest that the method to stimulate this process involves developing relationships and connections that can engage all levels of society. However, The Vancouver Organizing Committee (VANOC) for the Winter OG2010 was the first organising committee to create a sustainability department to manage the three pillars of sustainability in order to create lasting benefits, reflecting the benefits of Proposition Three articulated in this thesis, both locally and globally (Holden et al. 2008). However, Hult (2013) has argued that the claim of a decrease in emissions in the developed world was also connected with the fact that most industrial production has moved to other countries as well as the fact that the transport environmental impacts of imported goods are not included in the environmental statistics. It is important to consider this problem when assessing sustainability achievements and drawing comparisons between developed and developing countries.

Preuss (2013) questioned whether mega-events are the best places to allow people to experience environmental theory in action by *sensing* subjects like using public transport or managing waste, described by the author of this thesis as Proposition Four. The Intergovernmental Panel on Climate Change (IPCC 2013) indicated that the most significant environmental challenge that the planet is facing is the further warming of the earth's surface generated by the greenhouse effect. Human activities can alter the concentrations of many natural and chemical gases like CO_2, methane, aerosols and nitrous oxide, which influence climate change. The consequences of this change can lead

to several global phenomena like the increased sea levels, increase of atmospheric moisture, freshwater dilution and many other issues which will cause distribution and lifecycle shifts for living beings (IPPC 2013).

The UAE ecological footprint shows that 78.6% of CO_2 emissions are due to the excessive consumption of cooling energy and production of desalinated water for the residences use. Many local initiatives and programmes are working in this context to discover the ecological footprint of the UAE and devise ameliorating measures. Hosting mega-events imposes a further challenge to the sustainability model of the UAE. Smith-Christensen (2009) pointed out that the trend of promoting the mega-event as sustainable green or carbon-neutral is only used to flag up environmental consciousness as these initiatives are rated high on the public agenda, serving as the primary expected outcome of hosting the mega-event set out in Proposition Four. In addition, mega-event best-practice resources are more available than the usual local construction is, and impacts are relatively easy to monitor and communicate. Wilkinson and Pickett (2009) claim that different uses of depleting resources creates a social inequality which will form a set of problems including but not limited to poor health or substance abuse. Henderson (2011) claims that practices of using locally sourced food and drink in the sustainable credentials are not enough for the overall event activity and further dramatic change is required; he also indicates that event suppliers have obligations to behave in a sustainable manner once the event is hosted as being credibly sustainable, or being seen to comply with sustainability standards.

Smith-Christensen (2009) theorises that the concept of sustainability is likely to become a passing fad rather than a trend for change, and will be used to justify holding such events. That is; overuse of the sustainability concept may cause similar harm to the

outcome of neglecting it. The rationale behind this is because it is a developing concept that has to keep improving faster than the harm caused by human beings' activities to mitigate the damage. Smith-Christens (2009) indicates that the mega-event should represent an event efficiently utilising their available resources and remaining self-sustaining despite only limited public sector support. Without that, the balance in the SDTBL indicated in Proposition One cannot be achieved and mega-events will never be able to serve the causes presented in Proposition Four. From this, it can be seen that those resources – including the financial budget, the stakeholder interests, the management system, time, the technical experience and the previous know-how generated by completed mega-events – can serve in enhancing the next mega-event if the event owner adheres to the suggestions being tested in Proposition Two.

Many researchers concur that planning for the overall input during the ELC should start during the concept and design stage as this will be vital for the overall sustainability and performance of the project (Smith et al. 2001; Priemus et al. 2008; Blyth and Worthington 2010). Furthermore, appropriate planning to shorten the lag time between the post-event and legacy phases should be a top priority when conceptualising sustainable mega-events with proper legacy outcomes compared to spending. Deng and Poon (2013) assert that this is even more pressing for emerging hosts such as China, South Africa, Brazil, Russia, Qatar, and UAE.

As much as the mega-event can be a threat, it can also form a legacy opportunity for the future generations. Preuss (2013) added that the Vancouver Winter OG2010 provided examples and material where schools were used to educate pupils about the value of protecting the environment. In order to achieve this, several case studies through examples of cultural groups like the Inuit were used to exhibit how those people

continued to live their lives in harmony with the natural world. In 2012, the London Organising Committee of the Olympic and Paralympic Games (LOCOG) leveraged the benefits of this on a larger scale. To achieve this, LOCOG formed the sustainability framework following the route of VANOC and set directions for itself and its partners for the best practices to address sustainability according to priority themes (Holden et al. 2008).

2.4.3 London OG2012 Sustainability Lessons

Despite the limitations in the sustainability practices and shifting of interests during the execution of the OG toward legacy which detracts from propositions Three's claim, London OG2012 is a learning platform on how to manage sustainable mega-events. Epstein et al. (2011) explained how LOCOG set sustainability targets without sustainable methods, so the contractors were pushed to innovate in sustainability methods. The authors detailed how the organisers worked with suppliers to re-use several materials, embraced the concept of a demountable lightweight stadium, and worked with the standard-sized building materials to reduce building material and construction wastage. Furthermore, the cable net system used in the Olympic arena with the lightweight design saved 1000 tonnes of steelwork and reduced the foundation depth and size; this design also reduced the costs of concrete and steel in the foundation, the transportation of the material, and the CO_2 that would have been emitted if the production of those materials happened in the unsustainable conventional way. (Jackson & Bonard 2011; Gold & Gold 2013).

The organisers worked in raising the awareness of sustainability to attain higher stakeholder commitment to sustainability. Nimmo et al. (2011) considered the importance of a sustainable design in the planning stage of London OG2012 and how it

affected the sustainability future of the event; as an example of this, the building of temporary structures played a significant part in achieving this by relocated that infrastructure to different places in the UK once the event was over. In addition, the Olympic village was converted into new housing including affordable housing units by turning the 17,000 athletes' rooms into 2,800 homes. Furthermore, achieving sustainability should go through the process of complying with the construction code that has to be adopted by the hosting committee. Jackson and Bonard (2011) stated that the ODA 2007B environmental standard for OG2012 included benchmarks for noise, air quality, flood risk and several practices that have to be accepted by the contractors before work begins. The set target of recycling 90% of construction waste was a very ambitious but achievable target. This adaptation of the environmental management's plan before the commencement of works, and following the code of construction practices and the financial incentives played a significant role in improving the sustainability results. London OG2012 created a waste consolidation centre in order to supervise the 3,000 contractors and sub-contractors involved to deal with waste management and segregation. An Internet tool was created for all those contractors to identify and share the materials on site that they did not need in order to be used by another contractor; such visibility made the waste management more efficient.

Stakeholders' management in the mega-event plays a major role in reaching the desired level of sustainability by balancing the priority of the SDTBL advised in Proposition One. The LOCOG (2009, p. 9) Report stated that "sustainability is fundamentally about people and how we live; it is not simply a technical discipline." This statement reflects the importance of having project management's plan for managing stakeholders' sustainability behaviour during the ELC. In contrast, Flyvbjerg et al. (2003) stated that the different levels of mega-event stakeholders reflect the levels of complexity that are

expected; yet, as citizens are usually kept at a substantial distance from mega-event decision making, this complexity is expected to be higher if the programme manager does not recognise the best practices to deal with stakeholders' complexities. However, this plan is highly contingent to the hosting city, and site-specific, as Seghezzo (2009) asserted that no sustainability plan can be applied effectively without setting it out in the right context.

Reflecting the importance of sustainable planning and sustainable design, appointing the contractors under the sustainability framework, adopting a stakeholder management system, and having a dynamic legacy plan can summarise the lessons learned from hosting OG2012. Samuel and Stubbs (2013) revealed the same results from the OG2012 case study by stating that sustainability is about embedding various aspects over all the organisational process and creating sustainable communities and sustainable business for local people around the event. Another valuable lesson learnt from this case study is that sustainability should not be expensive; it *is* achievable and can create a long-lasting legacy. London OG2012 cost US$10.4 billion, close to the initial budget, while Beijing OG2008 cost US$40 billion to achieve an ambitious goal of "zero net emissions" (Collins et al. 2008). If the argument is that China is not comparable to the UK regarding the cost of sustainability, how Greece hosted Athens OG2004 with the initial budget of US$1.6 billion and spent a net of US$16 billion as stated earlier is explained by the fact that most of that money converted to a massive debt for the Greek economy (Kim 2013). Reuters (2014) indicated that for Greeks who swelled with pride at the time, the games turned into a source of anger as the country struggled through a six-year depression, record unemployment, homelessness, and poverty.

2.4.4 The Triple Bottom Line

In order to consider "the sustainable" viewpoint, any business model, including the hosting of mega-events, should consider the economic perspective that will achieve the required sustainability level without imposing a high cost or affecting the quality of services provided (Marchet et al. 2013). For this reason, debates on sustainable development often return to the SDTBL coined first by John Elkington in 1994 and adopted by a large number of authors (e.g., Gibson, 2001; Pope et al. 2004; Sherwood et al. 2005). The rationale for the SDTBL comes from the arguments that each business model should prepare a tripartite bottom-line strategy. The profit bottom line represents the *profit and loss* account of the business model; the *people* component or the second measures how socially responsible the business model is, and the third is the *planet* account which measures how environmentally sustainable the business model was, which was presented in Proposition One. Carter and Roger (2008) indicate that the sustainability "three-pillar" model is what will secure long-term economic viability of the sustainability system and will in turn become part of ordinary daily practices and routines of stakeholders instead of having to be an imposed system. Through the SDTBL, mega-event organisers are more likely to secure the achievement of sustainability targets in different areas, including transport, and these targets will have a long-lasting impact.

Sustainable development does not mean having low economic development. The Department of Environment in the UK strategy (1994) underlined that a healthy economy is better able to generate the resources that meet people's needs. The SDTBL consists of three Ps – Profit, People, and Planet. However, as a significant business model gives priority to cost-cutting, the trend of transferring production towards low-

cost countries such as Brazil, India and China cannot change the fact that this transfer changes the sustainability of the developed countries' business model and creates an unbalanced international system where "people" and "planet" cannot be measured at the same level as "profit". From this, we can see how the importance of hosting sustainable mega-events in developing countries contributes to Proposition Four, and the possible impact this imposes on the overall sustainable system and behavioural changes for those countries.

Dealing with the challenges of delivering sustainable mega-events should always take into consideration the stakeholders' complexity along with the readiness of the hosting city to pursue sustainability. The plan for achieving sustainability targets should be generated based on the existing sustainability practices within the relevant countries before adopting any system from other countries. A good example of this will be in comparing the railway system in the UK, which came into use almost 200 years ago, with the new metro system in Dubai which started nine years ago. For this reason, this research intends to shed light on several important issues including the importance of maintaining the same level of sustainability practices over different stages of the ELC, having a tailored stakeholders' management system for the sustainability plan, and working to produce a project management governance body for delivering a sustainable mega-event. Furthermore, additional vital practices that should be considered to prevent making the same mistake involve learning from previous case studies explaining the challenges they faced in achieving the sustainability targets and establishing an avoidance plan. It is widely known that achieving sustainability targets in programme management may lead to further spending; that is why wise programme management should identify the critical behaviours that have a significant impact on the overall sustainability of the mega-events and should invest in reducing identified polluters for

positive long-lasting impact. The reason for these deliberations is due to the risk of high spending on the event simply for the sake of showing the world that the hosting city complies with general expectations; yet those acts could conversely reduce the competitiveness of the city, resulting in a backlash after the closing of the mega-event.

Transportation is one of several promising fields where a sustainable plan for public transport designed and built to serve the visitors of a mega-event will last as a programme legacy long after the mega-event has ended. In this respect, this system will keep contributing to the overall sustainability of the event even after the closure of the event. The same ethos can be applied to green power production and renewable energy investment which will act as elements of the sustainable plan for hosting a mega-event. Further, such initiatives will contribute long after the mega-event as an integral part of the strong sustainability legacy of the event. Lastly, Hall (2011) concluded,

> Perhaps the neo-liberal paradigm that marks contemporary mega-events has become so all-pervasive that it is difficult to think other. Many of the people who support mega-events probably genuinely believe that they make a great contribution to the economy and society. However, as with most contemporary tourism, they are not sustainable in their current form (p. 14).

In the following two sections, the author illustrates the major benefits and the possible consequences of hosting mega-events in order to present a different perspective.

2.5 Benefits of Hosting the Mega-event

The hosting of a mega-event, in general, represents an affirmative act that any hosting city should benefit from in cases where it has been managed effectively. Muller and Pickles (2015) indicate that the mega-event has to be understood as being multi-dimensional and planners should focus on four aspects; these are tourism, the media, finance, and urban legacy. Hosting a mega-event is now seen as an opportunity for a city to initiate a development plan and improve environmental and social aspects concerning

urban design (Pitts & Liao 2009). Those practices have the potential to become part of the hosting destination culture and routines as the hosting population has to live with such values for the full project lifecycle which can be in excess of seven years. Such a period is a sufficient length of time to create a new generation of skills and competencies among the workforce and upgrade existing approaches to comply with best international practices and standards.

Andranovich et al. (2001) argued that using a mega-event to boost the Gross Domestic Product (GDP) of the hosting destination will potentially be seen as a high-risk strategy for stimulating local economic growth. However, many destinations have been able to generate a profit from their events, and economic growth is not the sole target to deliver benefits to hosting cities and countries. OG1996 in Atlanta generated US$5 billion in tourism over an investment of US$650 million in construction-related expenses and US$609 million in federal funds (Tien et al. 2011). The Winter OG2002 in Salt Lake City generated US$4.5 billion in tourism over an overall investment of US$1.3 billion in federal funds (Andranovich et al. 2001).

Kang and Perdue (1994) estimated a long-term impact of the 1988 Seoul Olympics based on an ''Olympic Impact Curve,'' which represented the expected longitudinal effect of the mega-event. The results show that the long-term impact over three years (1988–1990) was estimated to be US$1.3 billion. The Olympic impact was actually found to be higher in the year following the mega-event and gradually diminished over a 10-year period. Such results demonstrate that the calculation of mega-event impact depend on the time frame of the observed period.

Since hosting a mega-event requires upgrading of the infrastructure of the hosting city or cities to meet the requirement of the mega-event awarding committee, the

development often will include "industrial relocation," "urban development," "infrastructure renovation" and "inward investment" as expounded by Roche (1994). The process of achieving these goals involves significant development activity which can lead to a decrease in the level of unemployment. By reducing unemployment, the purchasing power of residents increases and will affect many other sectors, even those that have no social or economic relation with the mega-event. Through application of a random growth model, Hotchkiss et al. (2003) demonstrated the positive impact derived from hosting a mega-event on the employment level, while Mason and Paggiaro (2012) highlighted the role of positive emotion during the mega-event in delivering a high-quality mega-event with long-lasting impact on behavioural intentions and visitors' satisfaction.

Coates and Humphreys (2003) consider that being concerned with just the direct financial benefits of hosting a mega-event is a case where the economic benefits should be considered weak at best. The investment in hosting the mega-event should target the triggering of a development plan, attract international investment, and generate an appropriate investment environment. Those elements will speed up the development cycles and inject cash flow in the market mechanism. Cornelissen et al. (2011) stated, "[The] Mega-event served to speed up developments." Swart and Bob (2007), however, argued that the mega-event should be first considered as a catalyst for progress and organised as part of urban planning development presented in Proposition Four. Direct economic effects of the mega-event are represented by the domestic and foreign investment triggered by the event, the infrastructure work related to the event, and the new income generated from spectators and participants. Cornelissen et al. (2011) reflected how the mega-event can generate income through the development of event venues, from increases in government tax income, and by the growth stimulated in

ancillary sectors like leisure consumption, new tourist attractions, and unique construction to serve this new sector. Cornelissen and colleagues further contend that a newly constructed 'iconic' building can become a landmark and a part of a city's character which will enhance the overall image of the city. In addition, such an iconic building can become an 'aesthetic focal point' functioning as an incentive for continuous urban development and entertainment facilities. This thesis highlights the importance of these venues, particularly in the legacy impact of mega-events.

Hiller (1990) provides an in-depth analysis of the mega-event's economic importance by showing it is essential and terming it as "windows of opportunity without opposition." The International Awarding Committee tests the development plan that the hosting city intends to initiate after securing the mega-event and checks that it matches with the promises made during the bidding stage. These promises commonly include development in the transportation system, a new airport terminal, more hotels, upgrading telecommunication infrastructure, and plans for urban development around the venues. As part of these plans, the venues are transformed into tourist attractions. The Expo Arena and The Olympics villages are leading mega-event legacies in creating tourism destinations. Parent (2008) found that Athens OG2004, Turin OG2006, Beijing OG2008, and Vancouver OG2010 Summer and Winter Olympics games were secured based on the different bids that were premised on the intent to gain "new facilities and increase transfer to event preparation and hosting knowledge" (p. 135).

Seville Expo1992 is viewed as one of the mega-event success stories. Spain used this event to generate an urban development plan for this southern city. With an additional Airport Terminal, a new train station, many river-crossing bridges and a highway between Seville and Madrid, Seville was able to present its historical value and

accommodate massive development. The legacy phase facilitated the transformation of the park into a Science and Technology Park which was occupied by educational institutions and 650,000 square metres of office facilities, government agencies, theatres, museums, and cinemas. This event serves as an example of the potential of Proposition Three in attending to ways of balancing spending between legacy and sustainability. However, the transformation process took longer as the post-legacy plan was not considered before the event and the lack of residential units that were located near to the park had a negative impact. However, Seville Expo1992 accomplished 41.8 million visitors, created 5,500 jobs, and regenerated an island of 215 hectares (Maddox 2004; Monclus 2009).

Deng and Boom (2011) describe the role of hosting the Shanghai Expo2010 in the development of the Huangpu River area, a 5.28-kilometre development with 2.5 million square metres of construction that came as part of the plan known as the Third Riverfront Development triggered by hosting Expo2010. The development took place along a riverfront of 8.3 kilometres development including a double-deck pedestrian walkway and convenient access for public transit which was completed ahead of the Expo opening. Another study by Deng and Boom (2014) indicated that the legacy strategy used in this development was a utilitarian one where, after the event, the exhibition structures were repurposed into public, institutional or commercial use. Hosting Expo2010 was part of a massive riverfront renewal spanning 75 kilometres of the Huangpu riverfronts initiated in 2002, and catalysed change for the full area.

Devos (2011) argues that the World Expo is always a useful tool for urban regeneration. The Belgian government used its mega-event as a catalyst for the construction of high prestige buildings located in the new central zone of the capital. Devos (2011) added

that Expo1958 was the first post-war Expo, the role of which was to put Belgium and Brussels on the map. The location of the Expo was seven kilometres away from the capital in Heysel Plateau which benefited the most from the new roads and public transport constructed as an expansion of the centre of Brussels. Expo1958 was able to produce a new administrative front for the official presence on the higher ground of the capital. Devos (2011) believes that these administrative complexes built alongside the Expo1958 proved to be the main initiative which identified the Belgian Welfare State's Exhibition complex.

FIFA and the Local Organising Committee (LOC) published a comprehensive sustainability strategy for FIFA2018 in Russia. This strategy has three vital issues and cross-cutting approaches in the TBL approach. The first crucial issue, *social,* has a clear strategy for health and safety, decent work environment and new designs for building capacity, inclusivity and equality, and social development. FIFA and the LOC team visited the construction and renovation sites for two days, and issued details for any compliance found and compiled a list of actions to be taken before the next visit. The accessibility for disabled people with limited mobility was taken into consideration through infrastructure solutions, services, and disability awareness training for stadium volunteers. FIFA2018 also committed to being a tobacco-free event. The second key issue, *environmental,* relates to green-building standards for stadia, low carbon energy strategy and a plan for risk mitigation and biodiversity. In order to achieve this, FIFA and LOC worked in accordance with ISO 20121:2012 and implemented the Sustainability Management System (SMS). The FIFA-LOC sustainability team has developed many policies, criteria, and procedures to achieve the objectives defined in the strategy. All the official stadia have to obtain green-building certification for design and construction; the entire hosting city has to comply with the ten topics recommended

for managing the environmental impact (use of water, energy consumption, air quality, ground transportation, green procurement, construction method, waste management, mitigation of environmental risks, tourism, and specially protected area). The third pillar in this strategy is the *economic* issue with the plan to improve the local economic development and ethical business practices (FIFA Resources 2018).

FIFA 2018 World Cup is issuing a sustainability report following the Global Reporting Initiative (GRI) G4 standard and periodically reviews the process. Those reports build on the previous mega-event experience and the recommendations for future events. The continuity of this learning process is intended to make future mega-events more sustainable. Iraldo et al. (2014) note that the final edition of the Expo2015 report provided for the first time in Expo's History would be a benchmark for the performance indicators that will assist future organisers to be more sustainable. Dubai Expo2020 is the first Expo to profit from this advance in sustainable management. The data provided included the benchmarks of waste produced, recovered and recycled material, CO_2 emissions, and many more. Irlado et al. (2015) believe that this knowledge of Expo's impact along with the method of measurement and quantification are part of the intangible legacy of the event. The Expo event owner should use those reports as benchmarking requirements for the next host, presented in Proposition Two.

The London OG2012 case study validates that hosting a green event proves that such performance is not impossible. Gold and Gold (2013) stated that the London OG2012 legacy without doubt lies in the sustainability's allied and overlapping counterparts an agenda. This agenda, named "one planet living", is framed around 10 principles: zero carbon; zero waste; sustainable transport; local and sustainable materials; local sustainable food; sustainable water; natural habitats and wildlife, culture and heritage;

equity and fair trade; and health and happiness. This agenda is a reflection on how the mega-event can balance the SDTBL presented in Proposition One. Gold and Gold (2013) indicated that those 10 principles were expressed concerning themes such as climate change, waste biodiversity, inclusion, health and well-being. Pelhan (2011) indicated that the huge event bodies like IOC and BIE are significant influencers in driving the sustainability in the mega-event industry. Yan (2013) posited that preserving the environmental quality after the event is essential to the attractiveness and the capability of the hosting destination for future events.

Furthermore, Death (2011) indicated that the German FIFA2006 World Cup hosted with green goal initiatives was able to deliver a carbon-neutral event as well as substantial water, energy, transport, and waste efficiencies. Schmidt (2006) asserted that the German FIFA2006 World Cup programme had proclaimed the event to be carbon-neutral; in order to achieve this, high accredited emissions offset projects were taking place in India and South Africa. In addition to that, the hosting committee was able to minimise waste by getting people out of their cars and onto public transport, bikes, and pedestrianised routes. Chappelet (2008) stated that Lillehammer OG1994 was successfully hosted with five green goals; to increase international awareness of ecological questions; to safeguard and develop the region's environmental qualities; to contribute to economic development and sustainable growth; to adapt the architecture and land use to the topography of the landscape; and to protect the quality of the environment and of life during the games. Cashman (2011) also indicated that Sydney OG2000 was able to deliver a green game. In order to achieve this, Sydney's original bid document included the statement that committed to subjects like energy conservation, use of renewable energy sources, water conservation, waste avoidance, and minimisation, protecting human health, protecting significant natural and cultural

environment, and appropriate standards of air, water and soil quality.

Aichi Expo2005 in Japan was a special occasion for Japan to demonstrate its ability to be sustainable, with strict environmental requirements and a theme of "Nature's Wisdom." The organiser was able to return the site to its original condition; use recyclable and reusable material in constructing the pavilion, thus fostering relations between nature and technology in architecture; plan a Post-Expo legacy based on citizens' requirements and sustainable usage of the site; and achieve zero emissions in transportation (Gao & Zha 2005; Deng & Boom 2011). This event was proof that a well-managed mega-event can balance SDTBL, argued in Proposition One, generate economic benefits for the hosting destination, and close without leaving a negative footprint on the environment or society.

The city that hosts a mega-event sends a clear international message that this country is welcoming, hospitable, and safe to visit. The event itself will bring international media attention and will increase the "recognition effects" described by Ashworth and Goodall (2013) as "the major rationale of hosting mega-event." It is a lifetime opportunity for a destination to change the perceptions held by potential tourists, as the exposure of practical information will be high. The details about this destination trigger perceptions critical to the future selection of holiday destinations. Such impacts will be strongly influential particularly for a destination that is poorly perceived by tourists because such an event will act as a catalyst to change the image in the minds of those concerned, as indicated in Proposition Four. Jago et al. (2010) found that some mega-events are not achieving the expected benefits promised by the hosting committee ahead of the event. They posit that this is a consequence of assessing the short-term results of those events instead of considering their long-term impact on the development strategy. The current

broadcast technology, social media tools, and media exposure lead to higher recognition for the hosting destination. This exposure increases the visitation frequency and volume during and after the event. Jago et al. (2010) refer to the FIFA WC2010 in South Africa as a method to expose not only the hosting country but also the whole continent to the world.

Another excellent example of the ability of the mega-event in changing the perceived image of the hosting society is the German FIFA2006 World Cup. Brenke and Wagner (2006) expressed how FIFA2006 had very minimal economic impacts yet it generated a positive effect on society including perceptions of tourists among the host population, attitudes of German people toward hospitality, and association of locals toward visitors which has generated a long-term impact on the tourism industry. Similarly, Sydney OG2000 was able to change the local perspective on acts of volunteering where the hosting committee recruited 62,000 volunteers. Sydney learned from Atlanta in using a private contractor to assist in the recruitment of such a massive amount of people, train them, and oversee the management process of voluntary staff (Webb 2001).

Hosting a mega-event frequently plays a positive social role through its impacts on stakeholders. Fredling et al. (2003) claim that a mega-event will "enhance community pride." Hall (1997) affirms that hosting a mega-event has the capacity to build a unique national identity and improves community sense of belonging. Based on research for the Barcelona OG1992, Toohey and Veal (2000) theorise that the only way to make a mega-event "untouchable" is by combining efforts between different levels of stakeholders and make them feel that the events are "fully their own." The author of this thesis believes that, through high levels of stakeholder involvement and inclusion, the SDTBL presented in Proposition One is more likely to be achieved. This OG remains an excellent

example of how empowering the community helped the hosting committee to redevelop and reposition the destination (Jago et al. 2010). Smith and Fox (2007) indicate that Barcelona OG remains a benchmark exemplar of what good management of a mega-event can achieve. The event was able to transcend local industrial decline, political unrest and general drabness which were replaced by fashionable association with sport and design; these in turn led to image transformation targeted by hosting the mega-event as Proposition Four indicates.

Socio-cultural activities are another powerful way of increasing opportunities that the hosting country has to promote the destination. According to Kim and Morrison (2005), such activities broader the probability of attracting further visitors once the hosting destination incorporates non-event attractions in addition to the event (Chalip & McGuirty 2004). The mega-event can function as a primary attraction to visit the hosting destination. However, it is often necessary to have a cluster of other features that can be visited in the surrounding area to secure the final decision to travel (Hinch & Higham 2001). Dubai currently has many socio-cultural activities like "The Global Village," one of the largest seasonal tourism, shopping and entertainment destinations in the world with over five million yearly visitors and covering an area of 1.6 million square metres. The "Dubai Shopping Festival", an internationally recognised retail event, is another major socio-cultural attraction. Consequently, Dubai has many tourist destinations that attract tourists, like the "Burj Khalifa" the tallest structure in the world since 2008, Dubai Mall, the largest mall in the world by total area and the most visited shopping and entertainment destination (54 million visitors each year according to Emaar), the Atlantis Dubai, the newly opened "Dubai frame", and many more tourist attractions.

The successful securing and hosting of the mega-event is a significant political outcome

for the leadership of the hosting destination. Andranovich et al. (2001) drew on an extensive range of sources to assess that the Mayor's presence in Los Angeles was strongly enhanced after the successful hosting of the OG1984. Meanwhile, Devos (2011) implied that Expo1958 conveyed the message of power for Belgium's government.

Mega-events have the power to spread messages that inspire people to respond to challenges that are common to humanity, like the environment, racism, hunger, discrimination, global warming, poverty, violence and many more. FIFA2014 in Brazil had a cause to spread – the "say no to racism" message. As mega-events are being hosted in countries with many social and economic issues, having a cause that will serve the hosting destination in particular and the world in general becomes a necessity. In some cases, those messages didn't achieve it set goals. However, it still represents a starting point to initiate the discussion about contemporary challenges.

FIFA's cause to fight discrimination passed many major milestones starting from the first resolution of the FIFA Congress in 1961, the FIFA Conference and Extraordinary Congress against Racism held in Buenos Aires in 2001, and the FIFA Disciplinary Code in 2002 which called for strong sanctions against any acts of racism. FIFA continues to fight racism and discrimination by allocating specific resources, developing an anti-discrimination handbook, and giving an award for achievements in this area. In May 2013, FIFA issued the 63rd resolution in the FIFA Congress to fight against racism and discrimination. This resolution was followed by FIFA's third conference in Zurich in March 2017 which called for equality and inclusion: "Making Equality a Reality". In November 2017 FIFA announced the successful anti-discrimination first-run monitoring system with all 871 FIFA World Cup qualifiers by introducing the FIFA observation for anti-discrimination in 177 matches, including the matches with the highest risks of

discriminatory incidents. FIFA made it clear that discrimination will not be tolerated in any form; discrimination is incompatible with universal values (FIFA Resources 2018). This kind of approach represents a strong example of how a mega-event can work as a catalyst for change in the hosting destination as presented in Proposition Four.

2.6 Possible Negative Consequences of hosting a Mega-event

Many nations consider the value of hosting a mega-event as a great political symbol and generator of substantial income; however, this is often overlooked since many previous experiences showed the potential for drawbacks in hosting such events.   The consequences of the poorly managed event can lead to catastrophic financial losses, with sometimes irreparable political, social or environmental damage (Hall 1992).

Hosting mega-events requires a substantial financial investment without a secure return on investment. Flyvbjerg et al. (2013) stated that the city or nation that decides to host an OG should be aware that this is one of the most financially risky types of mega-project that exists. The OG of 1976, 1980, 2000, 2004 and 2016 hosted in Canada, Russia, Australia, Greece, and Brazil came at the cost of long-term financial burdens and have actually hindered the countries' renewal attempts (Flyvbjerg et al. 2003; Agence France-Presse 2015; Oberjuerge 2015). Lei (2013) found that there is no guaranteed net economic gain that a mega-event host destination should expect as a result of hosting the event. For instance, the World Expo was never intended to be a moneymaking endeavour (Northcraft & Wolf 1984). Ross and Staw (1984) stated, "The financial history of world expositions is not a happy one. Since the onset of world fairs in 1851, only 20 events were able to break even or made a profit" (p. 281). Montreal Expo1967 and OG1976 proved to be financial debacles. The full hosting cost of the OG budgeted

at US$300 million, lost over one billion dollars. Right after those two events, another mega-event in Canada took place in 1986; Vancouver Expo1986 also faced much criticism with financial deficits of US$311 million (Chan 2016), The citizens' daily lives were disrupted with major increased traffic flow, and drivers had to compete for the 40,000 parking spaces with the 120,000 cars that entered this part of the city. Another problem was housing for the staff of Expo1986 and the visitors, with a vacancy rate under 2% and limited hotel rooms at that time with almost 11,500 hotel rooms (Ross & Staw 1986). In response to these problems, Proposition Two consequently asserts the importance of having a sustainable awarding system for mega-events. This action closes the door to unsustainable and reckless bids.

Vancouver Expo86 also faced many conflicts with union labour as the labour leaders threatened to walk off the site after contracts began to be assigned to non-union contractors. The conflict was escalated when Premier William Bennett intimated that he would withdraw from the event. British Colombia was going into recession in 1982; interest rates went up to 20% (Korstrom 2016). All those conflicts were taking place during the preparation stage while another World Expo was running with different significant problems. New Orleans Expo1984 in Louisiana was facing a number of significant challenges as well. These included the low number of visitors, banks' resistance to discount interest on fair loans, and the Louisiana Governor's warning to bankers not to foreclose in the face of unpaid interest, otherwise 'they will not get a nickel'. The Expo1986 project was initiated with a budget for US$78 million of projects with expected deficit not to exceed US$6 million; however, the end result was US$1.5 billion in project costs with a deficit of US$311 million (Ross & Staw 1986). However, even with such deficit, Expo1986 helped to reduce the double-digit unemployment rate at that time and played a significant role in transforming Vancouver from a sleepy little

town into the international metropolis it is today (Chan 2016). Atlanta OG1996 adopted a ruthless strategy that designated precisely what would be done with the sports facilities right after the games were over. However, even with such an efficient strategy, the large number of temporary constructions limited the physical legacy and the games became labelled the 'Disposable Games' (Rutheiser 1996). This is the reason that the author has introduced Proposition Two for exploration in this research.

The debate over how appropriate it was to spend millions on iconic stadia or venues in developed and developing countries in order to host the mega-event is still a contemporary phenomenon. The role of event owner is vital here as indicated in Proposition Two. Iraldo et al. (2014) stated that Milan Expo2015 was facing a substantial financial loss hidden by absence of transparency; this included an estimated cost of 23.6 billion euros for the exposition and an additional 10 billion euros reserved for the 191,000 employment positions. Baade and Matheson (2016) indicated that from 1968 to 2012, every single OG ended up costing much more than initially estimated. Some OG spent significantly over budget; for example, OG2008 Beijing cost around US$45 billion, OG Seoul1988 around US$6.5 billion, and Sydney OG2000 around US$7 billion (Preuss 2004). However, the drastic impacts on the economy of the hosting destination are riskier for the smaller economy. The OG2004 Athens event had a tag price that exceeded the US$11 billion forecasted; double the initial projections. Tagaris (2014) stated that hosting the OG was supposed to be a chance to transform Greece's image abroad and boost growth, yet ten years after the event which was returning to its birthplace, Greece has very little to celebrate. Greece's Hellenic Olympic Committee denies that hosting the game contributed to Greece's debt crisis which exploded in 2009; wasting US$11 billion can be blamed only to some extent for the country accumulating a debt that exceeded US$400 billion at the time (Tagaris 2014). Proposition Three was

generated based on the importance of balancing legacy with sustainability. The mega-event frequently limits the role of business entrepreneurs as it will attract large international firms; this is usually a precursor to unemployment and bankruptcy for small and medium companies (Leonardsen 2007).

Gelan (2003) claimed that the method used to calculate the effect of the net income generated directly from tourists' expenditures triggered by mega-event spectaculars on the overall economy should be more transparent as the current methodology is overestimating the impact. Cornelissen et al. (2011) went beyond that by declaring that the mega-event may affect the current tourist cycle for the destination with regular visitors, as they will change their plans to avoid the crowds and the associated premium prices. Allmers and Maenning (2008) found the same results during a post-analysis economic impact of France WC2002 and Germany WC2006, as the number of foreigners' overnight stays declined during the period of the mega-event. The expected increases in retail sales and decrease in unemployment level appear negligible as the authors believe that consumers diverted their routine consumption behaviour as a result of the World Cup due to their preference to go to public areas or stay home to watch live broadcasts (the couch potato effect), rather than pay to go to the stadium to watch live events (Allmers & Maenning 2008).

Many contracts involved in preparing for mega-events are of a temporary nature, which has a direct impact on the high turnover of employees. This process leads to quick replacement, loss of knowledge and skills, and lack of trust among the team (Deng & Boom 2011). This is one of the primary causes for not achieving the balance presented in Proposition One. In addition, the unfailing demand on competing to host mega-events through the emerging host destination does not seem to consider past failures. There is scant literature providing evidence-based analyses of mega-events' operations and

outcomes in order to facilitate experience sharing and knowledge exchange. Mega-event propaganda is always louder than the voices of the researchers who point out the possible impact of those events.

Filippetti (2017), an economic journalist for Milan Newspapers, attested that Milan Expo2015 opened its doors in May 2015 after many investigations about bribery and Mafia-related building companies, work delays, and overall doubts about the real usefulness of such an investment. The expected political outcome of this project was to launch an enhanced view of Italy's ruined image and struggling economy by providing a significant breakthrough for an economy as promised by Matteo Renzi, the prime minister at that time. Filippetti (2017) claimed that no one in the city of Milan saw such an outcome, with hotels and restaurant complaints about the low numbers of visitors who tended to book rooms outside downtown Milan. The first two months saw a very slow volume of visitors which forced the organiser to use social media to boost sales. The Italian government heralded the great success of Expo2015 with 20 million visitors; however, this number included Expo employees, and tickets sold at €5 to have drinks at night instead of the original ticket price of €32. The officially released number of Expo2015 visitors dropped with a limited number of foreign visitors and the Expo SpA, the Company that managed the event never released its balance sheet. The World Expo chief Giuseppe Sala said that he would publish an event balance sheet only after the city mayor election was held in order to avoid using World Expo in the election publicity. However, as Mr. Sala was himself a candidate who was elected as Milan Mayor, the balance sheet was never published and his job at the World Expo never completed. Expo2015 cost taxpayers around €2.2 billion with revenue less than €420 million, and some reports said that ticket prices would have to have been sold at €100 to reach the break-even point.

The fair distribution of government investment will always be questioned during the preparation of the mega-event. Black (2005) anticipated that London OG2005 would help increase the welfare of people living near London while those living elsewhere in the UK would not have the same benefits, such as government spending on infrastructure development. Such inappropriate development may increase the gap between the different locations within the same country, which may in turn encourage internal immigration and further crowding of the cities. The construction related to hosting mega-events facilities could also detract investment from locations that badly needed infrastructure. Hall (1997) indicates that mega-events can cause mass movements of people, and the accompanying significant volume of residential relocation, which brings Proposition One into question. In addition, Waitt (2003) demonstrated that local and marginalised people often feel excluded from mega-events as the high access fees, generally charged to finance elite venues, are an obstacle to their involvement. Coaffee (2011) reflected the same inappropriate development impacts of mega-event through the example of Rome OG1960 which led to complete refurbishment of the airport, sewage system, street lighting, and historical sites beyond the city's means.

Another term widely used in hosting the mega-event is the 'white elephant impact'. This refers to the cost of maintenance for the facilities built for the mega-event on the hosting communities (Lie 2013). This phenomenon is also an important aspect of the event owner's role in awarding the event to the right bidder with a solid sustainability system. A 2012 CNN report showed the anger of Montreal citizens over the investment in OG1976. The event came with the price tag of US$1.48 billion which left the city almost bankrupt at that time and generated a public debt that was not paid until 2006 (Newton 2012). Montreal Taxpayers called the stadium the 'big owe' instead of the actual name that referred to its shape– the 'Big O.' Matheson and Baade (2003) indicated that mega-

event facilities are designed to host massive amounts of people and are more prominent than local community requirements. Many facilities are left unused after the mega-event like the Olympic village in Greece, football stadia in South Korea and some parts of the Olympic village in Brazil.

Deploying the mega-event to develop a green economy is rare despite some references to the environment's legacy (Preuss 2013). Collins et al. (2008) found that mega-events are criticised for their perceived negative impacts on sensitive location – lately, many environmental movements have condemned mega-events for their negative contribution to climate change. Collins et al. (2008) added that environmental assessments do not offer a framework for events to be judged against each other or environmental criteria or even against any notional 'best case' scenario. ISO 2012 is considered a breakthrough in the sustainability practices during mega-events; however, this standard is only a guideline with and does not specify what the goals or measures of sustainability should be. Furthermore, the standard has no explicit specification for which sustainability issues should be managed or what the performance levels the hosting city has to achieve. The standard calls for transparency in the process which will allow a systematic evaluation of issues related to the operations where the organiser sets out his objectives and targets for improvement. From this, we can see that sustainability acts as a process and not as an outcome (ISO 2012), which supports the rationale behind testing Proposition Two relating to the event owner's sustainability role in the awarding process.

The tourist industry contributes strongly to the economic pillar of sustainability. Travel and tourism improved from US$6 trillion in 2007 to US$7.6 trillion in 2016, representing a 10.4% growth in contribution to the global GDP (WTTC 2017). This field outpaced the global economy for the seventh consecutive year in 2017 and created 313 million jobs with US$882 billion in related investment (WTTC2018). However, in terms of the

environment, the tourism industry is less sustainable; Hall (2011) concluded that emissions, resource usage and biodiversity loss due to tourism are higher than ever. Sherwood et al. (2005) found that mega-events will lead to excessive energy and water usage which affects the ability of the hosting destination's natural resources to recover. DeLacy and Bergin-Seers (2009) indicated that mega-events increase the carbon footprint of the hosting city and turn many virgin lands into a concrete jungle. Kim et al. (2006) stated that mega-event impact might include "change of land use, pollution of beaches, lakes, and rivers, and deterioration of cultural or historical resources" (p. 89).

Death (2011) argued that the estimated emissions of the FIFA2010 World Cup in South Africa were eight times higher than those of FIFA2006 in Germany. The reason behind this is due to the absence of high-speed rails links in South Africa which increased internal flights, the travel distance to South Africa for the major hub of fans, the need to construct five new stadiums and renovate five others, and the lack of enthusiasm for off-setting the national carbon footprint. Schmidt (2006) remarked that Athens OG2004 was widely viewed as an environmental failure, mainly concerning sustainable construction and green energy where the commitment to use energy from renewable resources was not delivered, and most of the electricity came from non-renewable sources. Schmidt (2006) pointed out that, despite the fact that the hosting city deploys major resources to achieve their environmental targets, they still struggle. Beijing set high environmental obligations while the city's air quality ranks among the world's worst and nitrogen dioxide levels are the highest in the world, posing an obvious hazard to competitive athletes. However, Beijing set a target to achieve 230 "blue-sky" days per year. Schmidt (2006) reported that Beijing ordered large steel makers to move their coal-fired smelters to different provinces, and set higher auto-emission standards along with many other green initiatives. In 2005 the air quality index was improved, and the city claims it

achieved 234 blue-sky days. However, that was not a long-lasting impact as in January 2006 the city announced the air quality index was the worst in six years with only nine blue-sky days reported. This result was considered an indication of the environmental impact of preparations to host a mega-event and why Proposition One was tested in this research. Although Beijing OG2008 was able to temporarily change the status quo it was not enough to mitigate against the new emissions generated by the preparations for hosting the event.

Preuss (2013) indicated that concerns over the economy are still much higher than the environment in low environmental-concerned cities like Sochi or Rio de Janeiro. Safety inside the venues is another subject to attend to carefully particularly since the Bradford City football club disaster where a fire killed 56 fans, and hundreds were injured (Herbert 2015). Equal priority of the SDTBL pillars will inform responses to these challenges.

Deng and Poon (2013) justified the rationale for the geographical shift of hosting the mega-event to the ambition to recast the new hosting destination in developing countries as a global powerhouse. In order to achieve this, many unprecedented infrastructural upgrading and spatial restructuring initiatives have to be completed at any cost. It is difficult to rationalise how Russia spent US$51 billion on the OG2014 in Sochi or how China spent US$45 billion on OG2008 other than from a political stance, where leaders of those countries had the desire driven by egos to demonstrate political and economic power (Baade and Matheson 2016), which explains why Proposition Two is presented in this research. Koch (2014) pointed out the negative environmental impact of developing, powering and cooling Qatar's purpose-built stadia as the games are going to take place in 2022 in the hot season, in addition to that, the Qatari local sports clubs do not require such size of the venue as the numbers of local football spectators is limited compare to what they are preparing to have in the world cup. To that end, Qatar was

sharply criticised at the United Nations Climate Change Conference (COP 2016) held in Doha for hosting such an event while Qatar is the world's highest consumer of electricity and water per capita without having a clear ongoing plan for change, as presented in Proposition Four. Milan Expo2015 was criticised as well. In a progress report for the Expo construction, Biondillo (2014) noted the slow site movement, the exasperation of the workers, and the immobility of the work under the strong accident preservation regulations, and expressed doubt that the project would be accomplished on time. The Milan Expo2015 venue design shrank from 1.1 to 0.4 million square metres, ending up one-fifth the size of the Shanghai Expo2010 model. Wainwright (2015) indicated that out of the €13 billion construction costs, €1billion was used to hide building that was not completed in time for the inauguration.

In a well-connected world equipped with many social and conventional media tools, the news is broadcast faster than ever. The terminology "media scoop" is well-known in the media industry and reflects the value of showing or discovering subjects before the other media organisations do: in addition, "bad news sells." Hosting a mega-event will bring international media companies to the hosting destination looking for undesirable stories about the hosting destination. Agence France-Presse (2015) indicated that the nation was shamed by not cleaning pathogenic sewage from Guanabara Bay for Rio OG2016. Jago et al. (2010) stated that mega-event negative results might be headed by the ability of the plight of the disadvantaged group to receive media attention before and after the event. Recent examples of this are the FIFA2014 and OG2016 in Brazil where media covered the forced relocations of the lower socio-economic groups, the safety issues, and uncertainty of meeting the deadline in construction sites.

Corruption scandals are also frequent in mega-events. In Shanghai 2010, seven managers and former members of parliament were arrested one year before the opening. This

raised questions about investment sources and accuracy of the published onsite costs. In addition, such acts shake the sustainable image of the Expo Committee which they were attempting to portray (Wainwright 2015).

Protestors' activities also receive international exposure during the mega-event life cycle. Nadvi (2008) indicated that the high media profile of the mega-event will make the hosting city a potential terrorist target. Matheson (2009) asserted that the OG has long been a target for terrorist attacks with many deadly incidents in both Munich OG1972 and Atlanta OG1996. In addition, he argued that the costs of security escalate dramatically. Sydney OG2000 had a security tag cost of US$250 million while security for Athens OG2004 cost US$1.6 billion which was four times higher than the initial budget, not to forget that the September 11 attack in 2001 occurred between these two mega-events. Nowadays, Athens security costs have become widely accepted as the bench mark costs to secure a mega-event.

Baade and Matheson (2016) shared the experience of OG2016 which cost Brazil in excess of US$10 billion and led to a severe recession, reduction in public services, and increase in unemployment level. Brazilian turned out to protest against what they described as misallocation of resources. Furthermore, the growing threat of the Zika virus was increased with international visitors scheduled to return to their departed countries. Baade and Matheson affirm that the cost-benefit analysis of hosting the mega-event is considered a poor investment decision for developing countries compared with those in the industrial world. In addition, they stated that Rio de Janeiro, a popular and fashionable destination in South America, still needed to construct 15,000 hotel rooms to comply with the 40,000 hotel-room requirement of the IOC. This oversupply led to bankruptcy of some of these facilities after the event, similar to the case in Lillehammer OG1994 where 40% of the hotels went bankrupt (Teigland 1999).

Jago et al. (2003) theorised that the complications that emerge during hosting a mega-event lead to a permanent "tarnished city image" that will shape the perspective of the hosting destination for the future visitors or investors and contribute negatively to Proposition Four. Mishra (2012) described the negative role of the media in the 2010 Commonwealth Games in India in a paper called "the shame games," a medium-sized event where the press focused on mismanagement and inefficiencies in game preparations. Many released articles and media coverage focused on the bias in covering events in developing countries compared to the management of such events in Western regions. These reports included subjects like deficiencies in India's infrastructure, poor functionality of the equipment and facilities, stories on India's racism, poverty, sex slavery and child labour laws violation, and the lack of safety and security in India. The media scrutiny augmented the existed stereotypes in differences between India and the West, inferring that visiting India would incur risk to the tourist.

During a mega-event, crime levels tend to increase; however, the local community's perceptions of this risk are not taken into account. Ohmann et al. (2006) stated that the crime rate during the FIFA2006 event increased while only 12% of the citizens correctly perceived this risk. Billings and Depken (2001) expressed similar concerns regarding the increase of criminal activities in the mega-event neighbourhood during the event. Hall (1997) found a relation between hosting a mega-event and increase in robberies and sexual and common assaults. Getz (1997) posited that the mega-event is a scene of both premeditated and opportunistic crimes. However, Howsen and Jarrel (1990) have argued that although mega-events contribute to increases in crimes like robbery, burglary, public drunkenness, disorder, and vandalism, they have no significant impacts in crimes where human beings are physically assaulted, like murders or rapes. More recently the Paris attacks in which Islamist shooters killed 130 peoples motivated Brazil to invest in

security operations to protect the two mega-events like no other country had done before. Agence France-Presse (2015) reported that 85,000 police, soldiers and agents were recruited to protect the event and the 500,000 visitors with the coordination of 80 countries. Even with such efforts, Pukas (2016) reminds us that it is still business as usual for the city's crooks – with more business and richer pickings. Brazil records 60,000 murders every year, higher than the death rate in some war zones.

2.7 General Review for High Contributors Sectors of Sustainability

2.7.1 Transportation

As the mega-event lifecycle includes intensive preparation and infrastructure development ahead of the event as well as major spectators' activities during the event, the transportation of people and goods plays a significant part in the overall programme sustainability outcomes. The mobility of people and goods is the spine of any mega-event. Countries' candidacy for hosting a mega-event will not be accepted without a plan for infrastructure upgrading along with transport strategy on how people and goods are going to be moved. Proposition Four was initially generated to address this issue in the role of the mega-event in changing the consumption habits of the host destination. The infrastructure development is frequently cited as one of the most critical motives for the countries or cities to bid to host a mega-event (Horne & Manzenreiter 2006; Guala & Turco 2009; Hall 2012). However, these mobility projects tend to receive less media attention than the construction of stadia or venues do. Mobility projects have to be tailored based on the need for the event and the adaptability of those projects to serve the local residences after the event. Hiller (2006) indicated that the post-event stage would require a pre-event plan for how to adapt the mega-event infrastructure to the needs of the residents. Malhado et al. (2013) argued that urban mobility has the potential

to significantly contribute to the economic regeneration of the host cities by attracting national and international investors and encouraging them by providing business environment improvements.

May et al. (2001) view the sustainability framework for urban transport against six principles. The first one is economic efficiency, as the system has to have a budget and an investor. If so, the project should undertake a positive feasibility study and have a viable business model that will serve as an economic booster and element for investment attraction. The second principle rests in the liveability of the streets and neighbourhoods given that the ultimate goal of any transport system is to serve the residents and improve the standards of public transport to increase the public's reliance on it. Third, the transport system has to respect the environment, play a role in reducing the carbon footprint, and achieve the optimal level in space management. The fourth principle is equity and social inclusion as the transport system should be able to serve the upper community layers by providing satisfactory cost-effective transport solution, as well as availability, accessibility, and quality of service. Fifth, the transport system has to be safe and trusted by society. The last principle of the sustainable urban transport system is to contribute to economic growth and be self-sustaining.

Based on May et al.'s (2001) principles for a sustainable urban transport framework, 20 qualified stakeholders representing 12 European Union (EU) member states worked together to set out the sustainable objectives for a viable mega-event transport system which was later published by the European Communities (2004) in Brussels, to include the following objectives:

• Accessibility: A sustainable transport system should aim to provide accessibility to all categories of inhabitants, commuters, visitors, and businesses.

- Health and safety: A sustainable transport system has to have a limited hazardous impact on health, safety, and security of the citizens. This confidence in the system is what will encourage the citizens to rely on it.

- Pollution: Noise emissions, greenhouse gas emissions, and energy consumption have to be kept at the minimum level with continuous research and studies on how to continue to reduce pollution.

- Efficiency: A sustainable transport system should be efficient and cost-effective for the transporting of both goods and passengers, and be reliable in timing and quality of the provided service.

- Urban Development: A sustainable transport system has to enhance the attractiveness and quality of the urban environment.

The Dubai Road and Transport Authority's (RTA) strategic plan for 2014-2018 targets are to achieve "environment sustainability for transportation" taken as one of the main goals and objectives. In order to accomplish this objective, the RTA strategic initiatives commence by planning to develop an environmental sustainability policy and energy management system framework for all the contractors working with the RTA; further, the implementation of a green economy is part of the Dubai Energy Strategy for 2030. The RTA is a significant stakeholder in this strategy through the implementation of several energy efficiency projects and investments in the technologies' upcoming plans which target the minimising of environmental impact. In addition, the RTA plays a significant role in raising public awareness about the role of the public means of transport in achieving green economy targets against its own transportation emissions (RTA Strategic plans 2014).

The RTA's success in improving and encouraging transportation is noticeable through the high ridership of Dubai Metro where more than 88 million people were transported in the first two quarters of 2015 according to RTA statistics. Manda's (2011) report quantified that railways consume 60-80% less energy than cars do. This saving leads to 80% less CO_2 emissions and is commercially viable as it is 30% cheaper than regular road transport. However, as sustainability is not the sole factor to be considered in transportation, Lue and Colorni (2014) proposed a criteria tree to evaluate the alternatives of the traditional transportation system by considering mobility, economy costs, and users' acceptability, along with the environmental considerations for air quality, noise, landscape and natural resource loss. This assessment can strike a balance between the transportation function and its efficiency. Silitonga et al. (2012) stated that the heavy dependence of the transportation's sector on petrol and diesel represents an unsustainable trend regarding energy security (the non-renewable resource) and CO_2 emissions (causing global warming). Mustapha and Bekhet (2016) argued that the rapid growth of the Malaysian economy is strongly correlated with the increase of CO_2 emissions, and the transportation sector is responsible for around 28% of the total emissions with 85% of those emissions produced by road transport. Klier and Linn (2013) identified a significant relationship between the increase in the fuel price and the level of CO_2 emissions in several EU countries. Mustapha and Bekhet (2016) and Klier and Linn (2013) proposed that the strategy of increasing fuel prices will lead to a decrease of 6.5% in CO_2 emissions as people will reduce travel distance; nevertheless, this policy will have a substantial impact on the inflation rate and the competitiveness of the country, which will result in an unsustainable economic outcome. For these reasons, governments around the world should seriously consider other alternatives for road transportation. The social, the environmental and the economic impacts of the

transportation are augmented in cities that host mega-events.

GCC countries are currently executing mega-transport projects including Etihad Railway in the UAE with a budget of US$11 billion (Jaisinghani 2014) with 2,092 kilometres of track distance divided into three phases, the Gulf rail network with a budget of US$15.5 billion and the Qatar Metro at US$2.2 billion (Menon 2014), not to ignore the Dubai Metro which in 2018 had been in operation for eight years. However, sustainability in transport is not limited to the railways. This research examines the stakeholders' environmental knowledge about the impact of private car travel attitudes, the role of the weather in using the car for short trips (below five kilometres), driving distance and trip planning, catalytic converters' role in reducing emissions, fuel-efficient engines, the continuous increase in private car ownership, and the social impact of owning a private car. All these factors accumulate to influence overall sustainability in transportation. The RTA estimates that the Dubai Metro facilitates a reduction in CO_2 emissions by over 645 tonnes per day; Shahbandari (2017) indicates that this is due to the reduced amount of vehicles on the roads which also reduces traffic congestion. The Dubai Metro 2030 plan is to cover 421 kilometres with 197 stations. Besides that, the Dubai Tram, launched in 2014, is the first tram outside Europe powered by a ground-based electric supply system. The RTA predicts that 66,000 passengers will use the tram by 2020 (Kannan 2014). Metro Dubai Route 2020 cost US$2.45 billion for 15 kilometres of the red line which connects Nakheel Harbour and Tour Station on the green line with the Expo site. Mr. Abdul Rahman Sales, the general manager of the Department of Finance in the Dubai Government, explained that the international finance houses have high confidence in Dubai due to the vision of His Highness Sheikh Mohamed Bin Rashid. He stated that this trust helped them to secure long-term loans with competitive interest rates; the first US$1.42 billion will be backed for 17 years by European export

credit agencies and arranged by a group of local and international lenders. The French Export Credit Agency and Bpifrance Assurance Export and the Spanish Export Credit Agency financed the first US$1.42 billion while the second US$1.1 billion was arranged by a conventional facility for six years commencing in 2022. In 2016, Dubai Metro design and construction were awarded by the Roads and Transport Authority (RTA) to the following: "Consortium of France's Alston Transport," "Spain's Acciona Infrastructures" and "Turkey's Gulermak" (Khan 2018). The 2014 Design MENA report indicated that a zero-emission bus service would transport visitors to and from the World Expo from pick-up points throughout the UAE. Furthermore, the RTA accounted for the legality of car-pooling in 2013 to increase vehicle occupancy rates and help mitigate congestion. This sharing system could be completed through online registration to help connect people living in the same area with those commuting in the same direction. Another RTA initiative is the "Udrive," a rental service offered by the RTA providing car rental by the minute.

The United Arab Emirates has six busy airports and four local flights operating with a capacity of up to 265,000 passengers every day through more than 1,250 fleets. The Aviation Authority announced that more than 126 million passengers travelled through all UAE airports in 2017 with around 512 planes registered under the four local operators (Emirates, Etihad, Flydubai, AirArabia). Dubai has two airports – Dubai International Airport (DXB) and al Maktoum International Airport (DWC). These airports play a significant role in the activity of the Dubai economy in general and are contributing to the preparations for the mega-event. In 2016, Dubai Airport handled 83.6 million travellers and became the world's busiest regarding international passengers and the third busiest airport overall when local flights are included. Dubai Airport welcomed 16 million airline passengers in 2002, meaning that the airport traveller number growth in

the last 16 years stands at 423%, the highest growth percentage in any airport worldwide (Smith 2017). Dubai Airports recently launched two major projects which will increase the capacity required for Expo2020 and onwards. The first project is DXB plus, an innovative project designed to deliver a consistent and differentiated customer experience which aims to boost the airport capacity to 118 million passengers by 2023 without any significant additional infrastructure. In order to achieve this, Griffiths (2016) indicates that Dubai Airport will enhance the streamlining of the customer-centric process and involve new technology. The second project by Dubai Airports that is currently underway is in the DWC airport terminal which will have an expansion to increase the capacity up to 26 million passengers by increasing the number of boarding gates, baggage reclaims, and check-in desks (Griffiths 2016). DWC is an airport that holds the ultimate space to turn into an airport handling 240 million passengers per annum. Griffiths (2016) argues that this airport has the vision to be the world's largest airport and had a plan to be the Emirates hub when it migrated from DXB to DWC. The DWC opened at the end of 2013 and will have a capacity to handle 160 million passengers and 12 million tonnes of cargo by 2020 (Clark 2014). The DWC development includes the creation of integrated sea and air freight facilities which are expected to play a vital role in the Dubai general transportation infrastructure and in serving Expo2020 (Milne 2014).

Emirates Airline is one of the significant international companies with the plan to have more than 250 aircraft serving some 70 million passengers by 2020. Clark (2013) argues that being the biggest airline in the world is not the end goal for this company as it aims to serve 90% of international travellers through one-stop flights benefiting from the strategic location of Dubai. Clark (2013) indicates that the number of international travellers doubled from 24.8 million in 2005 to 57 million in 2012. With airports'

infrastructure geared to host 20 million visitors in 2020, Emirates Airlines is one of very few companies that operate an A380 from a dedicated terminal. Emirates Airline is one of the most eco-efficient fleet operators in the world with a fleet age of only 6.2 years versus the global fleet average of 11.7 years. Emirates Group (2014) announced that the fuel efficiency results in the 2013-2014 fiscal year were 14.5% better than the international air transport association members' average. This step led to a reduction in carbon emissions to 0.764 kilogrammes of CO_2 per Tonne-Kilometre, which improved efficiency by 0.4%. Lastly, Dubai Airports (2014) announced a corporate social responsibility, safety and environmental policy to establish a carbon emission baseline by giving priority to the environment. This progress in environmental initiatives will limit the DXB and DWC carbon footprints while supporting the growth of the aviation sector and the broader UAE economy.

The UAE government views the Dubai Expo2020 mega-event as an opportunity to create further global collaboration. The overall direction of the UAE economy is to move toward renewable energy, sustainable waste management and energy efficiency given that clean transportation is a significant concern for the UAE leadership (SDG Report 2016). Based on this, significant steps in sustainability have taken place over the last few years, and the SHAMS1 project is one of the largest solar panels firms in the world to produce sustainable electricity. The overall diversification of the economy is another aspect of the developmental path towards sustainability and the government's encouragement to all stakeholders in business and society to establish a low-carbon economy. Given the significance of increased sustainability for the future of countries' economies and environments, Dubai is not unique in this journey, Abu Dhabi, the capital of the UAE, also marked a significant milestone toward sustainable economy by initiating the ESTIDAMA programme that promotes energy and water efficiency use in

the construction sector, and also has announced several protected areas that cover 8.96% of land from Abu Dhabi and 5.64% from the coastal areas (SDG Report 2016, p 65). Among other initiatives, the ADEPA (Abu Dhabi Environment Policy Agenda) 2030 aims to reduce water consumption per capita from 627 litres per day in 2013 to 340 in 2030, to reduce the carbon emissions to below 28.58 tonnes per year CO_2 in 2030 from the current rate of 37.44, and reduce the amount of waste from 1.7 kilogrammes per day per capita to 0.9 in 2030.

2.7.2 Utilities

ISO 2012121 (2012) highlighted the importance of having an energy-saving and sustainable energy supply plan in order to reduce the use and of fossil fuels and the resultant environmental impacts. Energy is part of the resource utilisation plan; if it fails, the full sustainable system will be at risk. Proposition One indicates the importance of equal priority for the SDTBL and Proposition Three shows the importance of a balanced legacy with sustainability. Under these conditions, the energy supply plan for a mega-event has to be explicated, and should continue after the closing of the event. The experience generated by hosting a sustainable mega-event through energy production and emission reduction should shape the future practices of the hosting city, serving as a catalyst to change as indicated in Proposition Four. The latest bid requirements of FIFA2018/2022 regarding environmental issues include having measurable objectives in core topics like water, waste, energy, transportation, procurement, climate change, and activities to minimise adverse environmental effects. IOC 2020 bid requirements are not far from this with requirements to (i) have brief assessments on environmental impacts and legacies of staging the mega-event, (ii) have plans in place to avoid negative impacts on the ambient air quality and quality of drinking water, and (ii) set out the details of environmental actions planned for implementation.

2.7.3 Construction

Hosting a mega-event is always accompanied by significant construction projects which require resource management and intense planning, particularly if the construction is going to be sustainable. The construction will take place concurrently in many large infrastructure projects – including hotels, residential buildings, and venues. The mega-event should be managed as a programme. Ferns (1991) defined a programme as "a group of projects that are managed in a coordinated way to gain benefits that would not be possible was the projects to be managed independently" (p. 149). Such programmes are different in many aspects: the deadlines of mega-events are always fixed; the media attention is high; the budget is limited; and the relationship between government and private sector is often strained; the awarding body has a repetitive audit and continuous monitoring; and failure in one project affects the overall success of the programme. Such construction conditions are a call for compromise in decisions as sustainable construction is always challenging. Bourdeau (1999) argues that sustainable construction is the approach that the construction industry uses to respond to the sustainable development requirements. Kibert (2016) indicates that 'sustainable construction' has been used interchangeably with other related terms like 'green' or 'high-performance' construction. Hill and Bowen (1997) stated that sustainable construction has four pillars: social, economic, biophysical, and technical.

In order to promote sustainable construction at the programme level, Shi et al. (2012) created a checklist that should be taken into consideration. This checklist includes many essential questions that answer issues like whether the programme has an agreed definition of the 'sustainable construction goals,' whether the 'sustainable construction department' is set at the programme level with a clear function and role, and whether the programme has an innovative and sustainable 'land use plan.' Furthermore, many other

elements in the sustainable construction plan also have to be engaged like the 'water and energy saving design guidelines' the 'reduction on environmental loadings plan,' and the 'legacy plan.' In addition, the 'performance-tuning design' will be considered as extra support for the construction sustainability plan along with the construction usage of water and electricity plans. In the sustainable construction plan, the programme should have a materials saving and reuse plan along with a plan for sustainable transportation. At the later stages, the programme should have an environment, water-saving and energy-saving plan for the operation phase. Lastly, with the continuous improvement process in sustainability, the sustainable construction programme should have a flexible performance-tuning plan along with an energy-saving plan for the demolition process and waste management. This checklist was taken into consideration during the data collection process for the Dubai Expo2020 empirical research in order to fully examine the requirements stated in Propositions One and Three.

Shi et al. (2010) claimed that the sustainability pavilion theme in Shanghai Expo2010 featured significant considerations of sustainable construction. All of the buildings in the pavilion were prefabricated; the work was completed with a zero waste approach; the walls and roofs were insulated with 170mm polymeric foam materials; all the windows were triple glazed; the construction cost per square metre was very competitive; high-level air filtering equipment was installed; the buildings were constructed with 30000m2 of Solar PV panels able to generate 2.8 MW of electricity per year; and vertical greening systems were incorporated to save natural resources and minimise the volume of environmental loadings, while still providing a comfortable place for living and working. Similarly, Hult (2013) highlighted that Expo2010 represented a significant node in the network of transnational imaginaries of a sustainable urban future. Construction for a mega-event has multiple benefits for the

local construction communities as it will attract multi-national expertise, improve the local workforce by working to comply with international standards, and solve the problems of some of the social challenges.

Comparably, Deng and Boom (2011) used the preparation period for Expo2010 to explain the pressure in construction during the peak period preparation in August 2006 which was 1350 days away from the opening day in May 2010. They described the situation by stating that the number of construction crews at that time was around 50,000. Many projects were undertaken synchronously like laying the new subway lines, the expansion of the international airport terminals, the development of train stations, and the renewing of the 5.28 square kilometres of the Huangpu River on both banks. Considering the scale, the nature and the diversity in projects and the schedule, the organiser was in a real race against the 'ticking clock' while many critical decisions were to be taken on what to preserve, dismantle, reuse, and construct. Managing such a programme is always a primary challenge to hosting a mega-event. Furthermore, Shi et al. (2012) proposed that sustainable construction should also address issues like land-use planning, energy conversation, reduction of environmental loading, high quality of service design, and performance-tuning design. Some previous mega-events followed these considerations to some extent; OG1992 in Barcelona was a chance for environmental recovery of a declining industrial area where 5.2 kilometres of coastal area were regenerated. Sydney OG 2000 Olympic Park was built in a formerly derelict industrial area full of toxic waste and transformed to a major sporting and recreational centre of the city (Iraldo et al. 2014).

The act of hosting a mega-event makes some projects priorities even if they might not have been politically or financially feasible before the event. Dodouras and James (2004) found that the positive environmental impact of the mega-event from the construction

perspective is by making the sector greener, initiating infrastructure projects in the public transport sector, upgrading the water and sewage services, and building new airport terminals. Preuss (2013) asserted that hosting a mega-event is one significant opportunity for the hosting city to develop a green economy through signalling sustainability considerations. Henderson (2011) proposed that the concept of offsetting environmental impact emerged as a result of notional ideas suggesting that the choice of one progressive action may compensate through the offsetting of another destructive one. Henderson further stated that a good example of this will be the reduction of the CO_2 from the atmosphere to offset that emitted by travel. Some of the most used methods to offset CO_2 are through the construction of large solar panel farms, replacing fossil fuel power plants which burn carbon fuels such as coal or oil with natural gas, initiating the internal process to become part of the international programme of certified emission reductions (CERs) credits, and constructing more green buildings.

Preuss (2013) explained that the mega-event motivates people to consider new approaches to how it is run. OG2008 made the Beijing citizens think about pollution; they supported change from coal heating to gas heating and initiated the programme of the recycling system. Similarly, the Athens OG2004 helped to educate people about the public transport system. Without the pressure of hosting a mega-event, it would be unlikely that the construction process was planned so carefully or that the educative lessons were so effective, and this change in perspective occurred very quickly. Getz (2009) noted an increased call in recent years to shift the concept of *hosting* a mega-event towards *managing* one that is more genuinely sustainable.

The construction field in Dubai is closely linked to the economic growth of the city along with the capacity to attract significant numbers of international investors willing to invest in Dubai. Hosting a mega-event can have a triggering impact on attracting such

investments. The research for this thesis focuses on the overall development and construction taking place in Dubai during the preparation period of the mega-event. An estimated number released by the Building and Construction Network (BNC) (2018) indicates that more than US$30 billion of construction is currently taking place in Dubai. However, many of a mega-event's economic impacts are rarely addressed after the event has ended. Minnaert (2012) argued that the reason for this is a result of the nature of economic impact studies as researchers are often commissioned by groups who have a vested interest in their outcome. Once the event has been completed, these groups choose firms that are likely to produce favourable results. In addition, the methodologies used by the majority of researchers are flawed in a way that biases the economic impact upwards by ignoring the 'substitution effect' as local residents shift their spending in order to save to attend mega-events such as the OG. In addition, there is the 'crowding-out effect', which causes regular tourists or business travellers to change their visiting plans in order to avoid the crowds. Those two impacts are only given limited consideration in assessments of the mega-event's impact. Two examples demonstrating the crowding-out effect is the number released by the UK Office for National Statistics (2015) which showed a drop in international visitors from 6.56 million one year before the OG2012 to 6.17 in the same period of the Olympics. Similar results were found in Beijing which reported a 30% drop in international visitors and a 39% drop in hotel occupancy during the month of the OG2008 compared with the previous year.

Nevertheless, as the concept of adopting sustainability in mega-events has developed over the last 20 years, the idea of the legacy emerged a few years ago as a result of the intensive spending involved in order to achieve sustainability. London OG2012 was one of the games planned with sustainability and legacy agendas firmly in place from the bid stage and included a multi-stranded narrative to achieve the SDTBL. Gold and Gold

(2013) detected the "uncomfortable relation between sustainability and the legacy provisions" (p. 3528) as both concepts receive high attention. London OG2012 represents an example of the perceived value of legacy from tax payers' perspectives compared to the overall value of sustainability as the money consumed for hosting this event was eventually ended to serve the community for years to come. Gold and Gold (2013) found that the new Coalition government (elected in May 2010) modified the OG2012 legacy promises by cutting them down and removing the term 'sustainability' from those promises and replaced by 'legacy', although without intending to imply that sustainability had been excluded from the Olympic Project, yet it was easier to be communicated with the public.

Chapter 3 Literature Review - Legacy in Mega-Events

3.1 Legacy and Mega-event

Concurrently with the development of the sustainability terminology in mega-events, another concept has emerged and is attracting discussion: that of *legacy*. The idea of the mega-event legacy emerged after critics debated the appropriateness of governments approving large amounts of spending and consumption for hosting mega-events. The detractors in these debates often argue that investment is diverted from the many cities and towns which will not be part of the mega-event, and that this affects the overall concept of sustainable development. Use of this terminology of sustainability and legacy creates a larger framework for the overall outcomes of the mega-event and can reduce the substance of criticism of the event. However, the major criticism is related to the fact that the majority of the projects that the host cities promise to construct if they win the bid are unlikely to be carried out if the bid is unsuccessful. In other words, the commitments from those responsible for sustainable development in hosting mega-events are not compatible with the actual needs of the country; rather, the development plan is made to fit the perceived requirements for success in the bid to host the event. Without a proper legacy plan, a sustainability plan will not be viable as expected, which reflects the rationale of Proposition Three.

3.1.1 Legacy and Sustainability

The term 'legacy' has a loose definition. The IOC (2002) defined it as having a recognised aspect, such as 'architecture, urban planning, city marketing, sports infrastructures, economic and tourist development', and intangible legacies as 'cultural value, intercultural and non-exclusionary experiences, popular memory, education, archives…' Preuss (2007) defined legacy as referring to all the planned and unplanned,

tangible and intangible structures with both positive and negative impacts that are created by hosting a mega-event, and which remain long after the event is completed. The sustainability and legacy pledges should each be determined and actively committed to by the mega-event stakeholder. Legacy is a far more confined term than sustainability, and it is often easier for an event owner to express their sustainability plan through legacy. Preuss (2019) indicated that the IOC started requesting legacy planning in 2000 from each applicant bidding to host the OG. However, it was only in 2012 that London OG organisers gave serious attention to creating and implementing a viable legacy plan (Girginov, 2013). The hosts for Tokyo OG 2020, Beijing OG 2022 and Paris OG 2024 all have a great sense of awareness towards their legacy outcomes. The IOC is only committed up to OG 2026 by host city contracts to tracking the legacy outcome for a period of several years after an OG is completed (IOC 2018). Leopkey & Parent (2012) have contextualised and broadened the evolution of the legacy concept over the years, yet report that it is still limited to urban regeneration, infrastructure development and change of governance. Those changes are the tangible and intangible legacy of the event. Grix et al. (2017) indicate that, when conceptualising legacies, most authors focus on legacy outcomes for particular stakeholders and do not give sufficient attention to the overall structures developed. A proper framework of stakeholder management for these events is more likely to create 'a sustainable mega-event' (Hall, 2012). As Crittendend et al. (2011, p. 80) have claimed, 'the sustainability efforts with objective financial metrics are more likely to be viewed as authentic by both internal and external stakeholders'. Preuss (2015) reports a literature review of 13 publications that published outcomes from mega-events, identifying legacy areas mentioned as economic, infrastructure, social, sport and culture which gives an indication that implementing a mega-event with sustainability considerations across the three pillars will lead to a

legacy outcome in different areas. Grix et al. (2017) found similar results with economics, urban regeneration, national pride, increased participation in physical activity, and international prestige and 'soft power' all cited. This literature reflects on the relationship between the two terms, in that mega-events with sustainability considerations will contribute to creating a mega-event legacy; however, it remains unclear whether legacy outcomes can be achieved without thorough and effective sustainability considerations. Konstantaki (2018) presented multiple case study results on OG 1998, OG 2000, OG 2012, OG 2014 and OG 2016 and found that the last two, held in Russia and Brazil, had a serious negative impact on the environment, which led to disputes about the legacies created. She found that a strongly negative perception of those two events prevailed, and that they were viewed as an example of poor event management, irrevocable environmental damage, wasted public funds, and destruction of heritage sites.

Legacy and sustainability are transforming the mega-event industry. In London OG 2012, Gold and Gold (2013) found that these two terms were equally significant when the hosting committee compiled the dossier to bid for the event. However, this balance steadily shifted during the project life cycle as the construction of the Olympic Park and venues began to take shape. Legacy impacts are more easily understood by the stakeholders and help justify the mega-event price tag for taxpayers. A joint UK Government and Mayor of London report, 'Inspired by 2012', was published in 2013 to indicate the impact of the event on sports and healthy lifestyles with significant investment in sports, primary school sport and international participation. The regeneration of East London is another significant legacy achievement of London OG 2012. The event triggered a rapid acceleration in urban regeneration: eight out of eight retained Olympic Park venues were secured within one year of the games; £6.5 billion

was invested in transport across London; 70,000 jobs were created by the event or activities related to the event; more than 60 contracts were won by UK companies for the Sochi 2014 Winter Olympics and Russia 2018 World Cup; disabled people's participation in sport is increasing; and there is increased accessibility and continuing creativity and innovation due to the excellent legacy impact of this OG. As much as this represents a legacy created through the OG, it also demonstrates the ability of a mega-event to generate a socially and economically sustainable model.

Sustainability considerations in a mega-event are always affected by the nature of the pressure on such events. Hall (1992) reasoned that the 'time pressure and cost overruns encourage last-minute changes with the result that environmental obligations are relaxed or even overlooked' (p. 131). Many years later, and after the development of the term 'sustainability', Preuss (2013) agreed with Hall's argument, explaining that the need to deliver an extraordinary event in a limited time frame often pushes environmental concerns aside, while legacy considerations in such cases have to receive further attention. He further clarified that mega-event cost overruns are usually due to underestimation of the complexity of the projects and the real costs, as well as the budget being set strategically low during the bidding process. In addition, the interference of political interests may lead to the 'piggy-backing' of additional projects attracted by the charismatic influence and power of the mega-event, adding to cost overruns. Such decisions affect the efficiency of the sustainability model in order to generate a visible legacy. Preuss (2013) indicated that mega-event proposal dossiers strive to create an impressive programme; some of these are highly visible, such as carbon neutrality, while others suggest more modest initiatives such as the use of solar energy for public transport.

At the time of writing this thesis, the FIFA 2018 World Cup was one of the largest

modernisation undertakings in Russia's history, with a budget of US$3.82 billion dedicated solely to the construction of new stadia and overall expenses exceeding US$50 billion (Alexandrova 2010). Qatar's budget is similar, with a pledge to spend US$4 billion on stadia and US$50 billion on upgrading the infrastructure. The question to be discussed with regard to the legacy outcomes of both events will be whether such spending helped to improve the sustainability model of each country or whether it was in fact a poor economic investment. However, the most critical aspect of these two events is arguably the post-event social impact and the perceived value to different stakeholders. Interestingly, the main legacy of Aichi's Expo 2005 in Japan remains the ability of the hosting committee to recycle the building materials in new construction initiatives and return the Expo Park to conditions similar to those before the event (Deng & Poon 2013).

Sustainability consists of the steps taken during the first three phases of hosting the mega-event until its completion. The legacy is the results of those steps after the completion of the event and the outcomes for years to come. A mega-event with legacy consideration should be sustainable; otherwise the outcome will be limited only to specific areas such as transportation. To broaden the impact of mega-events and make that impact longer-lasting, the first three phases of the event should be sustainable.

3.1.2 Legacy from Bidding to Mega-event

Bidding to host a mega-event is an essential decision for the intended hosting destination; it comes with possible consequences not limited to losing the bid. Bidding for such an event increases the brand value for the bidding city (Roche 2000). Moreover, it is often thought highly likely that the image of the hosting destination will be improved with the anticipated positive impact on economic, social and cultural domains, and the

generation of the attraction of interest for domestic and international tourists. On the negative side, many researchers (Roche 2000; Zhang & Zhao 2009; Song et al. 2015) found that bidding to host a mega-event is competitive among countries searching for an opportunity to enhance their country's image and brand value. Multiple bidding without securing any mega-event can be considered as a national embarrassment and reflects the poor perceived image of the bidder by the international committee. Turkey is an example of repetitive failure to secure any mega-event. After many failures in OG2000, OG2004, OG2008 and OG2012, Aksoy, the General Director of the Istanbul Olympic Committee (IOBC) decided not to bid for the OG2016 and stated to Reuters in an interview that "We have learned how difficult it is to land the Games" (Grohmann 2011). In 2012 the IOBC bid for the OG2020 by building on the strong economy at that time and a promise to construct the third bridge, Bosphorus, with the bid's slogan "Bridge together." The bid for OG2020 again failed as it was won by Tokyo, yet Turkey kept the commitment to build the bridge which was opened to traffic in 2016 (Grohmann 2011; Grayson 2012; Mackay 2012). Izmir, another Turkish city, also failed twice in their candidacy to host the World Expo in 2015 and 2020 (Daily News 2013). Turkey was not proud of such a legacy of failure in securing a mega-event even if they gained some benefits from the experience of the bidding processes.

There are numerous examples of many bids for and hosting of mega-events that became success stories. Oberjuerge (2015) indicated that the OG1984 in Los Angeles turned around a profit of around US$232million. LA84 is a foundation set up with US$93 million of that surplus, and it still supports Olympic-style competition and training in southern California as a legacy of the OG1984. Los Angeles OG1984 is an excellent example of how to build on the existing legacy of the hosting city to reduce the spending on such a host. OG1984 required only two venues – the aquatic centre and a Velodrome.

The total expenditure of the entire hosting event was US$546 million while the total income was US$778 million. Giving the right to bid to countries with emerging development plans or with existing infrastructure is a wise decision. This author believes that the time pressure of mega-events often persuades the hosting city to make major compromises regarding cost, sustainability considerations, quality of construction and legacy plan in order to meet mega-event deadlines.

3.1.3 Mega-Event: Opportunity to Build a Strong Legacy

The legacy of the mega-event may be merely the opportunity given to a country to build a showcase for skills and capabilities or to regenerate its perceived image. South Korea strongly benefited from hosting the FIFA2002 World Cup as it helped the city in developing business contacts, partnering and investing, and promoting international awareness about the destination. In addition, the activity of hosting a mega-event has a strong symbolic function that raises national pride and emotions, excitement, and sense of community (Lee & Taylor 2005). Furthermore, Florek et al. (2008) indicated that the mega-event can transform the perceived image of a community. Germany was internationally considered as a place with high education and an active research community, great in manufacturing, and heavily weighted on the hard side of economics, production and politics. However, Germany before the FIFA2006 World Cup was not generally associated with warmth, hospitality, culture or fun. This mega-event helped Germany to transform the image of the strict industrial nation into a more fun, spontaneous and likable community, and it made a positive change in the perception of the host country which was reported as the most positive and most substantial legacy. Angela Merkel, the German Chancellor stated: "The World Cup was a unique opportunity for Germany to present herself as a hospitable, joyful and modern nation, bursting with ideas." Florek et al. (2008) shared the results of FIFA2006 under the

significant 'soft factors' changer by boosting the impression of an atmosphere of a friendly and hospitable people, supporting both multi-cultural and tourism aspects.

Roche (2017) stated that perhaps the most spectacular construction for an Expo to date is the 300-metre public viewing tower in Paris created by Gustav Eiffel and his company of the Paris Expo1889 and named after him. Roche (2017) indicates other great legacy facilities like the Plaza de Espana in Seville (the legacy of Seville Expo1992), the Atomium Monument in Brussels (legacy from Brussels Expo1958), and the Space Needle Tower in Seattle (the legacy from Seattle Expo1962). Toohey and Veal (2000) however have argued the opposite viewpoint, finding that many mega-events share a common legacy of enormous debt and underutilised infrastructure. Li and McCabe (2013) have argued that very little research focuses sufficiently on tourism legacies of mega-events, one of the most important legacies, and they propose that there is much confusion among researchers surrounding concepts and issues in this area. However, Roche (2000) believes that the mega-event retains considerable importance regarding the exchange, transfer and diffusion of the information, value, and technologies between different countries and regions creating cultural globalisation.

3.2 Mega-Event Legacy Plan

Chapplet and Junod (2006) distinguished five types of mega-event legacy. The first one is the *sporting* legacy through the facilities and venues which often become 'emblematic symbols' and help with changing the sports culture of the hosting city including the introduction of different types of sports or activities. The second is the *urban development* legacy as the mega-event is an opportunity for the hosting city to reallocate manufacturers and rearrange the city in a more modern way. The third is the *infrastructure* legacy which includes upgrading of the infrastructure and airport

terminals, opening up new access routes by air, road and rail, and improved telecommunications along with modernisation of basic services like water supply, electricity and waste management. The fourth legacy is the *economy* through increasing numbers of tourists and the experience of the local companies in encouraging business to raise quality levels to meet international standards. The *social* legacy is the fifth important legacy as such an event leads to the creation of many stories and myths – or what the authors called 'collective memory'. The mega-event helps residents to change their 'perceptions of the host city or region' as Chapplet and Junod (2006) have posited.

The mega-event legacy plan has become a necessity for any hosting committee and helps with justifying the high expenditure. The 63-metre-high China Pavilion built for Shanghai Expo2010 with a floor area of 153,000 square metres is one of the most recognised mega-structure legacies, which was reopened twice after the Expo2010 due to its popularity. Currently, this building has been transferred to China's Fine Arts Palace for Contemporary Arts (Deng 2014). Atlanta's OG1996 was designed with a plan to transfer the stadium to become the home of the Atlanta Braves Baseball team. The aquatics and the Olympic villages were managed by Georgia Tech University where they are used as basketball courts and running tracks for the students, local clubs and schools. The Olympic villages eventually housed thousands of students (Usborne 2008). Los Angeles OG1984 came right after the financial failure of Montreal OG1976 and the political upheaval in Moscow in 1980 as the only city able and willing to host the games. Los Angeles created the new model for the Olympics by concentrating on improving existing facilities, and only built the aquatics and the Velodrome centre. The funds for those buildings were raised through corporate sponsorships, television rights, and ticket sales. OG1984 was the first games since 1932 to make a profit of US$200 million (Usborne 2008).

Deng (2012) proposed two main concepts of planning for a long-lasting mega-event legacy impact. The first one is to build the plan based on market demand. Expo2010 was constructed in an area aiming to be an important event destination in the Asia Pacific Region. The Shanghai Foreign Economic Relations and Trade Commission and the Shanghai Foreign Investment Commission set a plan to host 500 international exhibitions and 1000 international conferences annually by 2010 while the significant local convention and exhibition centres (CECs) had a space capacity of 30,000 square metres in a single exhibition by 2007. Looking for such ambitious targets compared to the exhibition areas that existed before the World Expo indicate a space deficiency of around 200,000 square metres, which justified the construction of the Expo Centre. The second concept is the fixed component; the exhibition centres in China are used for annual local political events including the Shanghai Municipal People's Congress, and the Shanghai Municipal People's Political Consultative Conference. Both events require massive spaces to host all of the attendees. Expo2010 was conceived as a significant destination to hold conferences, forums and public events not only for the 200 national participants and international organisations but also for the 34 Chinese prefectures and regions. This two concepts underpinned the formulation of a long-lasting legacy plan for Expo2010 specified well ahead of the event.

Economic gain is not always the primary area of success for mega-events. Kim et al. (2006) claimed that the FIFA2002 World Cup generated more societal and cultural benefits than it did economic gains. The study compared pre-world cup and post-world cup impact, and the significant benefits for South Korea fall under the "cultural exchange between tourists and residents, the cultural identity of local communities, understanding of other societies, preservation and development of the local culture and natural resources and restoration of historic buildings" (p. 87). Based on social exchange and

distributive justice theories, Kim and colleagues theorised that the external stakeholder of the mega-event is more likely to form perceptions of the mega-event based on how much the exchange is valued ahead of the actual exchange occurrence. South Korea's products and brands already had the potential; yet with the international exposure they became more compatible and widely accepted.

The competition between cities to host mega-events is justified then to some extent by the capacities of those events to influence history and modern international culture. Roche (2000) asserted that the World Expos are more potent than other mega-events; he) demonstrated that those events are vital in the reorientation of national societies towards international or global society. he further argued that the mega-event helps in the shift from modernisation to globalisation which reduces differences between countries, moderates gaps, and generates further consensus that humanity is sharing one world. Furthermore, Roche (2017) contested that the post-event period is mainly evaluated through the shared memories which become part of the ongoing identity of an ex-host city and

> part of the narrative of the story about themselves that ex-host cities and nations recurrently tell both later generations and also visitors. Besides, some of the principal buildings, places, and spaces of the original theme parks may also remain physically. Moreover, if they were initially perceived at event-time, they may be able to go on exerting such as the effect on the public who encounter them in post-event periods (p. 116).

Roche (2017) asserts that the only way to achieve this is if the mega-event is designed with a legacy scheme in place, planned ahead of the construction of the venues and infrastructure, and should include characteristically creative pieces of architecture. Cornelissen (2004) asserted that the tourism legacy impacts are the most important legacy that the hosting destination inherits from hosting a mega-event, and it remains the primary driving motive for such an initiative. Li and Blake (2009) asserted that

tourism legacies also impact on attracting tourists to the host destination who do not watch the event, which also generates economic legacies. The reason behind this is the extensive media exposure which plays a significant role in changing the image of the host country by displaying the much-improved tourism facilities and infrastructure.

The mega-event role in improving the image of the hosting destination can be generated through a successfully held event which will demonstrate the capabilities of the hosting city in organising large events, creating a safe and friendly environment, and formulating supportive and effective policies. Lee et al. (2005) defined the destination image as "an individual's mental representation of knowledge, feelings and overall perception of particular destination" (p. 840). The reflected image can have a long-lasting impact on the people who attend the event, or those who hear about it. Florek et al. (2008) indicated that the subjective nature of the perceived image for the hosting destination reveals the fact that people hold images about destinations even if they have never been to these places. Such an image or perception will differ from person to person. Florek et al. (2008) indicated that the cognitive elements (awareness, familiarity, and associations with an object), emotional elements (feelings and emotions towards an object) and behavioural elements (the tendency of specific behaviour toward an object) are jointly represented, resulting in the perceived image of the hosting destination. In addition to that, Biel (2013) expressed the idea that the encompassing country image should be classified into two types of associations – *hard* and *soft*. The first one is related to rational, objective and performance-related issues which reflect the tangible brand features or functional benefits, while conversely, the soft association indicates reflected image based on subjective elements like emotion, excitement, friendliness or innovation. Li and McCabe (2013) suggested that the hard legacies (urban renewal, infrastructure development, and tourism legacies) are more easily perceived and captured than are soft

legacies; so, for example, social sustainability often receives less attention.

3.3 Social Impact of Mega-Event

The growing awareness of the social impacts of the mega-event is a new trend of thought which conceives of these events as having more to do with human and social influences such as happiness and subjective well-being than with the principal arguments of economic impacts. This greater social awareness can generate many positive impacts like pride, self-esteem and optimism, and the confidence in investment in the destination that will encourage foreign companies to move their offices or initiate trade agreements with the host country, as expressed by Li and McCabe (2013). What the authors emphasised is the role of the new management skills and innovation accumulated through the hosting of the massive event. In addition, they indicated that the primary critical areas of the social impact of hosting a mega-event are tested through tourist satisfaction, identity and image effects, local residents' perceptions and participation, and volunteering. Those five impacts can be measured through indicators like tourist perceptions, civic pride, local valuation of the event, intention to participate in activities, and the impact of the inspiration the event brings to children and young people. Brenke and Wagner (2006) found that the World Cup 2006 economic impact in Germany was relatively small compared to positive effects accruing to society as a result of hosting the games. This social impact can have an indirect effect on the long-term perceptions of tourists among the host population, attitudes towards hospitableness, and associated social and human effects. These improvements can lead to long-term positive impacts on the tourism industry.

Thornton (2012) indicated that the legacy evaluation of the mega-event can be tested through the mass participation and economic impacts of the events regarding the

employment and Gross Value Added (GVA), rather than through direct income. In addition, the legacy evaluation has to indicate the volunteering and community engagement, as well as changed attitudes to disability and increased social participation from this group. Legacy in sustainable development includes encouragement of behaviour change through testing its long-lasting impact, the overall well-being of the host city community, the improvement in the international profile of the hosting destination, increased reputation, and how much the hosting committee invested in the legacy initiative out of the overall spending on the event. Environmentally, Preuss (2013) attested that the green legacy would be measured, among other benchmarks, particularly against the knowledge accrued on how to recycle and how to educate people about recycling. The increases in public transport efficiency and effectiveness along with constructing facilities and buildings according to high ecological standards are also components of the green legacy of any mega-event.

On a more cautionary note, Lenskyj (2008) pointed out that the Olympic Industry is accused of its "failure to conduct business in a socially responsible and ethical manner" (p. 149). Lenskyj (2008) argued that if the Olympic movement is looking to claim an authentic legacy, many changes will have to be made. The first one is to provide and ensure accessible housing, tenants' rights, a free media, freedom of assembly, unrestricted public use of public spaces, and increased awareness about the impact of Olympics propaganda in order to protect children and young people from its negative potential influence. Without those demands being met, Lenskyj (2008) asserts that "talk of a lasting legacy for all residents in Olympics host cities is empty rhetoric" (p. 152). The mega-event, in general, threatens to interfere with the regular routines of the hosting city's ordinary citizens and often requires increased safety considerations. As alluded to above, mega-events are a potential target for terrorist attacks which increases the already

spiralling costs for securing the event. Lenskyj (2008) believes that neither the impact on the environment nor the actual cost of hosting an OG have been measured correctly or revealed in order to keep have bidders for the next games.

Finally, understanding tangible and intangible legacies is achieved through the context of the IOC (2003) in the forms of the architecture, urban planning, city marketing, changes in perceived image, international exposure, local experience, cultural values, sports infrastructure, favourite memory, environmental protection, economics, experience, know-how, and tourist development. The IOC (1996) indicated that environmental protection is the third pillar of Olympism along with sport and culture. Coaffee (2011) has since added that mega-event legacy in environmental protection must be broadened to include environmental considerations and public and private collaborations.

3.4 The Gap in the Literature

The significant gap in the literature that this research addresses concerns the sustainability and legacy considerations during the preparation stage of a non-sport mega-event, hosted for the first time in the GCC region. Expo 2020 presents a unique opportunity to consider sustainability and legacy considerations in developing countries, and this thesis seeks to contribute to knowledge based on an extensive review of the literature on sports mega-events in developed countries and by applying this knowledge to Expo events. Taking into consideration that the trend for hosting mega-events over the last ten years has moved from mainly developed country contexts to include both developed and developing countries, the author investigates how commitment to sustainability might be achieved, especially in relation to promises made.

The extant literature on mega-events offers many examples where such events are used

by the host country or city to achieve sustainable development or ecological modernisation (Death 2011). However, the selection of a sustainable development path is no longer an isolated choice. Hunt (2005) asserts, 'The whole population of the world will benefit if they can ensure that their future development is more sustainable, the whole world will suffer if they fail' (p. 20). Roche (2000) argues that mega-events, in general, have been and remain an important element in orienting national societies to become part of international society, through exchange of ideas and activities of modernisation and globalisation. Expos, more than other mega-events, have been important and influential forces in the history of modern international culture. In his 2000 book *Mega-event and Modernity,* Roche highlighted the role of mega-events in exchange, transfer and diffusion of information, value and technologies. He concluded that mega-events are one of the major players contributing to cultural globalisation. This reflects not only the importance of hosting mega-events, but also shows how critical is to do so in a manner which supports the sustainability path, as the impacts of these events exceed the borders of the host destination.

The problems relating to the nature of hosting mega-events while respecting sustainability considerations and creating a positive legacy are well known and oft debated. Mol (2010) describes mega-events as 'high profile and very visible happenings that attract worldwide attention, organisers can hardly ignore universal norms on the environment, democracy, transparency and equality in the route towards such event' (p. 511). The standards of what to constitutes sustainable hosting vary from one destination to another. The issues of stakeholder management and involvement are also key elements in the overall sustainability outcome of the hosted event. The challenges facing a city hosting a mega-event for the first time are likely to be different from those for cities that have hosted mega-events multiple times and apply different

models of sustainability. In addition, the mega-event itself requires a high consumption of diverse resources over the ELC and the host has to consider how this event will create a distinct legacy; consequently setting the main priorities when hosting a sustainable mega-event is often a highly complex and challenging task.

The review of the literature reveals that only a very limited number of published studies exist in subjects related to this specific field and, to date, they do not cover the specific research questions addressed by this thesis (Kennett, 2010; Weber & Ali-Knight, 2012; Sofotasiou et al., 2014; Jauncey & Nadkarni, 2014; Wittkunh & Reiche, 2015). Furthermore, the number of research studies considering sustainability and legacy considerations during the period of preparation for Expo 2020 are very few. Taha & Allan (2019) present a review of the efforts of the Expo 2020 leaders and organisers in Dubai to deliver a sustainable urban environment and create a lasting legacy beyond the event. Vij et al. (2019) present the pre-event perception of Dubai residents of hosting Expo 2020 by conducting a quantitative research study of 300 residents. This study shows that Dubai's citizens have positive perceptions of the possible impact of the event on their lives, and presents the importance of involving local residents in organising a successful event that addresses the triple bottom line. In general, international researchers of mega-events tend towards an intensive focus on sports mega-events, specifically the OG, with limited research studies on commercial mega-events such as a World Expo (Levermore & Beacom 2009), so engaging in research that concentrates on a commercial mega-event and its sustainability and legacy considerations represents a significant study addressing a distinct gap in the literature.

Konstantaki (2018) stated that 'Despite its emergence as a popular concept, sustainability is a complex issue that has been poorly understood by stakeholders,

policy makers and organisers of mega-sport event' (p. 50). Furthermore, as this research considers the bidding and preparation process in the ELC of hosting mega-events, it adopts a wider scope to assess those impacts than previous studies, which often have not taken the full event lifecycle into consideration. Preuss (2015) theorises the process of building up legacies, starting from the bid and continuing post-event, which is considered a contemporary subject within the hosting process of any mega-event. Figure 2.1 shows the process of the legacy plan during the ELC. As this research examines the sustainability and legacy considerations for hosting Expo 2020, it will contribute to knowledge by establishing the basis of planning for these issues during the first two phases of the ELC. Future studies can then use these findings to compare the achievements of Expo2020 with future events, as well as to establish a baseline for the actual outcome compared to the current potential use value that organisers plan to achieve.
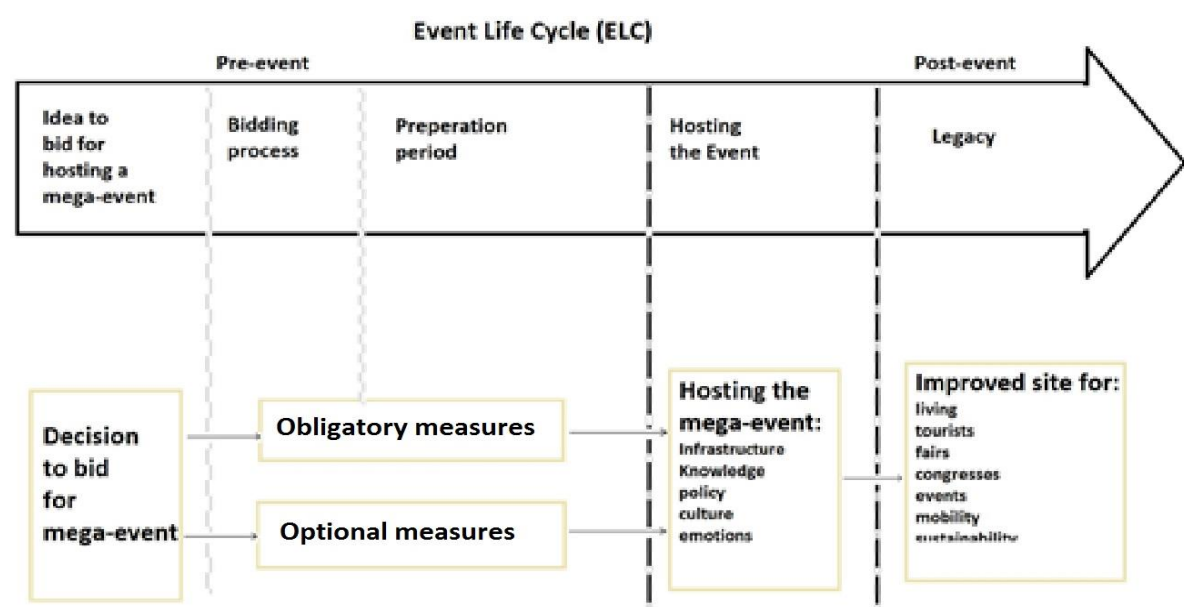
Figure 2.1: Process of building up planned legacy (based on Preuss 2015, p. 1926)

Expo 2020's uniqueness comes from the exceptional development of the Emirate of Dubai. Dubai is one of seven Emirates forming the United Arab Emirates (UAE). This

young country and federation was formed in 1971 in the harsh desert environment with very limited water resources; however, with the seventh-largest oil reserves in the world, the investment of oil revenues generates sustainable economic growth regardless of the surrounding geo-political challenges. Sheikh Zayed Bin Sultan Al Nahyan, ruler of Abu Dhabi and first president of the UAE, initiated the process of building a strong, sustainable country by investing in sectors such as healthcare, education and infrastructure. The UAE, in general, experienced rapid development, influenced by the wise leadership of Sheikh Khalifa Bin Zayed Al Nahyan who followed in his father's footsteps with the following vision of the future:

> The United Arab Emirates will continue its cultural approach to dealing with the outside world; its call for truth; for justice for the oppressed; for building bridges of love, harmony and cooperation between different peoples in the world; and for all the mankind to live in peace and prosperity (SDG report, 2016).

This research seeks to gather data which will help to address further important gaps in the literature and provide academic information and ideas to support the current efforts by the Expo 2020 management committee to improve sustainability practices. The UAE's leaders have expressed the importance of sustainability in many different situations. HH Sheikh Mohammed Bin Rashid stated, 'UAE will continue its sustainable development drive to both increased prosperity and preserve our traditions, heritage, and identity. It is time to look into the future with confidence and optimism' (SDG report 2016), while HH Sheikh Mohamed Bin Zayed affirmed that 'Abu Dhabi is a focal point for action that carries us along the path of sustainable development' (SDG Report 2016). Based on this empirical and historical context, there is a distinct opportunity to research the mega-event's impact on sustainability and its legacy in a country which has made serious attempts to address this subject, particularly over the last ten years. It may be observed that the nature of Expo is different from that of the FIFA World cup or the OG. However, as these three events are widely known as mega-

events and are repeated every few years, attracting millions of spectators from all over the world, it is reasonable to identify and evaluate practices from any previous mega-events in order to learn from events which have had formal commitments to sustainability practices for a longer period of time, particularly the OG. Consequently, this research endeavours to apply sustainability considerations arising from the OG to events with fewer sustainability considerations (such as Expo and World Cup), from countries with long-term sustainability practices to countries which have a serious plan and intention to become more sustainable in the future. The different dimensions of legacy outcome will be investigated in order to contribute to the development of the legacy literature for mega-events intentionally and to cover impacts beyond economic effects or infrastructural changes (Gratton & Preuss, 2008; Preuss, 2007). It was only around 2005 that the specialist literature on legacy began to consider more complex views of legacy and to emphasise different dimensions such as social, environmental and political legacies (Chappelet, 2012; Preuss, 2007).

Furthermore, this research aims to bring together the best of the applied sustainability and legacy practices in mega-events; examine mega-event sustainability commitments in the GCC; observe how these commitments are developing during the project life cycle; and recommend what corrective actions can be taken before the completion of the project, through the development, on-going revision and execution of an optimal stakeholder management plan. The evaluation of the legacy plan and how Expo 2020 will use the event infrastructure during the legacy stage were not included in the core literature on mega-events, although recently IOC took the first step in shaping the bidding process for the Winter OG 2026 by stipulating that candidate cities must consider the infrastructure and needs of the population in their bidding dossier (Preuss, 2019). In addition, the social aspects of how the host population will gain the necessary

knowledge and skills to stage a mega-event, including issues of security, hospitality, learning to use public transportation and becoming more fully acquainted with environmental projects (Gratton & Preuss, 2008), all represent a challenge for the people of the UAE that has never previously been tested.

3.5 Conclusion to Chapter

The literature review of this thesis provides an excellent opportunity for different types of mega-event stakeholders enabling them to develop and produce a framework for a sustainable mega-event, monitor the sustainability practices over the ELC, and create a mega-event legacy worth the costs paid by the hosting city. This chapter has presented four propositions that arise from the content and research problems addressed in the literature. These four propositions are explored throughout the following chapters reporting the empirical research.

The rationale for Proposition One is the need for equal priority to be given to the SDTBL presented in the literature on mega-events, and, in particular, this will require stakeholders to consider and evaluate deficits in sustainability much more carefully. The benefits and consequences of hosting mega-events offer a model that shows positive and negative sides and presents a broader perspective for readers. The review of the literature reveals that the financial benefits of hosting mega-events remain somewhat limited compared to what these events could actually offer. Analysis of the available research findings on previous mega-events show that without a proper balancing of the sustainability pillars by planning to achieve different set targets in each pillar, the mega-event is likely to challenge the status quo of any hosting destination.

The role of event owners in creating sustainable awarding systems for the mega-event was presented in this review. Proposition Two was explored and articulated based on analysis of the practices of three events owners (IOC, FIFA, and BIE). Given that the event owners present hosting mega-events as a once-in-a-lifetime opportunity for the hosting destination, further research is required to find what can make the awarding system more profitable for the selected destination as triggering development by hosting a mega-event remains a high-risk strategy that is unlikely to be sustainable.

The author presented the importance of legacy created by the mega-event and how the event's organisers are using this to justify the high spending and risk for return on investment (ROI). Furthermore, the use of 'legacy' to justify the rationale behind hosting mega-events is also presented. The legacy in the mega-event as well as the sustainability of the event was discussed through different cases; however, one case was able to encapsulate both aspects. London OG2012 represents an opportunity with different sustainability practices and legacy considerations. Nevertheless, the author was unable to explicate in great detail the uncomfortable relationship between *legacy* and *sustainability* and how the more one is focused on, the more the second will be neglected.

The role of mega-event as a catalyst of change is also presented throughout the research and the author proposed justification for how those events can achieve much more than is currently the case. Hosting a mega-event remains an opportunity for the hosting city to change local practices and increase sustainability considerations. The author presented many cases where those events are appropriately used and result in changing the hosting destination for the better.

This literature review has covered the subject from different perspectives, start with what

a mega-events is, how such events are growing, the sustainability considerations in those events, and how to host a sustainable event. The opportunities generated by hosting any of those events along with the possible consequences in different areas are also presented order to provide the author's perspective of different angles that the hosting destination should consider. The following Table 2.1 gives a summary and comparison of the different mega-events listed in the literature review.

Successful hosting of a mega-event	Mega-event with major criticism
Mega-event played a role in restructuring space and social relations, such as Barcelona OG 1992 and Seoul OG 1988 (Gaffney 2013)	Montreal OG 1976, Vancouver Expo 1986, Athens OG 2004, South Africa WC 2010, Milano Expo 2015, Brazil OG 2014 and WC2016 all demonstrate the high cost of hosting a mega-event.
Lillehammer OG 1994 is the first mega-event to consider sustainability (Gold & Gold, 2013), while London OG 2012 is the first mega-event to achieve certification event sustainability (CES) (Guizzardi et al., 2016).	Beijing OG 2008 cost US$40 billion to achieve an ambitious goal of 'zero net emissions' (Collins et al., 2008). Death (2011) argued that the estimated emissions of the FIFA 2010 World Cup in South Africa were eight times higher than those of FIFA 2006 in Germany.
London OG 2012 designed the venues with a legacy plan to repurpose them in the legacy stage ahead of the event (Gold & Gold, 2013).	FIFA 2002 in Korea and Japan built or remodelled around 20 stadia to host the event, with majority not used today as they exceed the football stadia requirements of these two countries (Gaffney, 2013).
London OG 2012 is a learning platform for how to manage sustainable mega-events (Epstein et al., 2011). Vancouver Winter OG 2010 showed the engagement of society with the sustainable goals of the event (Preuss, 2013), and is the first event to create a dedicated sustainable department to manage sustainability pillars and create	Greece hosted Athens OG 2004 with an initial budget of US$1.6 billion and spent a net US$16 billion (Schmidt, 2006). The Olympic Games of 1976, 1980, 2000, 2004 and 2016 hosted in Canada, Russia, Australia, Greece and Brazil respectively brought long-term financial burdens and have in fact hindered these countries' renewal

long-lasting benefits (Holden et al., 2008).	attempts (Flyvbjerg et al., 2003; Agence France-Presse, 2015; Oberjuerge, 2015).
Brenke and Wagner (2006) found that the economic impact of FIFA 2006 in Germany was relatively small compared to the positive effects accruing to society as a result of hosting the games.	Vancouver Expo 86 faced conflicts with union labour as labour leaders threatened to walk off site after contracts were assigned to non-union contractors (Chan 2016).
Jackson and Bonard (2011) stated that the ODA 2007B environmental standard for OG 2012 included benchmarks for noise, air quality, flood risk, and practices to be accepted by contractors before work began.	
Samuel and Stubbs (2013) state that OG 2012 sustainability is about embedding aspects throughout the organisational process and creating sustainable communities and sustainable business for local people around the event.	Sydney OG 2000 had a security cost of US$250 million while security for Athens OG 2004 cost US$1.6 billion, four times the initial budget. The 9/11 attack in 2001 occurred between these two mega-events. Nowadays, Athens's security costs are widely accepted as the bench mark for security for a mega-event (Matheson, 2009).
London OG 2012 cost US$10.4 billion, close to the initial budget (Samuel & Stubbs, 2013).	The costs of Athens OG 2004 exceeded the US$11 billion forecast, double the initial projections. Tagaris (2014) states that hosting the OG was viewed as a chance to transform Greece's image abroad and boost growth, yet ten years after the event, Greece has very little to celebrate. Greece's Hellenic Olympic Committee denies that hosting the Games contributed to Greece's debt crisis which exploded in 2009; wasting US$11 billion can be blamed only to some extent for the country accumulating a debt that exceeded US$400 billion at the time (Tagaris 2014).
Nagano OG 1998 was the first Olympic Games to follow an environmental protection policy (Konstantaki 2018).	Sochi OG 2014 was heavily criticised for its negative impact on the natural environment, waste of public

OG 2008 raised awareness of pollution among Beijing citizens (Preuss 2013) and created a long-lasting legacy through urban transformation and new infrastructure development (Konstantaki 2018).	resources, and increased crime levels (Konstantaki 2018).
Epstein et al. (2011) explained how LOCOG set sustainability targets without sustainable methods, so the contractors were pushed to innovate in sustainability methods in London OG 2012.	Filippetti (2017) reports that Milan Expo 2015 opened its doors in May 2015 after multiple investigations into bribery, connections between building companies and the Mafia, work delays, and overall doubts about the real usefulness of such an investment.
Nimmo et al. (2011) considered the importance of sustainable design in the planning stages of London OG 2012, and how this affected the future sustainability of the event.	The Worldwide Fund for Nature (WWF-Russia) and Greenpeace discontinued their involvement with Sochi OG 2014 due to disagreement over the choice of site for the Olympic venue and lack of a careful assessment of the site area (Digges 2014). Sochi OG 2014 had devastating consequences for the Caucasian boxwood tree, led to illegal waste disposal in various places, and pollution of the Black Sea by dumping untreated sewage (Kravchenko 2014).
Samuel and Stubbs (2013) indicate in a case study on London OG 2012 that sustainability is about embedding various aspects over all the organisational process and creating sustainable communities and sustainable business for local people around the event.	The Rio de Janeiro OG 2016 bid won based on a document with three sustainability pillars of 'planet, people and prosperity', and a sustainability framework based on a sustainability management plan (SMP) which was ineffectual, with deadly levels of pollution in the air and the threat of a potentially explosive spread of the Zika virus (Konstantaki, 2018).
Cornelissen et al. (2011) reflect on how the mega-event can generate income through the development of event venues, from increases in government tax income, and by the growth stimulated in ancillary sectors including leisure consumption, new tourist attractions, and unique construction to serve this new sector.	The 'white elephant impact' refers to the cost of maintaining facilities built for the mega-event and borne by the hosting community e.g. OG 1976 (Lie, 2013). Mega-event facilities are designed to host massive numbers of spectators and are more prominent than the local community requires. Examples include the Olympic village in Greece, football stadia in South

	Korea and some parts of the Olympic village in Brazil (Newton, 2012)
Parent (2008) found that Athens OG 2004, Turin OG 2006, Beijing OG 2008, and Vancouver OG 2010 Summer and Winter Olympics games were secured based on bids that were premised on an intention to gain 'new facilities and increase transfer to event preparation and hosting knowledge' (p. 135).	Biondillo (2014) noted the slow site movement, the exasperation of the workers, and the lack of progress in the work as a result of strict accident-prevention regulations, and expressed doubt that the project would be accomplished on time. The Milan Expo 2015 venue design shrank from 1.1 to 0.4 million square metres, finishing one-fifth the size of the Shanghai Expo 2010 model.
Seville Expo 1992 attracted 41.8 million visitors, created 5,500 jobs, generated an urban development plan, left the legacy of an additional airport terminal, new train station, additional bridges across the river, highway, and a park that was transformed into a science and technology park, and regenerated an island of 215 hectares (Maddox 2004; Monclus 2009).	The Seville Expo 1992 post-legacy plan took longer to put into practice as the plan was not considered before the event; the lack of residential units near the park also had a negative impact (Maddox 2004; Monclus 2009).
Deng and Boom (2011) describe the role played by hosting the Shanghai Expo 2010 in the development of the Huangpu River area, a 5.28-kilometre development with 2.5 million square metres of construction, 8.3 kilometres of riverfront development, and repurposing the structure into an exhibition centre.	Deng and Poon (2013) attribute the geographical shift in hosting the mega-event to the ambition to recast the new hosting destination in developing countries as a global powerhouse like Russia FIFA2018 and OG2008 in China.
Death (2011) indicated that the German FIFA 2006 World Cup, hosted with green goal initiatives, was able to deliver a carbon-neutral event as well as substantial water, energy, transport and waste efficiencies.	
Brenke and Wagner (2006) reported that FIFA 2006 had a minimal economic impact yet generated a positive effect on society including perceptions of tourists towards host population, attitudes of German people toward hospitality, and association of locals towards visitors	Sydney OG 2000 had a security cost of US$250 million while security for Athens OG 2004 cost US$1.6 billion, four times the initial budget. The 9/11 attack in 2001 occurred between these two mega-events. Nowadays, Athens's security costs are widely accepted as

which has generated a long-term impact on the tourism industry.	the bench mark for security for a mega-event (Matheson, 2009).
Sydney OG 2000 was able to change the local perspective on volunteering, when the hosting committee recruited 62,000 volunteers (Webb 2001).	
	Iraldo et al. (2014) stated that Milan Expo 2015 was facing a substantial financial loss concealed by absence of transparency; this included an estimated cost of 23.6 billion euros for the exposition and an additional 10 billion euros reserved for the 191,000 employment positions. Filippetti (2017) indicated that Expo 2015 was a chance to relaunch Italy's ruined image and struggling economy, but without success. Estimated figures showed that Expo2015 lost US$34m, the same amount that Spain lost in Sevilla Expo 1992 while Hanover Expo 2000 has the worst losses of the past decade, reported at US$ 1.2 bn.

Table 2.1 A summary and comparison of the different mega-events addressed in the review of the literature.

Chapter 4 Methodology

4.1 Introduction

This chapter justifies why the author of this thesis selected the case study as a research methodology. The methodological choices and the rationale for adopting this strategy as a research process come as a result of developing a conceptual understanding of the phenomenon of hosting sustainable mega-event using Expo2020 as a case study to achieve this. Throughout the chapter, the author clarifies the methodological choices and the research process he followed. The chapter is structured based on two main sections. The first section describes the underpinning research philosophy, ontology, epistemology, and research reflexivity along with the case background. The second section discusses the research design, case method and data collection method. Suggestions on other research designs are made and research ethics are addressed.

The selection of the qualitative case study approach came as a result of the nature of the research which seeks to answer questions about "how" and "why." Stake (1995) indicates that qualitative research has no single wellspring as it is evolving from the multiple curiosities of humankind. The research aims to fill the gap in the existing literature about sustainability practices during mega-event by providing a sustainability model for the first hosting experience, and explaining and evaluating those practices based on the holistic treatment of sustainability and legacy phenomena compared to previous mega-events in developed countries through the current experience of Expo2020. Furthermore, this research aims to engage the growing construction

sustainability practices in the UAE to serve the overall sustainability model of the country. Rossman and Rallis (2003) indicate that qualitative research shares different common characteristics: for instance, it is oriented toward the natural world where the researcher goes to the people without extricating them from their everyday worlds; it uses multiple methods of gathering data; and it focuses on context and assumes that understanding human experience in detail is gained by exploring these complexities. However, Stake (1995, p. 4) stated that "case study research is not sampling research. We do not study a case primarily to understand other cases." In addition, examining the challenges and opportunities of hosting mega-events will address a contemporary phenomenon whereby Yin (2014) indicates that a case study is more appropriate for such type of research. As the main case study has three sub-cases, the case study database was evaluated based on the same case study protocol in order to maintain the reliability of the research. Stake (1995) suggests that cases should be selected based on their ability to maximise what we can learn and understand and perhaps to modify the generalisation. This author believes that by applying the case study research strategy, he will explore the research questions in greater depth, analyse the data widely based on the related literature review, and address the research problem through different perspectives.

Maxwell (2013) describes five kinds of intellectual goal that are considered as the rationale underpinning qualitative studies. The first goal is "understanding the meaning" as he believes that by doing so, the core subject of the research is going to be fulfilled by the fact that the researchers should understand how the participants are engaged in the study in terms of their situation, experiences and actions. The second

goal is to understand the context within which the participants act and how much external influence affects their actions. As this qualitative research focuses on a relatively small number of event stakeholders within specific situations, the thesis should be able to focus on how such events, actions and meanings are shaping their circumstances and behaviors in which the case occurs. The third goal is to understand the process by which the events and actions are taking place. The significance of this goal comes from the fact that the research is looking to achieve a justified outcome. Still, the importance of the process that led to the outcome informs the strength of the qualitative research. The fourth goal is to identify unanticipated phenomena and influences as the openness and flexibility of the qualitative research allows to modify design and focus during the research in order to understand or discover the relationship. The last goal as Maxwell indicated is to develop causal explanations which are always considered as the traditional view for the outcome of the qualitative method in drawing causal conclusions.

Silverman (2010, p. 333) stated, "Your methodology chapter should aim to document the rationale behind your research design and data analysis". Therefore, the author of this research presents the data, how they were collected and why the collection methods were selected. He also discusses the data analysis process and presents the advantages and limitations of using such a method for the data analysis. As Stake (1995) advises, although a case study seems to be inadequate for generalization, studying one case in depth can show that many activities or problems will come up again and again. The author experienced this in the literature review, which demonstrates that hosting mega-events challenges are frequent and repetitive.

Marshal and Rossman (2011) indicate that qualitative research methodologies have become progressively central modes for enquiry in the social sciences and applied fields. Since this research touches on subjects like regional planning, social work, community development and management, the qualitative approach is considered appropriate for this study. In addition the logical exploratory aim of this research is to understand the legacy and sustainability practices in mega-events.

4.2 Research Philosophy

Researching the field rather than in the laboratory or through a mailed questionnaire became an important, complementary and legitimate approach to social science. Saunders et al. (2016) simplify the research philosophies as "systems of beliefs and assumptions about the development of knowledge. Research philosophy contains important assumptions about how you view the world" (p. 150). These assumptions are going to play a major role in shaping different aspects of the research project. Saunders et al. (2016) defined the term 'research philosophy' as "a system of beliefs and assumptions about the development of knowledge" (p. 124) as the ultimate goal of embarking on research is to develop knowledge in a particular field.

The qualitative research has to be pragmatic, flexible, politically aware and self-reflective as understanding the meaning for participants in the study of the events, situations, experiences, and actions will play a significant role in engaging the author of the research with the overall context or "meaning" of the research. Maxwell and Miller (2008) indicate that using "meaning" here should be considered in the broad

sense which includes cognition, affect, intentions, and other related aspects that the qualitative researchers consider as elements of the participants' perspectives. Maxwell and Miller (2008) believe that these perspectives are part of the reality that a researcher is always trying to understand. Furthermore, the development of knowledge in a particular area is still viewed as the ultimate goal of any research philosophy. Saunders et al. (2012) defined Research Philosophy as the "Overarching term relating to the development of knowledge and the nature of that knowledge concerning research." Selecting one specific research philosophy is based on selecting the assumption with which the researcher views the world. Once this assumption is stated, the research strategy and the selected methods are set based on this assumption.

Saunders et al. (2012) indicated the importance of the researcher's specific view in influencing the relationship between knowledge and the process by which it is developed. The concept of research design has to have a specific set of assumptions for articulating the relationship between data and theory. They added that a "well-thought-out and consistent set of assumptions would constitute a credible research philosophy which will underpin your methodological choice, research strategy and data collection technique and analysis procedures" (pp. 124-125). Easterby-Smith et al. (2002) indicated that understanding the research philosophy would be fundamental for three main reasons. First, it will assist in selecting the most appropriate research design, it will help in identifying the type of the appropriate data or evidence, and it will define how the data will be collected and interpreted in order to reach academically solid justification for the research questions. The second reason has emerged from the role of the research philosophy in assisting the in recognising the ultimate design for this specific research question and the limitations of other approaches. The third reason is because it is so important for the study to have a philosophy that will help in identifying

and create designs that go beyond his or her experience.

Maxwell (2013) indicated that by a qualitative study, "you are interested not only in the physical events and behavior that are taking place, but also in how the participants in your study make sense of these, and how their understanding influences their behavior" (p. 30). The author of this thesis selected the interpretative approach as a philosophical perspective based on the fact that this research was investigating a new subject in the UAE. The physical events and behaviours are taking place for the first time in the region within such a context, and the event stakeholders are pursuing a goal that each understands in a different way. This understanding is strongly affecting their behaviour and the overall sustainability and legacy outcome of the event. Glesne (2011) indicates that once the researcher is looking to explore and understand human ideas, actions and interactions in specific contexts, the interpretative approach will be the appropriate philosophical perspective. Bhattacharya (2008) advised that the "interpretive approach" encompasses the fundamental aspects of most qualitative research and it makes the main difference for selecting the research approach to be qualitative or quantitative. Denzin and Lincoln (2011, p. 13) asserted that

> all research is interpretive: Guided by a set of beliefs and feelings about the world and how it should be understood and studied. Some beliefs may be taken for granted, invisible, or only assumed, whereas others are highly problematic and controversial. Each interpretive paradigm makes particular demands on the researcher, including the questions that are asked and the interpretations that are bought to them.

4.2.1 Research paradigm

Biedenbach (2015) stated: "Researchers rarely state the philosophical assumptions despite their value for both the research process and advancing the research field" (p. 33). However, the author of this research is going to do so in order to show the value of utilising paradigms and formulating the research philosophy in order to clarify the

research endeavour. The understanding of the method of developing the scientific findings in the real life of the stakeholder, based on the research findings, reflect the main role of the research paradigm as a framework to guide scientific communities to regulate the fundamental subjects in order to solve challenges for subjects under research. Guba (1990, p. 17) stated, "The net that contains the researcher's epistemological, ontological, and methodological premises may be termed a paradigm" while Mingers (2003, p. 559) theorised a paradigm as "a construct that specifies a general set of philosophical assumptions". Glesne (2011) indicated that a "paradigm represents a framework for scientific research in order to make assumptions about the nature of reality, the types of questions to explore, and the method to follow in order to do so as a higher-level theory informs every research study" and Morgan (2007) stipulated that "the consensual set of beliefs and practices that guide a field is typically referred to as a paradigm". (p. 49). Denzin and Lincoln (2011) classified the higher-level theories and philosophies that guide the social scientists researcher into seven paradigmatic families: Positivist and post-positivist, constructivist-interpretive, feminist-post structural, ethnic, Marxist, Cultural studies, and Queer theory (Figure 4.1). Glesne (2011) named the paradigmatic families as positivism, interpretivism, critical realism theory, and post-structuralism. Disputing the idea that each group of those four paradigmatic families should be considered as a loosely bonded group of philosophies and theories, Glesne (2011) believed that they share several related schools of thoughts.

Paradigm/Theory	Criteria	Form of Theory	Type of Narration
Positivist	Internal, external validity	Logical, deductive, grounded	Scientific report
Constructivist	Trustworthiness, credibility	Substantive, formal	Interpretive case studies
Feminist	Lived experience, dialogue,	Critical, standpoint	Essays, stories

Ethic	Dialogue, caring,	Standpoint, historical	Essays, dramas
Marxist	Theory, falsifiability	Critical, economic	Economics, sociocultural analyses
Cultural studies	Cultural practices, subjectivities	Social criticism	Cultural theory as criticism
Queer theory	Deconstruction	Historical analysis	Theory as criticism, autobiography

Figure 4.1 Interpretive Paradigms (based on Denzin and Lincoln 2011, p. 13)

Biedenbach (2015) affirmed "paradigms can serve as powerful facilitators for directing research towards significant contributions that progress the research field" (p. 40). The author of this research is adopting the research philosophy from Saunders et al.'s (2016) book, *Understanding research philosophy and approaches to theory development.* The author believes that the research 'onion' reflects the rationale behind the data collection method as it lies in the centre of the 'onion.' It represents the diagram being used to underpin the choice of data collection technique and analysis procedures. By doing so, the author intends to answer the question 'why I made the choice I did', in order to lend credibility to the research and by doing so, the research should be taken seriously.

Saunders et al. (2016) categorise five major philosophies in business and management as follow:

4.2.1.1 Positivism

Saunders et al. (2016) remarked that the label 'positivism' signifies the importance of what is 'posited.' Glesne (2011) indicated that the researcher following the positivist paradigm aims to make generalisations about social phenomena, explain their cause, and create predictions related to those phenomena. The knowledge generated from this

process will be gained through objective observations, measurements, and carefully designed experiments. In most cases, researchers start their investigation by adopting methods and selecting a specific theory for the phenomenon under study subsequently proposing several emerging hypotheses based on the theory. Then, these hypotheses are tested by objective methods that keep the researchers at a distance from the subject to minimize bias. Glesne (2011) advised that the rationale for doing this is to ensure that the researcher is not influenced by the behaviours or responses of the people under research. Saunders et al. (2016) relate positivism to "the philosophical stance of the natural scientist and entails working with an observable social reality to produce law-like generalizations" (p. 135).

In the positivist approach, the researcher makes assumptions that "the social facts have an objective reality" and that the "variables can be identified and relationships measured" (Glesne 2011, p. 9). The study aims to achieve generalisability, causal explanations and prediction from the findings. The researcher who adopts an extreme positivist position considers organisational behaviour as very similar to the method of researching physical object and natural phenomena. The positivist philosophy is sometimes known as direct realism. This paradigm reflects the researcher's experience through his sense in viewing the world as it considers that 'what he sees is what he gets'. The data collection process in this approach searches for phenomena that can be measured to produce credible and meaningful data. The key tenet of research within this paradigm is to predict (Glesne, 2011). The interpretation of the causal relations in the collected data will enable law-like generalisations to be made. In turn, the study will use these rules to build his future assumptions or to predict the behaviour and events in organisations (Saunders et al. 2016).

A researcher who adopts this paradigm will have axiology as value-free research where the researcher will remain detached throughout the research, neutral and independent of what is being investigated. Also, the researcher's role should remain one of 'objective portrayal' (Glesne, 2011). He or she will begin with hypotheses and theory and maintain an objective stance throughout, even though they may believe that it is impossible to exclude their values from the investigation. The typical methods of this philosophy are deductive and highly structured. They seek the norm, use formal instruments and deal with large samples. The existing theories are utilised in order to develop hypotheses. By following such a research paradigm, the hypotheses will be tested and confirmed, partially accepted, or refuted. Such a philosophy will help in further developing the theory and open questions for further research. Many authors adopt this paradigm finding that it often helps with the processes of research planning. Lastly, this research approach mandates researchers to use an abstract style of language in the write-up (Glesne, 2011).

4.2.1.2 Interpretivism

This paradigm is developed as a critique of positivism but emanating from a subjective perspective believing that the world cannot exist independently of the mind or ideas. Glesne (2011) attested that this philosophy indicates that social science exists to understand human ideas as they are different from physical phenomena since they create meaning. For this, researchers following this paradigm, they should look for the action and interactions within specific contexts or concerning wider culture. Denzin and Lincoln (2011) state that most qualitative researchers are often associated with an interpretive philosophy. Saunders et al. (2016, p. 140) point out that "the purpose of interpretive research is to create new, richer understanding and interpretations of social

worlds and contexts". Often, the interpretive researchers will try to collect what is meaningful to their research participants. By doing so, the researchers following this philosophy seek not to make pre-assumptions about the nature of the subjective world.

Furthermore, interpretive researchers should explicitly subjectivist as they focus on multiple interpretations, complexity and richness, and the findings are socially constructed through culture and language. Christie et al. (2000) expressed that this philosophy provides a methodology that helps in studying individuals' beliefs more than the wider external reality. These multiple meanings and interpretations lead to change in the process, experiences and practices. Such a paradigm deals with a small sample by conducting an in-depth investigation, yet a range of data can be interpreted (Saunders et al. 2016). Such a philosophy is only applicable in qualitative methods of data collection and will lead to a lengthy descriptive write-up of the patterns.

The researcher who adopts this paradigm is considered a part of what is being researched. Subjectivity plays a significant role in this philosophy, and the researcher reflexivity is included. The axiology is based on simple concepts by focusing on narratives, stories, perceptions, and interpretations (Saunders et al. 2016). Glesne (2011) indicated that researchers who adopt this philosophy believe in a world in which reality is socially constructed, and variables are involved that are interwoven and challenging to measure; yet along with the complexity , they also believe that such reality is continuously changing. However, as it is socially built, Glesne (2011) argued that accessing the perspectives of several members from the same social group in a specific phenomenon may identify common cultural patterns for thoughts and actions shared among the specific group. Glesne (2011) further asserted that the main purpose for research within this paradigm is to 'understand', through an extensive interpretation

and contextualisation. Researchers adopting this paradigm cannot be detached; they require personal involvement and empathic understanding. This research approach is inductive, searches for patterns, seeks pluralism, and makes minor use of numerical indices. In addition, it generates hypotheses and theory and uses descriptive language for the writing up of the findings (Glesne, 2011).

4.2.1.3 Critical Realism

The paradigm of critical realism is based on the philosophy that focuses on explaining what we see and experience; yet within the framework of underlying structures of reality which shape the observable events, the reality is the most important philosophical consideration (Saunders et al. 2016). Christie et al. (2000) expounded that this paradigm is also known as 'post-positivism'. Researchers following this paradigm believe that the reality is not accessible through our observation and knowledge of it as it has multiple layers including 'the empirical,' or what represents our 'sensations', which reflect how we see the world in general but not necessarily the actual things.

Furthermore, what we see represents "a small fraction of the total of the actual events that are occurring at any point in time" (Saunders et al. 2016, p. 139). From the events that are observed or experienced are termed as the empirical become observable; but beyond that 'the real' that shapes 'the actual' may not be observed. Such a paradigm will always lean towards the bigger picture, believing that what we see represents only a small part of the whole.

Researchers who adopt this paradigm should have an axiology of acknowledging bias as this has been created by one's worldviews, cultural experience and upbringing. They try to reduce these biases and errors and be as objective as possible. The researcher

ontology is physical structure following causal mechanisms and looks to any surrounding situation through the stratified world (the empirical, the actual and the real). Bhaskar (1997) remarked that realism interprets the world which includes mechanisms, events and experiences in three domains of reality, shown below in Figure 4.2.

Empirical domain: Experiences

Actual domain: Events and non-events generated by the **Real**

Real domain : Causal structures and mechanisms
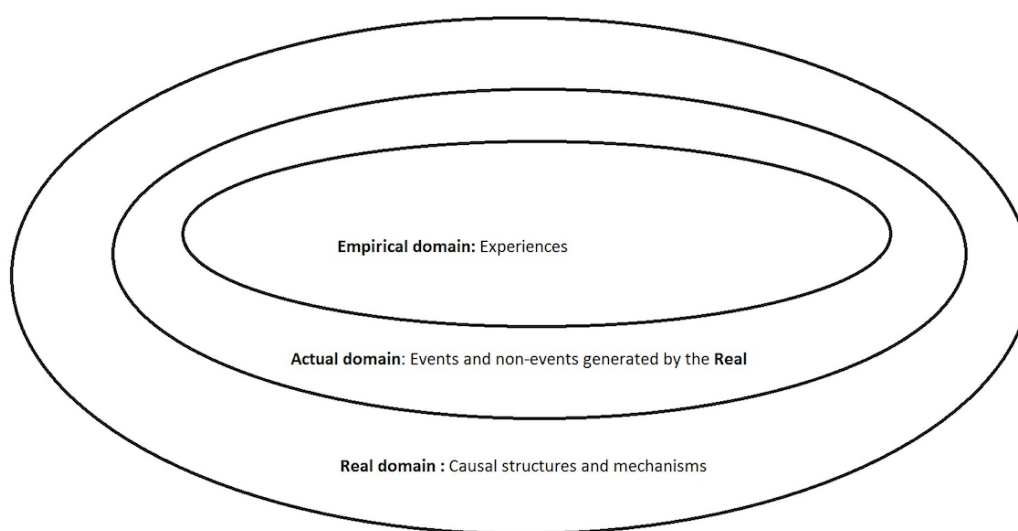
Figure 4.2. Ontological assumptions of realism (based on Bhaskar 1997, p. 13)

The first domain is the *real* domain which contains the process that produces events and generates mechanisms with a tendency to produce patterns of the researched event under limited circumstances. The second domain is the *actual* domain where the events occur no matter whether such events are observed or not, and the last domain is the *empirical* domain where the experience is obtained by direct observation. The epistemological relativism for a researcher adopting this philosophy is based on the belief that facts are social constructions and that knowledge is historically located and transient (Saunders et al. 2016).

4.2.1.4 Postmodernism

Saunders et al. (2016, p. 141) argued that postmodernism "emphasizes the role of language and power relations, seeking to question accepted ways of thinking and give voice to alternative marginalized views". The postmodernists critique positivism and objectivism even more than the interpretivists do as they attribute further importance to the role of the language; and they reject modern objectivism and instead emphasise the chaotic primacy of flux, movement, fluidity, and change. They also seek to expose and question the power relations that underpin dominant realities. Like the interpretivists, the postmodernists make in-depth investigations of phenomena by being flexible in deconstructing any forms of data which will be analysed used qualitative methods.

The postmodernism researchers' axiology believes that researcher and researched are inevitably embedded in power relations and that the research is radically reflexive. Furthermore, this philosophy looks for the epistemological terms like 'truth' and 'knowledge' as denoted by the dominant ideologies (Saunders et al. 2016).

4.2.1.5 Pragmatism

Pragmatism is the last type of research paradigm categorised by Saunders et al. (2016). This philosophy "strives to reconcile both objectivism and subjectivism, facts and value, accurate and rigorous knowledge and different contextualized experiences" (p. 143). The authors assert that concepts are only relevant where they support action. The typical research path of a pragmatist researcher is to start with a problem and target practical solutions which will appraise future practices. From this, we can infer that the most critical element in the research design and strategy throughout this philosophy is the research problem and the research question. The pragmatists claim that interpreting

the world and undertaking research will never be limited to one single point of view which can cover the entire picture. This is because each subject has multiple realities that exist whether the research covers it or not.

The axiology of pragmatist research is based on the value-driven research where the researcher strives to focus on the research problem and answer the research question. The epistemology of this philosophy is by considering the practical meaning of knowledge in a specific context and looking for knowledge as the facilitator that will enable successful action. Furthermore, this philosophy leans on problems, practices, and relevance. This paradigm can be followed in a range of research methods like quantitative, qualitative, action research and mixed methods. The key reason for following this philosophy is its emphasis on finding practical solutions and outcomes (Saunders et al. 2016).

4.2.1.6 Summary of Paradigms

Paradigms represent the framework of thinking for developing a design for the research; it is the way that the researcher's beliefs help to generated knowledge to generate knowledge. Although five paradigms were discussed above, Morgan (2007) justifies his classification of paradigms under four categories by considering the "shared belief systems that influence the kinds of knowledge researchers seek and how they interpret the evidence they collect" (p. 50). Morgan (2007) indicates that the main differences among those versions are in the level of generality of that belief system. The descriptions below are classified from the highest level of generality down to the level of specificity for the different versions of paradigms.

Paradigms as Worldviews: This is the broadest version that treats paradigms as worldviews of experiencing and thinking about the world. Morgan (2007) remarked

that this view includes beliefs about morals, values, and aesthetics. It represents the basic set of assumptions that guide the researcher's inquiries.

Paradigms as Epistemological Stances: Morgan (2007) specified that this version treats the best known epistemological stances like realism and constructivism. The method of doing so is through a unique belief system that influences the nature of the research question and how it is asked and answered. This paradigm adopts a narrower approach of concentrating on one's worldviews which are adopted through the philosophy of knowledge. These paradigms draw attention to the deeper assumptions that the researchers make. However, it still tells us little about more substantive decisions like what to study and how to do so (Morgan 2007).

Paradigms as Shared Beliefs Among Members of a Specialty Area: Morgan (2007) described this paradigm as "shared beliefs within a community of researchers who share a consensus about which questions are more meaningful and which procedures are most appropriate for answer those questions" (p. 53).

Paradigms as Model Examples of Research: This paradigm is the most specific version that treats it as model examples that serve as 'exemplars' which represent the method which the researcher followed in the given field (Morgan 2007).

Morgan (2007) postulated that it helps to consider those four specific versions of paradigms as nested within each other. However, the researchers should not forget that this hierarchy is classified from generality to specificity in the four versions of the above-mentioned paradigm concepts as they are not mutually exclusive; nor is one of the paradigms right and the others wrong. Instead, "the question is which version is most appropriate for any given purpose" (Morgan 2007, p. 54). However, the level of the hierarchy of ontology, epistemology, methodology and concrete research model

which aim to help people understand the phenomenon has to be considered. By doing so, the first perspective of the paradigm is the ontological stance which aims to examine the nature of the subject of interest. The second is generated from the epistemological stance to explain the appropriate method to detect relevant knowledge for the subject of interest. The third perspective is considered through a methodological view which aims to design a research framework that inquires about the relevant knowledge for the subject of interest. The last perspective investigates the research model that will serve to address the research question.

Finally, the five paradigm concepts are not mutually exclusive. Morgan (2007) contended that those paradigms complement each other over different levels of the hierarchy of ontology. Based on all of the above, the author of this thesis presents the philosophical issues for this research through discussing the ontology, epistemology, axiology and methodology, along with the adopted research model.

4.2.2 Ontology

The identification of the ontology is a significant aspect of the research process; the earlier this aspect is selected, the better the research design. Ontology reflects the essence and meaning of reality which the researchers try to explore. Saunders et al. (2016) contested that ontological assumptions are the realities you encounter in your research. Those assumptions will determine what research objectives and phenomena focuses on, and by doing so, they will find out how you see and approach those assumptions. Glesne (2011) believes that the ontological questions concentrate on the nature of being and will usually be selected to define the beliefs, related to reality, and the kind of things that make up the world. Glesne (2011, p. 282) defined ontology as "Beliefs about the world, what makes up the world, and how those aspects inter-relate.

Ontology asks what is the nature of reality, and what can be known about it?" (p. 282).

Glesne (2011, p. 6) confirmed that "if you are a positivist researcher, your ontological beliefs include a fixed reality external to people that can be measured and apprehended to some degree of accuracy". The rationale behind adopting positivism in many types of research is usually to make generalizations about social phenomena, to provide explanations about their causes, and to create predictions concerning those phenomena (Glesne 2011). However, by looking through the design of this research and the method that the author adopts throughout the research, the interpretive approach is more appropriate to describe the researcher's philosophical stance in this thesis as he aims to situate mega-event sustainability in a specific context; understand mega-event legacy; establish its implications for the sustainability pillars; and make interpretations. It is always fascinating to see how people "interpret and make meaning of some object, event, action, and perception" (Glesne 2011, p. 8).

Saunders et al. (2012) claim that ontology can be divided into two aspects: first *objectivism* which assumes that the existence of one external reality will be objective and independent of the researcher and social actors. The second ontological aspect is *subjectivism,* also known as constructionism or interpretivism, which views reality as socially constructed. However, in the subjectivtivist ontology, the researcher assumes that social phenomena and their interpretation are accomplished by social actors. Furthermore, the researchers understand that this reality is engaged in social interactions and social phenomena are in a constant state of change (Biedenbach 2015).

In this thesis, the study embraces a subjectivist approach to ontology. The rationale behind this selection came as a result of researching the reality which is considered as socially constructed and involved individuals' interpretations of their circumstances.

To explain the research phenomena further, the researcher conceptualises knowledge as a result of the profound consensus for the meanings that establish each individual's view of reality.

4.2.3 Epistemology

Vollmer (1993, p. 164) attests that: "Epistemology is the science which investigates the validity of knowledge. It sees knowledge as fundamentally problematic and in need of justification, of proof, of validation, of foundations, of legitimation." (Epistemology is about finding how we know the things that we consider as knowledge or truth. Glesne (2011) defined epistemology as "A philosophy that deals with the nature of knowledge or how we know the world and justifies our beliefs about the world" (p. 280). The main object of epistemology is knowledge; the main task is to analyse. Vollmer (1993) posited that "Epistemology does not prove the existence of knowledge; it presupposes knowledge. It relies on convictions, intersubjective evidence, successful conjectures [and] confirmed hypotheses" (p. 165), while Biedenbach (2015) stated that "Epistemology underlines what is accepted as valid knowledge" (p. 35).

Epistemology starts with some specific questions; for example: what do we know? How do we know? Why do we know? By investigating any subject, we start in the midst of a phenomenon, a current situation, a naïve question. In order to address these, we turn the subject under investigation into factual knowledge. When doing so "we will analyze it, to classify, to structure, to systematize, to give definitions, explications, derivations, proofs, to find criteria of adequacy, of truth, of objectivity, of demarcations, of rationality" (Vollmer 1993, p. 182). Saunders et al. (2016) indicated that researcher will make assumptions about human knowledge in each research stage which they consider as epistemological assumptions. The selected research paradigm

is fundamental in the selection of the epistemology and theoretical perspective that a researcher will adopt for the study. Saunders et al. (2012) claimed that the selection of the research paradigms will affect the researchers' views on what constitutes acceptable knowledge. For this reason, the selection of the rational choices will help the researchers to identify the data to be collected, the sources of those data, and the method adopted for data interpretation which is related to the research question.

Since this author adopts an interpretive paradigm, it requires adopting assumptions from the arts and humanities in order to know what we know. Saunders et al. (2016) highlighted that what is considered as adequate knowledge for this philosophy will be based on opinions; adopted theories and concepts are too simplistic. The data are collected in the form of narratives, stories, perceptions, and interpretations where the researcher will aim to find attributed meanings. Doing so, the researcher will be able to reach a new understanding of the subject under investigation and have a new worldview as a contribution. However, the main contribution to the knowledge that such research can make will always be unique to a specific context. The researchers' role is critical here as they should seek to understand the different realities of the people in the research in order to make sense of their motives, understand their activities and intentions, and locate these within a meaningful boundary.

4.2.4 Axiology

The ways and extent to which one's values influence the research process are termed axiological assumptions. Saunders et al. (2012) contended that axiology concerns the judgment of value and what role the researchers' values will play in the research process. It also defines the boundaries of how researchers should treat their values when dealing with the research participants' values. This author believes that what this

study represents is value-bounded research where the researcher is part of what is being investigated as a stakeholder living in the UAE and being affected by the hosting of Expo2020. Furthermore, the expected contribution of knowledge that this research provides is built based on the interpretation of the author. This clarifies the role of this researcher in the interpretation, which is reflexive

Mingers (2003, p.339) stated that axiology is "what is valued or considered right"; it also requires the recognition of differing values. The author of this thesis states his ethical commitment in a later section; meanwhile, he commits to consider the value of the research participants throughout the process. By doing so, he will respect the position of each stakeholder and ensure that no harmful impact is going to be generated as a result of this research. The rationale behind this research is to improve the current sustainability practices and create guidelines for future hosts of the mega-event. The research makes no negative critique of the mega-event stakeholders at any stage.

4.2.5 Methodology

Mingers (2003) argued that the terms 'methodology', 'method' and 'technique' can have multiple overlapping meaning. The 'method' or 'technique' are used for a specific activity with a clear and well-defined purpose; both terms can be used synonmously. The term ' methodology' has more complex meanings like methods of intervention, the articular methods adopted for a specific study, and the generic combination of multiple sets of methods which are frequently used as a whole in order to assist researchers in undertaking research. Glesne (2011) summarized method as "a technique of procedure that is used to generate or analyze data", while she theorises methodology as:

> a theoretical framework that guides how researchers come to know what they know. The methodological framework includes assumptions about what is of importance to study, what constitutes legitimate knowledge, and what counts as evidence for making

knowledge claims (p. 282).

Furthermore, Glesne (2011) indicated that methodology could include elements like phenomenology, symbolic, interactionism, narrative analysis, and group theory.

Empirical research has two main approaches: deductive and inductive. The *deductive* approach is built on the rationale that the data will not be collected before exploring theories and developing hypotheses; once so, the data are going to be used to test and confirm those hypotheses. On the opposite side, the *inductive* approach has a different rationale for how research should be conducted; mainly, the starting point of this approach is the data collection and data analysis. This process is what generates a new theory (Saunders et al. 2012). Rossman and Rallis (2003) indicated that the two approaches contrast. Qualitative research, in general, is inductive. It is emergent rather than tightly prefigured as it has been historically defined as resting on principles of inductive logic by reasoning from the particular to more general statements to theory rather than on deductive reasoning (as shown in Figure 4.3), and it is fundamentally interpretive as its focuses on description, analysis, and interpretation.
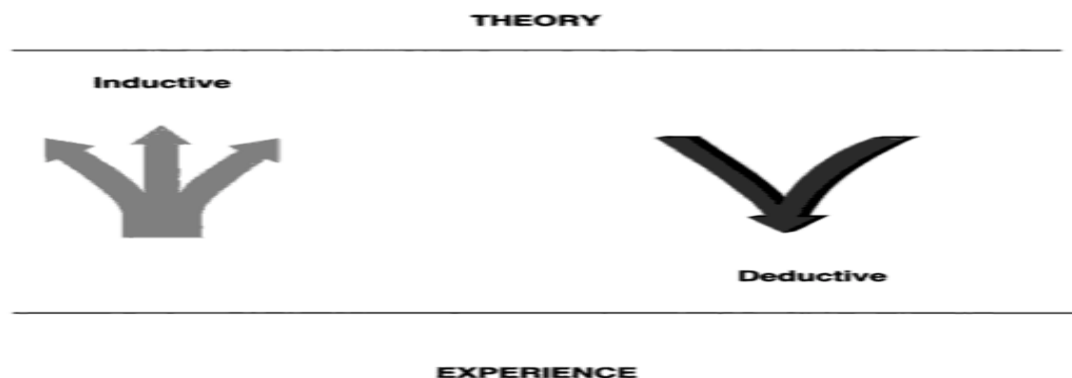
Figure 4.3. Deductive and Inductive Reasoning (adapted from Rossman and Rallis 2003, p. 12)

Ketokivi and Mantere (2010) explained that deductive reasoning occurs when the conclusion logically results from a set of premises. If all the premises are correct then the conclusion is valid. In contrast, inductive reasoning starts by observing a gap between the conclusion and the premises. Based on this the conclusion is judged to be supported by the observation made. The data collection in the deductive approach is used to evaluate propositions or hypotheses related to an existing theory while for the inductive approach, the data collection is used to explore a phenomenon, and identify themes and patterns in order to create a conceptual framework (Saunders et al. 2016). The generalisability of both approaches is contrastingly distinctive; since the deductive approach generalises from general to specific while the argument reasons vice versa with the inductive approach. Both approaches are shown in Figure 4.4 , adapted from Trochim (2006).
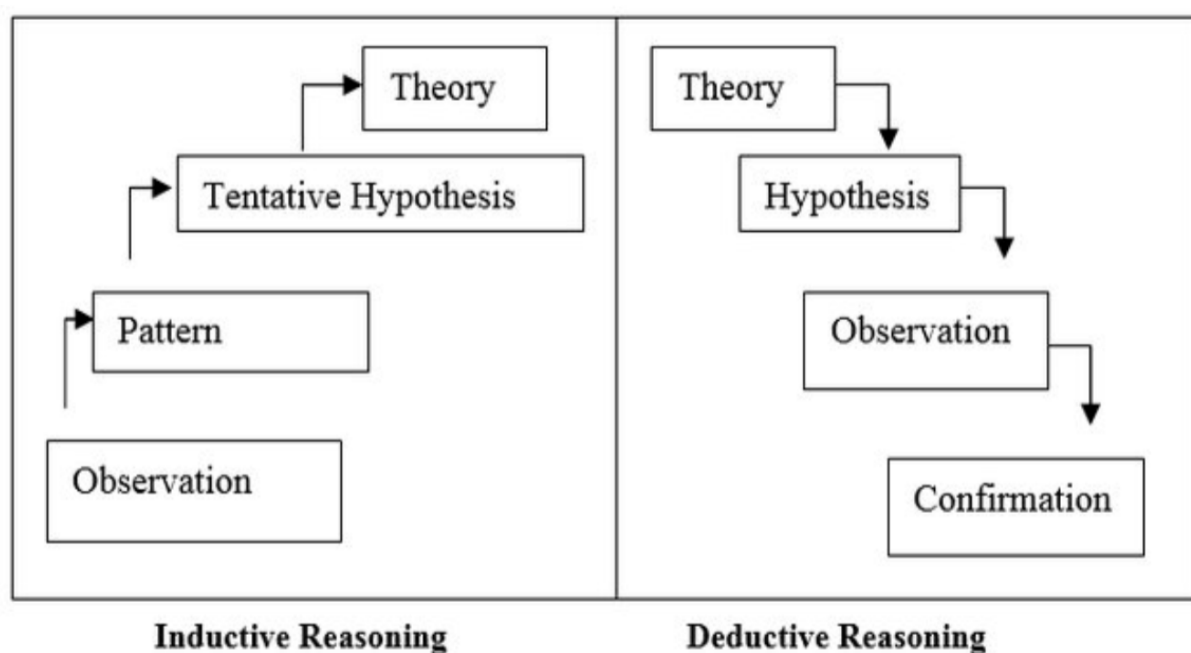
Figure 4.4. Deduction versus Induction (adapted from Trochim 2006)

This author believes that he should not assume that the techniques used in this research are the only possible way to conduct this research and establish validity for the findings

(Silverman, 2014). For this reason, as the research is based on observations for sustainability methods, legacy considerations, and social adoption in the direction those leaders follow, it aims to create a sustainable model during the hosting of the first mega-event in the region, the inductive data-driven approach is most appropriate as this study investigates the sustainability considerations within an ongoing project. Saunders et al. (2012) indicated that the inductive approach would give the researcher insights of the phenomenon and help to develop a theoretical explanation through the collected data and its is analysis.

4.3 Research Strategy

Herein, a consensus is reached that qualitative interpretative research is the most appropriate approach to test sustainability in a mega-event within an ongoing project and to test the legacy considerations that will be generated after the closure of the project. The qualitative approach is suitable for researching discovering stakeholders' intentions, behaviours and practices during the preparation period for this mega-event. Based on the above-reviewed literature on how challenging it is to be sustainable during the hosting of a mega-event, the stakeholder behaviour remains one of the most crucial subjects to investigate for through the case study approach. Silverman (2014, p. 18) highlighted that "the main strength of qualitative research is its ability to study phenomena which are simply unavailable elsewhere". This is enacted by using naturally occurring data through the sequences of asking many 'what' and 'how' questions with the research participants that can lead on to answering 'why' questions through a developing knowledge and understanding of the broader context in which the phenomenon arises. Silverman (2016) postulated that using qualitative research in understanding practices has many advantages like capitalising on the fieldwork

relationship with practitioners in order to create an interest in the field under study. In addition, the participants can compare their practices with those reported in the research in order to adopt new practices or improve the current one. This is why other management researchers like Gill and Johnson (2010) argue that the qualitative approach in management research is more valuable as it helps in identifying new variables and relationships.

4.3.1 The Case Study Approach

The case study approach in the qualitative inquiry refers to the intensive study of a case. The author selected this approach due to the research question types which include exploration, description, and understanding of the phenomenon of sustainability and legacy in the mega-event. Glesne (2011) asserted that a "case" can vary, from one person to a village or from an event to a set of procedures. Yin (2014) stated that "a case study allows investigators to focus on a "case" and retain a holistic and real-world perspective" (p. 4). Stake (1995) clarified that each "case" is a bounded integrated system with working parts; while Flick (2014) found that "the aim of case studies is the precise description or reconstruction of cases" (p. 121). The researcher is the ultimate decision-maker in selecting what to include or not within the case boundaries. A case study research project tends to involve in-depth and often longitudinal examination while the data are collected through observation, in-depth interviewing, and document collection and analysis. Stake (2000) suggested three types of case study: intrinsic, instrumental, and collective. This empirical case study concentrates on collective and to some extent, instrumental rationale. The reason for selecting one primary case with three sub-cases in this thesis was to search for patterns and to investigate a general condition through a variety of methods and within a

bounded context (Expo2020).

Yin (2014) theorised that case study has a twofold definition:

"1- A case study is an empirical inquiry that

• Investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when

• The boundaries between phenomenon and context may not be evident" (p. 16)

"2- A case study inquiry

• Copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result

• Relies on multiple sources of evidence, with data needing to converge in a triangulation fashion, and as another result

• Benefits from the prior development of theoretical propositions to guide data collection and analysis" (p. 17).

Furthermore, Yin (2014) contested that as the case study represents a logical set of statements, the quality of the research is judged based on the logical tests. The four main concepts that can be used in order to test the design are trustworthiness, credibility, conformability, and data dependability. However, Yin (2014) simplified that the four tactics for dealing with those four tests when doing a case study are: construct validity, internal validity, external validity, and reliability. In order to ensure *construct validity*, the research design should depend on multiple sources of evidence and establish a chain of evidence during the data collection process. In addition, the

researcher should maintain an updated review of key informants' case study reports during the writing-up stage. The second test is *internal validity*; in this test, the researcher should find matching patterns, build explanations address rival explanations, and use logical models during the data analysis process. The third test is the *external validity* where the researcher should set the research design with an identified theory. The fourth test is the *reliabilit*y where the researcher should set a case study protocol and develop a case study database in the data collection process. The author has applied those tests as he understands the criticism of reliability in qualitative research and the impact of precise data within the final presented documents. However, not to forget that case study research is not sampling research, Stake (1995) reminded us that "we do not study a case primarily to understand other cases. Our first obligation is to understand this one case" (p.4).

The selection strategies for research sites and participants adopt the maximum variation sampling by looking for three different sectors and collect data based on their perspectives. This gives this author a segment across a range of variation with a search for common patterns across great variation (Glesne 2011). However, Stake (1995) remarked that the case study seems an inadequate basis for generalisation; certain activities or problems still come up again and again. The literature review confirmed this statement in many repetitive case studies and, for this reason, this author is looking to contribute with specific practices that represent the minimum practices to host a sustainable mega-event that will create a positive legacy. This research adopted the exploratory and descriptive approaches along with the interpretive understanding for the phenomenon under study in order to present the Expo2020 case study during its occurrence, by answering as many as possible questions of 'why' and 'how'; as Yin (2014) indicated that this is the aim of using a case study.

4.3.2 Research Design

The research design of a case study has five particularly important components proposed by Yin (2014):

1. **Study question**: This is the first principal component for the research design. The three main research questions of this thesis are based on 'how' questions, which demonstrates why the case study approach is appropriate. Sustainability and legacy in Expo2020 remain a complex case. The author uses many sub-questions, some of them were removed as the development of a literature review narrowed the interest to limited key topics.

2. **Study propositions**: The propositions play a major role in directing the attention to something that should be examined within the scope of the study. Yin (2003) stated that "without such propositions, an investigator might be tempted to cover "everything" which is impossible to do" (p. 23). The author of this thesis provided four propositions; Yin (2014) theorised that only when the researchers are forced to state some propositions, will they move in the right directions. This research has four ambitious propositions, three of which the author proposes based on the review of the literature and one that was generated as it developed during the research.

3. **Unit of analysis - the case**: This step is always challenging as the researcher should define and bound the case in order to define "the case" as individual and collect the data based on research propositions in order to identify the relevant information. Yin (2014) theorised that "the more a case study contains specific questions and propositions, the more it will stay within feasible limits" (p. 31). As this research has

distinct propositions and research questions, the Expo2020 case study is likely to generate a piece of knowledge about the right sustainability practices not only for the Expo2020 mega-event but for many similar events in the future. The author understands the importance of bounding the case into three sectors: transport, construction, and utilities; whereby "Each unit of analysis would call for slightly different research design and data collection strategy" (Yin 2003, p. 25). Still, some criticism is expected that even those sub-cases are too broad. The author believes that the three sub-cases are interconnected and form one case study using a unit of analysis adopted from previous literature, and within reasonable boundaries in the UAE that are related to the phenomenon, in a specified context, and not too specific or overly general.

4. **Linking data to propositions**: Yin (2014) theorised that the best preparation for conducting a case study analysis is by having a general analytic strategy. It is commonly known that many researchers start case studies without having a clear idea about how the shreds of evidence are going to be analysed. The researcher's style of rigorous empirical thinking is vital in these components of data collection, analysis and interpretation. This author uses the qualitative software package NVivo to help him in code and categorise data as he selected 'Relying on theoretical propositions' as a strategy to link data to propositions. However, this computer-based program is   just for assistance and do not make the links, although it assisted the author along with the other memos and notes he took. As this research has a set of theoretical propositions, by this time the collected data are shaped by those propositions as they were collected based on the original objectives and design of the case study and reflect the research questions, literature review, and propositions.

5. **Criteria for interpreting a case study's findings**: Since this research is based on the case study approach, the analysis of the findings do not rely on any statistics, and the best way to conduct the analysis is by addressing competing explanations for the findings. This step is considered a good general analytic strategy and helped to provide an example of pattern matching for independent variables. The research questions were designed in a way that each question hides rival theoretical propositions about why the Expo2020 mega-event wants to be sustainable and create a legacy. Many previous mega-events had different goals. At the beginning of the thesis, the author presents this challenge along with other challenges to test whether the stakeholders are trying to please the international communities with their sustainability practices while they remain one of the major oil producers and polluters. For this reason sub-cases were initially selected; Yin (2003) called this a multiple-case and found that, in such conditions, "the mode of generalisation is "analytic generalization," in which a previously developed theory is used as a template with which to compare the empirical results of the case study" (p. 33).

Yin (2003) suggested that with a complete research design that embodies the five components described above, the researcher should benefit from the theoretical framework for the case study in order to complete it. A good case study should make an effort to develop a theoretical framework. Using theory in the case study approach is the primary vehicle for generalising the results of the case study.

4.3.2.1 Multiple Case Design

The design of this research depends on the rationale that one single case study for a specific "case" represented by Expo2020 has to be researched through a 'multiple case study' that investigates the same subject. The author adopted this model in order to be

more compelling and generate robust findings. The logic of this selection is generated by the prediction that testing the sustainability of the mega-event through multiple sectors or cases is to either predict similar results or predict different results but for predictable reasons (Yin 2003). Given that generalisation through case study is too theoretical and not applicable to populations or universes as Yin (2003) indicated, the replication approach for multiple-case studies is shown in Figure 4.5.
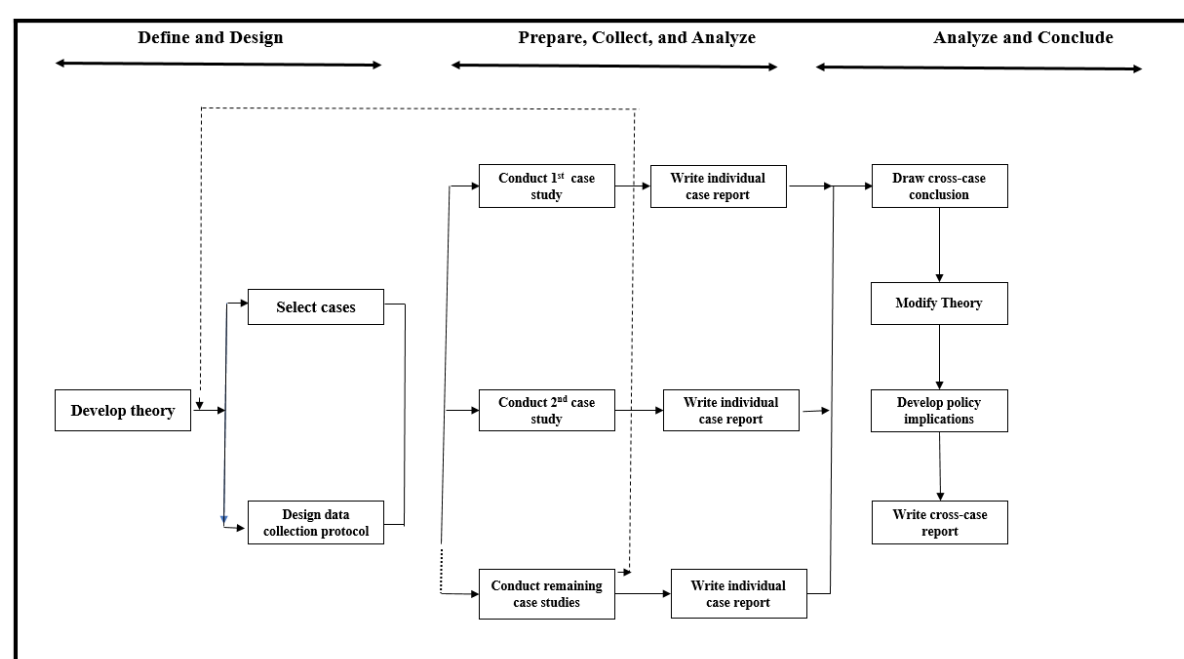
Figure 4.5: Case Study Method (adopted from Yin, 2003, p. 51)

This research study has multiple case studies and multiple units of analysis, and Yin (2003) indicated that this is considered an *embedded* case study. The research method starts by selecting each case study and writing an individual case report for each one, and from this, the researcher draws cross-case conclusions which are tested based on the theoretical propositions. In this way he confirms or rejects those theories, or modifies them based on the case under research. The last steps are to develop policy

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implications and then write the cross-case report or what the author terms the "Main case" which combines all the multiple cases under one holistic case.

4.3.2.2 The Three Case Studies

Stake (1995) indicated that the descriptions of contexts generated by the qualitative researcher help the readers to develop vicarious experience by giving them a sense of "being there." The empirical research in the following chapters is based on case studies for three sectors related directly to serve the hosting process of mega-event. The **construction process** of the Expo2020 site along with all the supportive construction of infrastructure, hotels, buildings, and communication form the first case. The second case is the **energy generation** that the UAE requires in general, and the additional capacity requested to serve this host; the case study includes how the UAE is approaching the energy generation in general. The third case study is on the **transportation** which forms one of the major polluters in any mega-event preparation process. In each case study, the research took place over 15 months. The sectors were the holding segments of many sub-divisions which have to contribute to sustainability and legacy as well. Access was gained mainly through the university connections with significant stakeholders in those entities, the researcher's connections and, in a few cases, through direct visits to the sites. Expo2020 sites had a closed door policy that anything related to the information inside has to be officially released through their communication teams. The researcher was able to arrange interviews with the Expo team in many exhibitions and on two occasions where he was able to enter the main site through previous arrangements. However, none of those interviews was recorded, and the names of the interviewees were not allowed to be shared. Also the interviewees were keen to emphasise that the information they provided was unofficial.

Those cases were selected based on the alignment with the research objectives. Each of those cases will contribute actively to the Expo2020 sustainability plan and will have a significant impact on the overall legacy for such a programme but with high diversity. Yin (2003) expressed that deciding on the number of the cases will vary based on the theoretical framework, purposes, questions and propositions of the research which will set the boundaries for the case selection. The cases represent the main three subjects in hosting any mega event and allow to gain an in-depth understanding of the topic under investigation within a real-life context. All the three cases want to serve the Expo2020 by allowing a successful hosting for the events through implementing different process, practices and methods in order to fill the gaps in hosting sustainable the mega-event in the UAE.

4.3.3 Methods of Collection and Analysis

The three primary methods in collecting data for qualitative research grouped are by Flick (2014) as follows: (i) 'Talk as data'; as major data collected for a qualitative research are basically 'talk', the three basic approaches are first the interviews with the research participants where the interviewees are expected to answer a set of questions. The second approach is the elicit narratives in a single interview where the researcher does not ask the specific question but lets the interviewee describe or talk about the subject under research. The third approach is to stimulate discussion in the focus group and record those discussions. (ii) 'Data beyond talk' or what researchers describe as observations represents the second methodological approach in data collection. This approach includes ethnography, analysing documents, talking to the stakeholders in the field, and taking photos or videos. (iii) 'Using existing data;' in much qualitative research, the researchers will not produce data but depend on existing data for their

analysis. This case study involved an in-depth examination of the case under investigation. Yin (2014) listed six commonly used sources of evidence: documentation, archival records, interviews, direct observations, participant-observations, and physical artifacts.

The aim of having three case studies was to ensure that Dubai's preparation for hosting Expo2020 is not limited to the visible sectors for the event owner and it reflects the full strategy about how to have a real sustainable event. In addition, generalisation through three cases in the same subject is much more substantial than having one single case. Furthermore, the variation in methods used to achieve the results in each case was significant as well. The study primarily used interviews but also used every opportunity to observe the sustainability practices in general and look into the details and the related culture. Any opportunity to discover more about the sustainability practices was used. During the preparation visits for every interview, the day of the interview and later after the interview, the researcher took every opportunity to look into the day-to-day practice in the case study entity; these included all the press releases and external documents they share. The interviews were with key people, directors and decision makers.

The data sources are associated with multiple selections of data or evidence. Yin (2014) indicated that the excellent case study should rely on as many sources as possible. The following is a presentation of those sources.

4.3.3.1. Document analysis

Documentation was used to retrospectively investigate the organisations' history and generate some knowledge about what the company is doing, and its role in serving Expo2020. For example, before going to the Road and Transport Authority (RTA), the

researcher accessed their website and went through many the press releases in the last five years of RTA. That helped to generate an idea about the role of leadership in pursuing sustainability and every aspect, and that was reflected clearly in the company culture. Furthermore, the researcher searched on similar entities' roles worldwide and how those entities dealt with hosting mega-event. As Yin (2003) stated, "you could even do a valid and high-quality case study without leaving the library; "the researcher believes that the information gained through the research on similar subjects and from the documents and press releases afforded strong knowledge about information about what the research is expecting from the entity. In addition, the researcher sought access to any material which identified past or current issues within the organisation, such as brochures, newsletters, advertising or public relations materials and so on as well as statistical information on the organisation from business databases. He also learned terminologies and language used in organisation's sector and abbreviations used by the employees.

The researcher was able to review documents printed for internal purposes, minutes of meetings, documents published on closed circles, and progress reports.

4.3.3.2 Interviews

Interviews are considered as one of the essential sources of evidence in qualitative research. The author conducted many interviews with key stakeholders while he used the knowledge generated earlier about the organisation to focus on their sustainability practices and the underlying rationale. Stake (1995) indicated that the "interview is the main road to many realities'. Flick (2014) clarified that the semi-structured interview is widely used as it allows the interviewee to express his viewpoints with such open design situation compared to standardised interviews or questionnaires. The two

principle uses of the case study are to obtain the descriptions and interpretations of others, where interviews represent the best chances of this.

The interviews with each key stakeholder happened only once, and it was a unique chance that the researcher had to invest as much as possible in. Average interview time was around one hour. The interviews themselves were semi-structured into a list of broad questions to allow some degree of comparability between interviews and cases. Those interviews intended to approach the critical stockholder through a conversational interaction more than a question-answer session. Some interviews took less time than expected; others were as long as two hours. Except for the interviews with the Expo site team, all the interviews were recorded and many notes were taken during the interviews as well. The key stakeholder was a little nervous about the recording process before it started until the researcher explained the ethical research considerations. However, some of the most valuable parts of the interview took place after the tape recorder was switched off; notes taken were written up after the researcher left the organisation and used in the following part. As many of those notes reflect a personal belief that the researcher generated during the interview, he left a significant portion of questionability on those notes as Yin (2003) stated that "Analysing the complexity of human being will never be an easy task even for a mind reader if there is one". All the interviews conducted in this research were a responsive interviews shared with the researcher who tried to build a relationship of trust with the interviewee which allowed the conversations to be more open. All the questions were designed in a friendly tone and gently requested with some probing. Some of the questions were avoided or modified during the interview, and other questions were revolving based on the interviewee's response. The data collected from each interview was leading for further details, illustrations and in-depth aspects for the subject under

discussion.

4.3.3.3. Description of Contexts

As this case study is more instrumental than an intrinsic case study, Stake (1995) indicated that such a case study context may be important for the case yet may have little interest for the study. The observations during the visits of many key stakeholders were analysed as well as the culture surrounding the organization. Many organisations made serious preparation for those interviews, and they surprised the researcher with the number of documents they used during the interview. Others looked more relaxed, and they even asked to move out of the office and hold the interview in the coffee shop. All those observations were used to analyse the social sustainability component of the organisation.

4.3.3.4. The Analysis of the Records, Notes, and Documents

This process involved repeated reading and listening. All the records were transcribed by the author which was a chance to hear those conversations slowly and for as many times as required. In addition, the content was categorised into the three pillars, legacy, and sustainability. In addition to following the multi-method approach indicated above to the researcher was able to compare data produced from one method to what was produced by another. For example, the transcripts of the interviews with the RTA key stakeholders were compared with the press release generated by the first method. This is a sort of pragmatic version of Denzin's 'triangulation' (1973) which distinguishes the complexity of case study research and the multiple ways that data can be generated.

Using secondary data has many advantages. Saunders et al. (2016) indicated that secondary data require fewer resources like time and money and offer more to think

about general aims and substantive issues. Secondary data are unobtrusive as they have already been collected. It can provide comparative and contextual data which will help the researcher to put his findings within a more general context. It can result in unexpected discoveries, and it gives a chance for others to check it. However, the researcher is always cautious about secondary data as they may have been collected for a different purpose than the research. The compiler of such data has no control over the quality, and initial purpose may affect how those data were presented.

This process of analysis for the records, notes and documents helped the researcher to generate key categories for each case study sector which became a trial to reflect the issues and topics suggested by the data. These categories underwent continuous revision over the research time, which allowed for reorganisation of the data. This took time to reach the focus in the data the researcher was looking to achieve. The formal analysis of all the data took place after the completion of the study. The rationale for this was because during the study the researcher was trying to make sense of the collected data and how they serve the theoretical proposition.

The author was generating research notes during this process in order to make the most of the most valuable data collected. These included many management tools like the business plan, project specifications, sustainability models, project meeting agendas, exhibition themes, and minutes of meetings. The data-gathering plan was always prepared to make the best use of the researcher's time. Stake (1995) indicates that the data collection process should be conducted with a firm definition of the case, list of research questions, sources of data and time allocation for each process, along with a robust reporting. However, it is important to recall that the primary source of data for

this thesis is the interview, supported by documents and archival records. The author was struck by the amount of preparation some stakeholders did before the interview in order to support their statements.

4.3.3.5 Direct Observation

The direct observation was another important source for collecting data in the natural setting of the "case" as it is contemporary research. Many sustainability practices and environmental conditions were available to directly observe them in real time. The construction was happening across the road; the researcher himself is part of the construction process through his day job and has many internal insights. Many of those observations varied from formal to informal; however, the researcher adopted a practice of procedures during multiple observations process to ensure the credibility of the research. He attended many meetings, exhibitions and workshops, and throughout, his role remained that of observer.

4.3.4 Development of Data Collection Instruments

The study aimed to collect empirical data for which he developed an interview protocol. The semi-structured interview questions were generated from the extensive literature review and the theoretical propositions. Shao and Muller (2011) set five types of questions in order to cover different themes; these are (i) the nature of programmes under study, (ii) the success criteria of the programme, (iii) the success factors, (iv) the programme context, and (v) the primary stakeholder of the programme. These instruments allow the research to collect information about the program include lifecycle, success factors, programme context and many more.

The researcher, however, believes that as qualitative research produces texts, those

texts have to serve what Flick (2014) describes as the main three purposes: (i) the essential data on which the finding is based; (ii) the basis of interpretations; and (iii) the crucial medium for presenting and communicating findings. The interviews transcripts from this research, along with their interpretation, are presented in the appendix. Furthermore, the challenge of transforming reality into text is always a challenging process, as the remaining records in the research are what was 'caught' and what was documented based on the method of transcription.

4.3.5 Testing the Instrument

The researcher tested the proposed questions for the interview during many preparation meetings ahead of the data-collection process. Most of the questions were posed face-to-face to engineers working in construction and power generation; this was achieved by asking them for their opinions and seeking their ideas about how much the researcher had to cover from this subject. In addition, the researcher rehearsed the interviews in his mind many times.

Stake (1995) suggests that "much of what we cannot observe for ourselves has been or is being observed by others" (p. 64). He added that interviews' are the key to obtaining data in a case study approach. This case study's interviews were conducted with many key stakeholders in construction companies, DEWA and RTA as well as those on the Expo site. The positions were mainly head of sustainability, head of programmes, project manager, and head of design.

Researching three different yet interconnected sectors offered a variety of the perspectives which form the critical factor of establishing thematic and case patterns and analytic generalisation. The interviews were continued until saturation of information was identified. The researcher understands that much more information is

still available for this subject; however, it is essential to set the boundaries to complete the research.

The locations of the interviews were divided between Abu Dhabi and Dubai. The majority of the interviews were conducted in the offices of the stakeholders and within the actual frame of what each one of them is doing. Very few decided to have a casual interview by asking the researcher to meet them outside the office. Apart from the interviews with the Expo stakeholders, the remaining interviews were tape-recorded with two different recording devices to avoid any technical issue. Interviews lasted between 45 and75 minutes, and a small number lasted more than 90 minutes. All the audio files were preserved and transcribed by NVivo. The researcher promised each interviewee that he would send a copy of the transcribed interview to them by email and ask for any change. Most replied with very few comments, and some did not read the transcripts.

4.3.6 Documentation

The documentation and reviewing process remains a significant source of information for this study. Stake (1995) indicated that "Gathering data by studying documents follow the same line of thinking as observing or interviewing" (p. 68). The data were collected from emails, minutes of meetings, flyers and external communication documents. Furthermore, much crucial information was published in newspapers and on the organisation websites where the researcher did the interviews. The review and analysis of those documents helped him to understand many strategies under implementation and the key elements driving sustainability considerations.

4.3.7 Other Sources

Stake (1995) suggests that "almost every study finds some need to examine newspapers, annual reports, correspondence, minutes of meetings, and the like" (p. 68). As much as the researcher needs to have a mind that is organised, the qualitative researcher should always be open to unexpected clues. The secondary data collected are used as backup data and divided into two groups: (i) documents publicly available and (ii) data that are not in the public domain. Those sources are archival records, observations, newspaper and commitments toward IOC. The 'state of sustainability' report published every year is another critical and resourceful document that the researcher waited for its publication during the three years of the study. Overall, the researcher benefited from being a player in the construction field to gain access to many places, meetings and exhibitions where further information was obtained.

As the methodological approached followed in this research was more focused on interpretive investigation of the sustainability practices followed in Dubai during the preparation of Expo2020, the researcher's initial orientation during most of the site visits and fieldwork was to observe, realise how stakeholders perceive the value of sustainability, and discover the sustainability drivers. For the first few visits, he looked for the presences of the sustainability culture through visible signs like the posters inside the companies, chargers for electric cars, and the happiness of the employees. The more people the researcher interviewed, the more I could identify a pattern that most of the Dubai stakeholders are following as if they had the same top management or as if they were receiving the same strategic instructions. The feelings of achievement generated when an interview or site visit endorsed something that seemed to confirm an idea or make explicit a previously half-conscious connection was always a

motivation driver.

4.3.8 Case Study Protocol

Yin (2003) indicates that "Case study protocol is desirable under all circumstances, but it is essential if you are doing a multiple-case study" (p. 67). The case study protocol choice is essential way for increasing the reliability of a case study research. The researcher set the propositions and the case study questions after the literature review. The review of those research tools was modified after testing those questions as indicated earlier. The theoretical framework was a significant part of the research design, and the researcher worked in setting a proper logic model. The research of sustainability and legacy in three different case studies remains a challenge that has multiple layers of investigation and intensive information. The protocol was used here as an agenda for standardising the investigator role through the three case studies.

The researcher adopted the rest of the case study protocol proposed by Yin (2003) by setting 'data collection procedures.' In order to do so, the researcher had a plan to identify the optimum time to visit the sites, arranging meetings where possible in the same place, and ensuring targeted effort for each interview. This plan also included the names of sites to be visited, the contact details of the right person to be interviewed and the preparation before the visits which included documents to be reviewed, the website of the entity and what they publish, and the access requirements. Each interview question was set to serve the goal of the research and at the same time be tailored to the specific case study in order to get the most of the research. The last part of the case study protocol is the guide for the case study report which includes the format of presenting the information, the outlines, the documentation of the findings, and the accurate presentation of the interviewee's bibliographical information.

4.4 Data Analysis

Stake (1995) expressed that data analysis has no particular moment to begin. It is a matter of giving meaning for the first impressions a as well as the final complications. Flick (2014) indicated that data analysis has two basic approaches; the first one is the 'coding and categorizing' and the second one is 'investigating data in context' (p. 44). The first approach will depend on generating categories from the collected data in order to analyse them based on written statements from the interviews that are labelled and categorised; what is called *coding*. NVivo is used in this research to support the coding and categorising process. The rationale of this process is to group the data collected from one source with other similar statements in order to generate categories. The second approach in data analysis is the 'text in context'; here the researcher is considering the overall context of the collected data through a narrative analysis that covers the whole case. The author of this thesis believes that is the best approach.

Rossman and Rallis (2003) indicated that the ultimate goal of qualitative research is learning. Any research should be designed with potential uses in mind. In this research on *sustainability and legacy of the mega-event*, the perspective for thinking about use is more into effective use as the knowledge provides the best solutions or recommendations to reach the goal. By doing so, the finding of the research is developed into knowledge. Rouslston (2014) stated that, "in broad terms, analyzing interview data includes the phases of (1) data reduction; (2) data reorganization and (3) data representation" (p. 301). Yin (2014, p. 133) added that "the analysis of case study evidence is one of the least developed aspects of doing case studies". The case study is not an experiment with fixed formulae, and it strongly depends on the researcher's

style of rigorous empirical thinking. In addition, the method of presenting evidence and considering the alternative interpretations inform most of the researcher's style in analysing the data. The diverse set of evidence remains the challenge that a researcher has to face in order to set his analytic strategies. Yin (2014) expressed the strategy needed by a researcher to help through the analysis, along with what the researcher can provide. There are four strategies; these are presented below, followed by five specific techniques to be used in this research stage. The researcher has to be alert about his choice before collecting the data in order to ensure that the collected data will be analysable.

4.4.1 Four General Strategies

4.4.1.1 Relying on Theoretical Propositions

This strategy is built on following the theoretical propositions that led to the case study as the research objectives, and design will be reflected in research questions, literature review, and propositions. The research propositions have their impacts on shaping the plan for collecting data and strongly contribute to the priorities of selecting and implementing the relevant analytic strategies. Yin (2014) emphasised that the theoretical propositions stemming from "how" and "why" questions are instrumental in guiding case study analysis in this manner.

4.4.1.2 Working Data from the 'ground up'

This strategy depends on the results of the earlier phases which involved what Yin (2014) called 'playing with the data,' or finding a pattern for the first time. By doing so, the researcher may suggest a useful concept which will form a start for the analytic path and possibly suggest additional relationships. The guidance of following an

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inductive approach to data analysis is through a set of procedures to assign codes to the data, and each code will represent a concept of potential interest. Yin (2014, p.138) indicated that that "the resulting guidance can be relevant to all case studies, in addition to studies based on grounded theory".

4.4.1.3 Developing a Case Description

This strategy relies on the method employed to organise the data according to the researcher's descriptive framework. This strategy could be followed as the primary strategy or even as a supportive strategy once facing difficulties in using either of the first two. That is; if the collected data is completed without having an initial set of research questions or propositions or if the data were collected without following any useful concepts from the data, this approach can be alternative for those two strategies. Another rationale for following this strategy is to achieve research with the primary purpose to be descriptive rather than primarily theoretical.

4.4.1.4 Examining Plausible Rival Explanations

The last general analytic strategy presented by Yin (2014) depends on trying to define and test plausible rival explanations. This strategy may work with any of the first three presented strategy by including rival hypotheses for the initial theoretical propositions (if following the first strategy) or by producing rival inductive framework (if following the second strategy), or providing alternative descriptions and interpretations of the case (if following the third strategy).

The author believes that developing his strategy for data analysis can be productive; yet having a general analytic strategy with an aim to link data to case study can be more

directive when analysing data. However, with any of those four presented strategies or the one provided in this reserach, it is essential to consider the use of the following five analytic techniques in order to create a compelling case study analysis.

4.**4.2 Five Analytic Techniques**

Yin (2014) outlined five analytic techniques to help researchers conclude their evidence as follows:

4.4.2.1 Pattern Matching

One of the most popular techniques in the case study analysis, this can be completed by comparing empirically-based patterns with a predicted one proposed ahead of the data collecting process. Results of having similar empirical and predicted patterns will strengthen the internal validity of the study. However, as the author of this thesis is taking a grounded theory route for analysing the collected data, it is essential to highlight that the rationale of this strategy is not simply to find "matches", but to also remain open-minded to emerging patterns. Following this strategy, researchers can start with variables from previous research, but the constructs or relationship between them may not be specified beforehand. For this thesis, the study worked on recognising the 'matched' patterns while remaining open-minded to allow new patterns to emerge as well.

4.4.2.2 Explanation Building

The goal of this analytic technique is to analyse the case study data in order to build an explanation about the case. In order to do so, the phenomenon has to be presumed by causal linking about 'how' and 'why' something happened. The explanation takes a narrative form. The process here is different from the grounded theory analysis as the

thesis has to build an explanation by making an initial prediction first and then draw comparisons. The study used a certain form of explanation building, while employing flexible analysis and interpretation. He also adopted a risk reduction process by relying on what Yin (2014) referred to as "critical friends" in order to ensure that the explanation building is convincing or there is an alternative explanation. This is without ignoring the importance of the case study protocol adopted and presented earlier in this research.

4.4.2.3 Time-Series Analysis

This analytic technique is similar to what is usually conducted in experiments and quasi-experiments. It is initially built on the rationale that the more intricate and precise the pattern, the more the time-series analysis will rest on a firm foundation for the conclusion of the case study. It is essential to maintain the objective of examining relevant 'how' and 'why' questions about the relationship of events over time and not relying entirely on observing the time trend alone.

4.4.2.4 Logic Models

This fourth technique has attracted increasing attention in recent years particularly in case study evaluations and studying theories of change. The rationale of this technique is that the complex chain of events is staged in repeated cause-effect-cause-effect patterns. In order to complete this logic model, the study has to start with matching empirically observed events to theoretically predicted events in order to create a logic model technique. Although it looks similar to the pattern matching, the logic model differs in that it relies on sequential stages and logic models.

This logic model was used when reflecting on the causal relationships between

variables. The three pillars of sustainability were challenging with the rationale that sustainability is expensive, so pursuing it will affect the economic and social pillars which will lead to these being less considered e in the future. However, by following this technique, I was able to reach a better understanding of the phenomenon under study.

4.4.2.5 Cross-Case Synthesis

This technique applies mostly when analysing multiple cases in order to strengthen the findings. Cross-case synthesis is viable within each individual case conducted or as a predesigned part of the same study. In both situations, this technique treats each case in a separated case. The fact that with such kind of cross-case synthesis, the examination of word tables for cross-case patterns will rely strongly on argument and interpretation, rather than numeric tallies. From this, the challenge of developing robust, plausible and fair arguments supported by data will be challenging.

For the process of data collection, the data are collected and interpreted on the case level as well as across cases in order to find significant similarities, differences, and site-specific experiences. However, at the case level, the analysis will include a detailed write-up for each of the selected case descriptions — the most critical goal of following this cross-case synthesis is to find commonalities and variances amongst cases. Goldstone (1997) indicated that the best way of using this analysis is to use narratives to preserve the essence of each case. Such a process will reinforce validity and support theory elaboration as well as understanding the context of each case study.

4.5 Methods of Case Study Analysis

Since knowledge generation and knowledge utilisation are directly linked, the thesis presents the analysis of this case study in order to research the problems and relationships of sustainability and legacy in Expo2020. This case has a unique life, and we do not sufficiently understand; for this reason, a case study is selected. The researcher's style and curiosity made the case unique in a certain way. It is an opportunity to see what others did not see. The source of evidence should be analysed and interpreted in a way that explains the relevance and importance of this exploratory case study. The analysis of results undertaken present and took note of all the evidence, present all plausible rival interpretations, cover the most significant aspects of the case study, and use the researcher's own prior, expert knowledge in the case of study (Yin 2014). For this, the study selected 'Relying on theoretical propositions' as an analytic strategy (Yin 2014) and the following analytic technique: (i) pattern matching to compare the findings from the case study with the predicted pattern made prior to data collection; (ii) explanation-building for analysing the case study through building explanations related to the case and finding a network of causal links about 'how' and 'why' something happened; (iii) employ a logic model for building a chain of events over an extended period of times in order to observe events and theoretically predict one event (iv) carry out a cross-case synthesis by using multiple cases to find commonalities and variances amongst cases under study.

The thesis applied the four analytic techniques as following: the 'pattern matching' is based on the main purpose of this study, so the compared patterns developed from the findings of the case study with the predicted patterns that were selected prior to data collection. This matching of patterns helped the researcher to prove many important points (that are presented in the next chapter) yet without closing the door on new emerging patterns. The second technique was the explanations building used when

trying to understand why things happen and uncover the reasons behind any event leading to further or fewer sustainability practices; this involved going beyond what everyone was trying to present and understand the rationale of the will behind being sustainable in a challenging sustainability process. The third technique is the logic model which was employed in order to understand the causal relationships between variables. However, the 'cross-case synthesis' was a very valuable technique for this research as the three case studies were looking to investigate the same subject. The three cases were serving three different sectors that will affect the final sustainability and legacy considerations of the Expo2020. For this, the collected data were interpreted at the specific case level and then across many cases in order to find similarities, differences, and site-specific experiences. The analysis involved a detailed write-up for each of the selected cases which include case descriptions. The last stage of cross-case analyses was used to explore and establish validity and support theory elaboration. The importance of this process is to understand the context of each case study and at the same time understand its commonalities with and differences from the other cases.

The raw data were categorised based on the aspects set out in the research protocol. The analysis of the meaning was based on the participants' words and codes that were then assigned. The identification of the codes from the words of participants and the comparison of these codes with the main category of the rationale behind sustainability helped in building patterns and enforcing validity once this process was completed. All the codes and categories were reviewed in order to ensure that they reflected the actual concepts of sustainability and legacy that each case reflects. The results are presented in the analysis chapter.

Stake (1995) stated that the case study work is often said to be "progressively focussed"

(p. 133). Because qualitative research selects issues that help in define data sources and data-gathering, the observations made and the reviewed documents represent an opportunity to reconsider the issues under study.

The selection of the Expo2020 was a significant case to research the sustainability and legacy in a mega-event. This research remains a chance for a researcher to have a case that happens in the place he lives and within broad research boundaries. The main aim of this research lies in creating a principally instructive example for pursuing sustainability in the mega-event, while explaining how challenging this step is an entity is trying to create a legacy as well. The main advantage of adopting the case study design for this research remains in its ability to provide a very detailed and specific way forward for the sustainability process.

4.5 Limitation of the Research Methodology

The research follows qualitative research using a case study approach to achieve the objectives of the research and answer the research questions. Concentrating on one case while trying to generalise the findings to the wider context remains the main limitation for adopting a case study strategy for qualitative research. The author of this paper tried to limit this by examining multiple cases for the same subject.

4.5.1 Validity, Reliability and Generalisability

Maxwell (2013) stated that "although methods and procedures do not guarantee the validity, they are nonetheless essential to the process of ruling out validity threats and increasing the credibility of your conclusions" (p. 125). Potter (1996) indicated that such a test could not be valid unless it is reliable; furthermore, the same test can be reliable yet not valid. The methodology that follows a set of objective procedures which

separates the researcher from the research is the only way to produce valid information. This thesis represent a reflection of the efforts done in order to make this study as accurate as possible concerning both concepts of validity and reliability.

4.5.1.1 Validity

The validation process of the sustainability practices, as well as being an essential part of the research on how to ascertain how Dubai is doing is to compare it with previous developed countries' practices. Except for its environmental part, Expo2015 in Milan was not a good reference as shown in the literature review, while Expo2010 in Shanghai had a better understanding of sustainability in general and how to use the mega-event as a catalyst of change yet based in developing countries as well. For those reasons, the comprehensive literature review for different types of mega-event is used in order to compare general practices with a focus on London OG2012 as an opportunity for benchmarking. By this validation of Dubai sustainability practices, the study aims to conclude how effective those practices are and propose an action plan in the form of an agenda in order to enhance those practices for the future.

Yin (2014, p. 239) considers internal validity as "the strength of a cause-effect link made by a case study, in part determined by showing the absence of spurious relationships and rejection of rival hypotheses". The internal validity is considered a concern only for causal or explanatory case studies. The study is committed to complete-ing the validity process and is aware of the risk of doing this only as part of the research design. Maxwell (2013) highlighted many validity tests that were selected based on what specific validity threats are most serious and plausible; by doing so, the identification of the right strategy will be possible. The author of this thesis selected triangulation as his validity strategy. The process of data collection in the multiple-

cases allowed to collect information from a diverse range of individuals with multiple backgrounds and using a variety of methods. This strategy reduces "the risk of chance associations and systematic biases due to a specific method, and allows a better assessment of the generality of the explanations that one develops" (Maxwell 2013, p. 128). However, Using triangulation will not automatically increase validity. For this reason, the study ensured that the methods do not have any biases or sources of invalidity by using multiple sources of data and secondary data which he has no impact on. Yin (2014) identifies three tactics to increase validity: (i) using multiple sources; (ii) establishing a chain of evidence and (iii) reviewing the drafted case study report by key informants. This method is adopted through multiple sources of evidence through interviews of the different case study, collecting documentation from different resources and sectors and observations. In addition, each case will have a certain type of triangulation. Flick (2014) expressed that triangulation may refer to two situations; the first is for using multiple qualitative methods in combinations, while that the other is to combine qualitative and quantitative methods.

4.5.1.2 External Validity

External validity remains one of the major barriers in doing case study research (Yin 2014). This multiple case study research design is adopted in order to perform a literal replication if the cases provided compelling answers to the research questions and consequently provide the reader with the correct and rational evidence for sustainability and legacy considerations. In addition, he conducts case study research with theoretical findings for validation and further development or what Yin (2014) terms 'analytic generalizations.' The triangulation (discussed above) would help here in strengthening the case study method and make the findings more conceiving and

accurate (Glesne 2011). The triangulation was applied by using multiple sources of data such as interviews, observations and documents review (Stake 1995). Yin (2014) expressed that using triangulation through multiple sources of data collection is seen as a means of validation. The same was repeated in the three case studies and across each case which will ensure further validity and allow for generalisations as indicated by Stake (1995).

4.5.1.3 Generalisability

Maxwell (2013) stated that generalisation refers to extending research results, conclusions, and other accounts that are based on a specific study of the particular case, settings and times to other cases for individuals, settings and times other than those directly studied. As the qualitative study usually considers a small number of sites, they rarely make explicit claims about the generalisability of their accounts. However, having multiple case studies for the Expo2020 will make the internal generalisability a vital issue for this qualitative case study. However, the author, even with the internal generalisability, understands the variation in the phenomenon of interest in the setting of each case and this is what led him to use a number of adequately characterize such diversity was used to check the internal generalizability of the research conclusion.

The finding of this research will achieve what Stake (1995) defined as 'naturalistic generation' through the personal experiences in the preparation period of the event. He contributes to this through his business role, and through researching a contemporary event through those three cases. To conclude, the three case studies form a partial re-writing of partial understandings of partial data: yet they still reflect the actual sustainability practices and legacy considerations through the lessons learned by the project team from the previous event. Looking for the District2020 plan is enough to

understand the impacts of the previous legacy generation failure have on the project. The rationale of this chapter was to give the reader the chance to gain some insight into the practical and textual strategies that was used in order to structure the following chapters and findings. The cases are presented as narratives in order to give the reader a better view of how Dubai's practices are sustainable, noting that some readers still have a mindset that, no matter what you do, the mega-event cannot be sustainable. The study aims to give the reader the chance to reach analytic goals. Analyses of the three case studies in terms of the sustainability practices and legacy role, the long-lasting legacy will be a great opportunity for all those interested to learn more about a sustainable mega-event

From this, it is clear that the external generalisability poses different types of challenges in qualitative research than it does in quantitative studies. The qualitative study may depend on its through the lack of external generalizability as it is not researching a large population. However, that does not mean that qualitative studies are never generalisable beyond the specific set of cases. Setting an explicit sampling for some defined populations to which the results can be extended is the method used for the generalization, (Maxwell 2013).

4.5.1.4 Reliability

The continuous chain of evidence is ensured throughout the analysis of the case study. Yin (2003) indicated that the researchers have to allow the externally observed to follow the derivation of any evidence; this should start from the initial research questions down to the case study conclusion in either direction. To achieve this, the first step should be writing a report that has made sufficient citation to the relevant portions of the case study. The second requirement is to ensure that the database reveals

the actual evidence and reflects the circumstances under which the evidence was collected. Third, the consistency of procedures and questions contained in the case study protocol should be ensured. The rationale of doing so is to present evidence that the data collection process stipulated by the protocol was followed. Lastly, the protocol should indicate the link between the content of the provided protocol and the initial research question. By doing those four steps, the errors and biases in the study was minimised.

The case study protocol is viewed as an effective way to increase research reliability (Yin 2014). However, in order to ensure the reliability of research with multiple case studies, the case study protocol becomes more essential. Yin (2014) viewed protocol as a guide for collecting case study data. This guide describes the procedures and general rules that is committed to be followed. Those procedures will be applied in the interviews, in the field work, and all the data collection methods of multiple cases. The researcher should follow the same procedures in each data collection process; an example followed by the author of this thesis is in the interview. Each interview started by the researcher recording the name of the person, the formal position of the interviewee, where the interview was conducted, and the date. Each interview was followed by the comments recorded outside the premises of the interviewee and within one hour of conducting the interview.

4.6 Research Ethics

The ethical considerations was taken into account throughout the conducting of this study. Saunders et al. (2012) agree that ethical concerns are always greater when human participants are involved. Glesne (2011) differentiated that the researcher-researched relationship is generally asymmetrical as the power is excessively located

on the researcher's side. Saunders et al. (2016) claimed that ethics "refer to the standards of behavior that guide your conduct about the rights of those who become the subject of your work, or are affected by it" (p. 239). The ethical dilemmas are challenging most of the easy solutions. Researchers are constantly debating about whether some people or area should be researched. Glesne (2011) presented five basic principles that affect the decisions of the Institutional Review Boards (IRBs) when reviewing the applicant's proposals:

1- The research subject should include sufficient information about the participants in the study;

2- Research subjects have the freedom to withdraw, without any obligation or penalty, from the research at any point;

3- The researchers must ensure that the unnecessary risks to a research subject must be eliminated;

4- The risks must be outweighed by the potential benefits of the research for the subject or the society;

5- All the experiments have to be conducted through qualified investigators.

The author of this thesis respects those principles and ensures that his research does not harm the safety, dignity or privacy of any of the subjects under research. Furthermore, he worked on determining the position of the subjects under investigation in advance as to whether they wish to remain anonymous or receive recognition. In both situations, the presentation of the possible impacts of their choices ahead of the data collection process is provided. Glesne (2011) remarked that the informed consent may be the right way of empowering the research participants by making the potential

study participants aware of the voluntary position in their participation, avoid any aspects that might affect their well-being, and that they can freely choose to stop participation at any point in the study without any penalty or obligation. The purpose of the research was presented to and negotiated with the participants continuously. The adopted codes of ethics guided the researcher to consciously consider and protect the rights of the participants to privacy and to maintain a balance in all the issues related to reciprocity.

The access to many research sites was not an easy job; this was facilitated by proper support from the university, intervention from the researcher's director of study, and the researcher's business connections. Some of the critical stakeholders gave him access to a lower management level than he had requested; their reasons for this was that time is limited or that they will speak about the project right after completion and not during execution. In any case,, access is not an easy task although, with the proper planning, adequate time allowance, right language, knowledge about the site, and the usage of the proper language, the task was not impossible.

Glesne (2011, p. 168) asserted that, "When research participants trust you, you invariably receive the privilege and burden of learning things that are problematic at best and dangerous at worst". The author of this research was not exposed to any dangerous knowledge, did not pay any subjects under research to participate in the study, and never used any deception. He did not use any misrepresented identities with any of the subjects under research. Furthermore, the respect between the researcher and the researched was mutual most of the time with intensive care taken not to flaunt his knowledge. He promised the research subjects that he would send them a transcript of their interview within two weeks after the meeting in case they wanted to change or

add something. Furthermore, in the emails, the reconfirmation from the interviewees on what was agreed before the interview regarding whether they remained anonymous or gained recognition concerning the information they gave was asked after the interviews as well. Glesne (2011) distinguished the ethical concerns depending on the epistemologies of the research; she found that positivist inquiry focuses on making a distinct separation between the research and the researched while this interaction is considered common once conducting research with the interpretative paradigm.

In addition, the study has complied with the following ethical principles and ethical rationale presented by Saunders et al. (2019) by focusing on the following points (pp. 243-244).

(i) Integrity and objectivity of the researchers which will define the quality of the research. This means acting openly, being truthful and promoting accuracy.

(ii) Respect the others by being socially responsible by recognising the rights of the other and respect their dignity.

(iii) Avoidance of harm includes stress, discomfort or conflict.

(iv) Uphold privacy of those taking part.

(v) Voluntary nature of participation.

(vi) Ensuring confidentiality of data and maintenance of anonymity of those taking part.

(vii) Responsibility in the analysis of data and reporting of findings by assuring the privacy, anonymity, and confidentiality when analyzing and reporting and interpret data.

(viii) Compliance in the management of data, and lastly

(ix) Ensure the safety of the researcher which mainly was not an issue in the UAE.

Many further steps was taken to ensure high ethical standards by following the University (BUiD) code of ethics which requires him to comply with the 'research ethics form' and to submit this form to the 'Research Ethics Sub-Committee.' This form was sent with a letter from the university stating the researcher's position by email to the subjects under study before any site visit. The interview protocol was attached with a covering letter that explains the objectives of the study, the planned duration of the interview, and a request of approval to use a digital audio recording.

Lastly, Saunders et al. (2016) indicated that "the feasibility and sufficiency are important determinants of what you choose to research and how you will conduct it" (p. 263) as without the right access the study will not be viable. However, those code of ethics ensure that the author of this research made the maximum possible outcome of any accessed he gain, recognised the potential ethical issues and solved them ahead of starting the interview process. As a result, decreased the 'power relationship' issue between the researcher and those he was granted access to.

4.7 Research Reflexivity

Glesne (2011) stated that the researcher's role includes personal involvement and empathic understanding. Glesne (2011) contested that "reflexivity generally involves critical reflection on how researchers, research participants, setting, and research procedures interact and influence each other" (p. 151). The researcher's interest, positions and assumptions play a critical role in the final inquiry. Reflexivity should

include own biases, subjectivity, value-laden perspectives, concerns regarding data collected, interpretations made, and representations produced (Glesne 2011). The reflexivity stance allows to present how the research was conducted with the participants, and how they will represent those participants in the reports. The researcher's biases, background, and assumptions will play a role through the entire research process, starting from selecting the subject of the research, the participants, the research questions and the audience intends read the findings. Corbin and Strauss (2015) remarked that researchers would want to study issues and problems that are related to their discipline as the study want to contribute to such areas. Rossman and Rallis (2003) shed light on the role of the qualitative researcher and his sensitivity to his biography and how it shapes the study.

Lincoln et al. (2011) defined reflexivity as "the process of reflecting critically on the self as researchers" (p. 124). The author of this thesis has been a professional specialist in the field of properties development, construction, manufacturing and supplies for construction materials in the UAE for more than 12 years. The previous degree in strategic management from the UK along with the five years as part-time researcher while working in a fast-moving environment created a wide background that shapes the perceived value of the sustainability and legacy. Furthermore, working in a senior position for the biggest local manufacturer that serves government ambitions in having sustainable construction sector has helped to broaden the author's perspective. The study wants to contribute to the overall sustainability achievement of the UAE as he is seeing the effort behind the rapid steps toward achieving this goal. However, Saunders et al. (2016) indicated that being reflexive will require to ensure the following:

- You reflect on why you choose a research topic;

- Why you prefer one research strategy over another;

- How you engage with those whom you wish to take part in your research;

- How you use the data they reveal to you;

- How you deal with any problem that confronts you during your project and so on;

- Be aware of your own biases;

- Recognise your role or self within the process; and

- Bringa new learning.

The study embarked on this research with the mindset of open curiosity and desire and willingness to interact in collaborative ways to overcome embodied factors. The strategy was selected with an inside belief that such a study cannot be conducted as quantitative research. On discussion with with the director of the study, he agreed that the research would follow a qualitative approach, and he helped in engaging the participants in this research. Furthermore, the background and experience played another supportive role in engaging with the participants. In addition, the business role was another critical factor in overcoming the challenges that faced as a professional problem-solver who saw the challenges as an opportunity to know more and not as obstacles. However, that does not mean that the researcher brought his background into the research as he upheld his role as an observer.

The role of the interviewer was vital: as an English-speaking Arabic male, with experience of working in the construction industry with a major manufacturer of

construction materials, I was positively received. By presenting my business card, I was able to generate a feeling of trust, eagerness to help the host in general, and convey a desire to benefit Dubai in learning how to be more sustainable, an area in which my employer maintains a highly positive reputation. My gender and age had a minimal impact on the interview; the majority interviewed were older and confident in their roles and viewpoints. However, the most important principle followed throughout the data collection process was to find multiple sources of evidence for each vital piece of information, confirmed along with a 'chain of evidence' that was maintained for the most critical information. In a number of interviews, the interviewees provided a new definition or broadened the understanding of some specific area of knowledge. In these cases, I repeated this information at the end of the interview to confirm that I had recorded the information correctly.

4.8 Different Way of Conducting this Research

The initial purpose was to complete a single case study that focuses on one specific side of the sustainability in the mega-event. However, the further the study developed the more he was convinced that he needed to have sub-cases or multiple cases. Yin (2003) indicated five rationales for using the single case study: the case study represents the critical case, extreme case or unique case, typical case, revelatory case, and longitudinal case. As the Expo2020 case study does not represent any of those rationales, the approach of adopting multiple cases was selected. Such a case study cannot be conducted with a mixed method of qualitative and quantitative, and it is not research that can be completed with a qualitative approach.

4.9 Chapter Summary

The method and methodology of conducting this research was presented along with the overall interpretive philosophical stance for data analysis which the researcher followed in researching the legacy and sustainability practices in Expo2020.

The research design from how the research question was formed to research propositions, unit of analysis, a method of linking research to proposition and criteria for interpretation of the case study. In addition he presented the methodological approach of the research by adopting the multiple case study design, which was designed to test the same case study of Expo2020. The rationale behind the case study protocol was presented and how it serves research with multiple cases was clarified. Furthermore, the four general strategies for conducting such type of research was presented. He discussed the data collection method he employed from documentary analysis, interviews and observation, and how he worked with all those collected data.

Chapter 5: Case Studies: Data Context and Analysis

5.1 Introduction

The previous chapter set out the philosophical and methodological foundations that was followed in this thesis. This chapter presents the case study findings, the data analysis, and the interpretation of the results. The inductive approach is adopted for the interpretation of the data. The first section provides an overview about the Expo2020 mega-event and the published data for the sustainability and legacy commitments. Further background on the sustainability background and what to consider the legacy of mega-event are presented as well. In the second section of this chapter, the report for the case results obtained from the three case studies of Expo2020 was provided. The sustainability considerations are presented under the three subsections of social, economic and environment issues. The key element to connect these three pillars was discovered from the data under the term 'the design'. The last section of this chapter is the cross-case analysis that presents the similarities and differences between the three cases and how the hosting of Expo2020 is affecting each of those three sectors.

5.2 Key Stakeholders for Expo2020

Stakeholder management is one of the key success factors of a mega-event. Stakeholder engagement was defined by AA1000 (2015) as "the process used by an organization to engage relevant stakeholder for a clear purpose to achieve an agreed outcome. It is now also recognized as a fundamental". Stakeholder identification is the first step in this case study as it will affect the way each case study is covered. Because the UAE has never experienced hosting a mega-event of this size before, this context should be improved during the ELC and will fully depend on the stakeholder's

management plan and the serious commitment to the sustainability targets. Nonetheless, even applying the best sustainability practices of preparing and executing during the preparation phases, we should not forget that these events are highly followed and spectators will travel from all around the world to attend them, which represents an unsustainable act. In addition, the large number of visitors generates immense pressure on the hosting city's natural resources and challenge their sustainability model. In the case under study, the sustainability model is still new and fragile and is facing many challenges in the current environment where it is operating. Sherwood et al. (2005) stated that mega-events would lead to an excessive energy and water usage. This increasing demand will have a significant impact on the carbon footprint of the hosting city as Delacy and Bergin-Seers (2009) noted. This impact will be augmented in the UAE as the dependency on rainwater and springs water is very limited and most of the consumed water comes as a result of the high-energy consumption method of the seawater desalination. On the other side, as the UAE has largely deserted areas, this offers an opportunity to use these empty areas without deteriorating the cultural or historical sites, which remains challenging in different countries.

The sustainable event will require a consensus between the key stakeholders about the final expected outcome of this activity. In order to do this, the author defines the stakeholders by highlighting the following as the major key stakeholders of the event:

- DM: Dubai Municipality

- Ruler of Dubai

- Rulers of other Emirates

- RTA: The Roads and Transport Authority

- Expo2020 Management team

- DEWA: Dubai Electricity and Water Authority

- Telecommunication companies

- Dubai Ports

- Supreme Council of Energy

- Emirates Authority for Standardization and Metrology

- Media

- Project Architects and Consultants

- Dubai Civil Aviation

- Dubai Civil Defence

- UAE Cabinet

- President and Vice President

- Federal Supreme Council

- RERA: Real Estate Regulatory Agency

- Dubai Airports

- Emaar Properties PJSC

- UAE companies of main contractors and subcontractors

- Suppliers

- Dubai Police

- Dubai Carbon

- Masdar City

- UAE residences and visitors

ISO201212 underlines the required competence of mega-event stakeholders to achieve

sustainable development. The first competence is represented by the determination of

the essential ability of the person(s) carrying out the actions related to the mega-event,

whose abilities and control affects the sustainability performance. Second, those stakeholders should be able to prove their competence on the basis of appropriate education, training, or experience. The third competency is through the acceptance of any stakeholder to acquire the necessary competence, and evaluate the effectiveness of the action where applicable. Fourth, the stakeholder has to maintain appropriate documented information as evidence of competence; within the context of their status, they start the event and the improvement throughout the ECL. Fifth, the stakeholder has to review and update the training and development programmes intermittently in order to ensure that the essential competencies continue to be developed, and associated training needs once needed.

The continuous communication of the sustainable development requirement is essential through the ECL and has to maintain an ascending trajectory as framed by ISO201212. In order to achieve this, the effective communication means has been defined and set out ahead of the event. The communication has to conclude the governing principles of sustainable development, the rationale for the event, a system for managing improved event sustainability, desired objectives, best practices in similar situations, relevance to interested parties, the current progress in relation to performance and, lastly, the feedback from the stakeholders involved. Furthermore, the sustainable development policy has to be drafted for the event during the design stage. This policy should include commitment to lead by example on sustainability issues, commitment to meet the legal regulations that apply to the event organisation, health and safety requirements, accessibility to the event, noise reduction process and health and safety considerations. The third commitment is contained in the adaptation of the continuous improvement process for the ELC and, lastly, to identify the sustainable development issues related to the scope of the project.

5.3 Governing Principles for Sustainable Development

After presenting the event stakeholders, the author then presents the governing principles of sustainable development for event management as set out in ISO 26000. The four principles are as following:

A)   *Inclusivity*: As presented in the literature review on many occasions, sustainability is not an isolated element that a mega-event can achieve by applying a specific set of processes. The first principle should include the identification of all the stakeholders that could affect or be affected by the decisions and actions related to the event. The first step in achieving this is to identify the stakeholders and classify them based on the power, urgency, and legitimacy as presented in Figure 5.1.
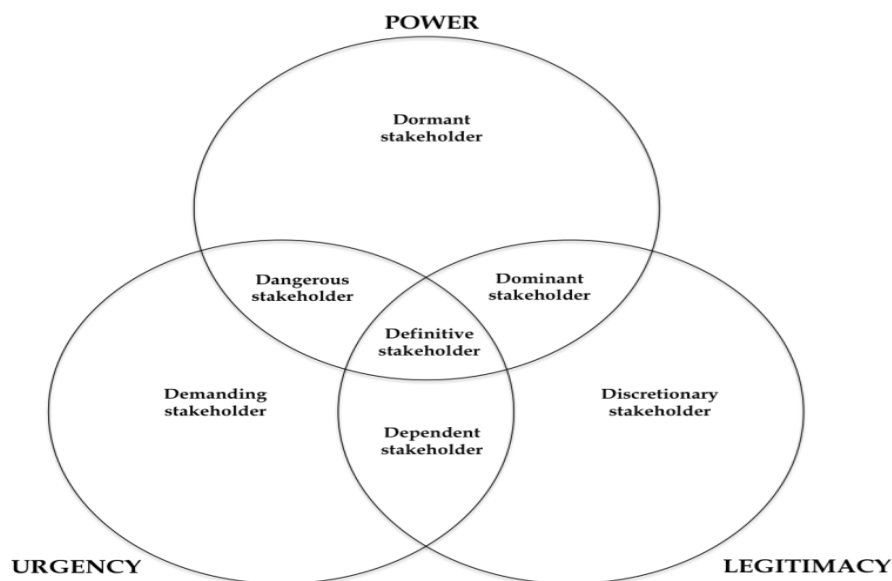
Figure 5.1: Classes of Stakeholders (Mitchell et al. 1997)

Dormant stakeholders have power to impose their will on the mega-event; however, their power remains dormant as long as such stakeholders have no legitimising or urgent requests. As the UAE is following a Federal system, the Federal Supreme Council, the President, the Vice President and the Cabinet represent good examples of such stakeholders. *Discretionary* stakeholders possess characteristics of legitimacy but

do not have a direct influence on the project, or have urgent requirements. RERA and the Dubai police represent good examples of this type of stakeholder. *Demanding* stakeholders have urgent requests but have no power or legitimacy. UAE residences and visitors who have no direct relation with Expo2020 represent this group. *Dominant* stakeholders have both power and legitimacy. This group of stakeholders receives the most attention from the mega-event management teams but they represent only part of a complex and broader set of government stakeholders. Dubai Municipality and Dubai Civil Defence are examples of this type of stakeholder. *Dangerous* stakeholders are usually powerful and influencers yet do not have legitimacy, they can influence the project success strongly if the stakeholder management process does not deal with them properly. This type of stakeholder includes Dubai Civil Aviation Authority, Dubai Airport, architects of the projects, contractors and sub-contractors, and Masdar city. *Dependent* stakeholders do not have power to influence yet still possess urgency and legitimacy by their claims as they acquire power from other stakeholders. Some examples of this type of stakeholder are Dubai Ports, the media, and the telecommunications company. The last group, the *definitive* stakeholders, have a high degree of salience. They possess the three characteristics presented in Figure 5.1 and should be handled by the Expo2020 team management very carefully and with appropriate priority. This type is represented by the Ruler of Dubai, the RTA, DEWA, Dubai Carbon, and Emaar. Based on these types, for each case, the discussion on how those stakeholders are being managed, how those parties contribute their views and understand the reasons for decisions and implications of actions, and if their rights and interests are taken into account.

B)   *Integrity*: This is the second principle of governing for sustainable development. Throughout the data collection process, the study maintained a continuous interest in

finding out how the stakeholders divided the above through power, urgency, and legitimacy, how they were dealing with each other with integrity, and how the diversity was encouraged and developed. Dubai itself represents an informative context for studying how diversity represents an asset and opportunity for any economy and not a challenge. Furthermore, one of the set objectives for the federal system of the UAE is to protect the rights and responsibilities of the people of the Federation. In the 'UAE vision 2021', one of the goals for 'United in Responsibility' is to achieve strong and active communities through bonding solidarity among citizens in a spirit of openness towards all citizens and expatriate temporary residents.

Integrity also aims to ensure that bribery, abuse, oppression, corruption and complicity are avoided. The United Arab Emirates has passed many major milestones in this field since the passing of Federal Law No. 03 of 1987 with a zero-tolerance policy on corruption. Currently the UAE has been ranked the world's twenty-first cleanest country according to a Berlin-based Transparency International Agency (Arabian Business 2018). Transparency in decisions has become increasingly important in most of the leading firms and Expo2020 adopted this strategy in awarding of contracts and appointing contractors. In many situations, Dubai Municipality demonstrates accountability for actions and in many incidents an open investigation was made. Ethical considerations in the decision-making process are another growing subject that has become important among the governmental entities and the rights of disabled people are respected. This group has been given the name *people of determination* and the Municipality hosted the first Special Olympics in 2019 as well as announcing this year (2019) as the *Year of Tolerance*. As the last point, the UAE law is based on Islamic Sharia which forbids the public sales of alcohol and drugs. Alcohol sales are limited to very specific places and special licenses are required. This has helped in avoiding

alcohol-related violence.

C)   *Stewardship*: The decisions taken by companies which may affect or lead to a significant impact on the environment or affect the biodiversity have to be assessed by the 'Emirates Nature - WWF", an authority that looks after natural resources and assets, climate, freshwater and wildlife with one ethos – to benefit society. The *UAE State of Green Economy* was published by the Ministry of Environment and Water in 2014. The report acknowledges that the rapid growth of the gross domestic product which has increased 27 times since 1975 has its own impact on the environmental challenges with the growth in population, energy and water demand rise, and fast-paced urban development. Currently the UAE carbon footprint is amongst the highest in the world taken on a per-capita basis. In addition, the challenge of the hot and dry climate imposes further challenges on energy consumption. Furthermore, the freshwater resources in UAE are extremely limited and most of the water supplied is desalinated. The UAE adopted the method of using the excess heat from electricity generation for this process. In addition, the UAE's per-capita waste generation is among the highest in the world, and most of this waste is ending up in landfills. With all those challenges, the UAE government set out many effective policy actions in order to reduce the negative impact on the environment and protect biodiversity and ecosystems.

The same governmental efforts in improving the sustainability model of the country are to be reflected in hosting Expo2020. Dubai Carbon Centre of Excellence was established in 2011 as a 'Private Joint Stock Company' based on an agreement between the Dubai Supreme Council of Energy (DSCE) and the United Nations Development Programme (UNDP) with a goal to support transition to a low-carbon and green economy through the consolidation of knowledge. Lastly, most of the UAE public sector is headed by local Emiratis who have a strong loyalty to their country and have

reputable jobs. From this, most of the decisions taken are based on the UAE rule of law and whenever the law is not providing sufficient environmental, social and economic safeguards, issues are referred to a committee to support such decisions or appoint international consultancy firms, as in many of the examples that are presented later.

D) *Transparency*: The fourth principle of governing for sustainable development requires the companies to have a high level of transparency. Currently the UAE has no law that gives the public the right to access data. However, the Dubai Statistics Centre (DSC) was officially established in 2006 to be the source of statistical information, and its role was further cemented under Law No. (28) in 2015. This law characterised the Centre as the only official statistical reference repository responsible for collecting, analysing, and classifying statistical data. Any private entity that wants to conduct any survey should get prior permission from the Centre. The information provided by the Centre is reliable, low-cost, and formatted in a comparative way.

5.4 Expo2020 Overview

Expo2020 represents a continuity of World Expos with a legacy of around 168 years. It is one of the oldest and largest international events to bring people together in order to experience, explore, innovate, and have fun. Many ground-breaking innovations were launched at World Expos like

> "the telephone (Philadelphia, 1876), the Eiffel Tower (Paris, 1889), the Ferris wheel (Chicago, 1893), the X-Ray machine (Buffalo, 1901), the ice cream cone (St Louis, 1904), the commercial broadcast television (New York, 1939), IMAX (Osaka, 1970), touchscreens (Knoxville, 1982) and the humanoid robot (Nagoya, 2005)" (Expo2020).

However, Expo2020 is going to be unique as the first ever World Expo to be hosted in the Middle East, Africa and South Asia (MEASA) region, first with expectations to have more than 70% of the visitors projected to come from abroad, and first to have key legacy goals to leave meaningful and lasting results by transforming the site into a

new city called District 2020.

The UAE is a welcoming country with modern infrastructure. It is a safe place to visit according to the Travel Magazine (2018) which selected the UAE as the second safest place to visit after Iceland, and is a convenient location. The Expo2020 site was selected carefully to serve many goals; the first one is to bring development to the Dubai South District which is located on the opposite side of the city where most of the development happens which will help to form a new business hub. Second, the location is close to Al Maktoum International Airport with easy access to Dubai and Abu Dhabi International Airport. The site will have its own metro station which will serve the surrounding communities as well and is capable of transporting 44,000 passengers per hour. The site will have easy access from the E311 highway which connects the seven Emirates together.

5.5 Sustainability in the UAE

Sustainability in the UAE is not seen a choice for the young country rather it is perceived as a necessity. The restricted natural resources gave the ancient UAE residents multifarious challenges. The weather is extremely hot for more than four months of the year; the fresh water sources are very limited and the living essentials were rare. Before crude oil and natural gas were discovered in the 1950s, mainly fishing, date palm cultivation and pearling created the economy. However, since the oil exports began in 1962 and following the sharp price rise for "black gold" in 1973, the income of the nation was completely transformed. However, the UAE understands that the oil reserves will soon be exhausted, so the government continues to work to diversify the economy by setting new economic directions like free trade zones, investment in the tourism sector, and being a hub for finances and re-exports. It also

aims to have a strong manufacturing sector in shipbuilding, construction materials and aluminium, the textile and travel industries, and tourism.

One of the key success factors behind the sustainability commitment of the three following pillars was the leadership who made sustainability a key priority. Participant 14 stated:

> Many years before, I was still a manager in Masdar city, we met Sheikh Mohammad Bin Zayed in Emirates Palace. He brought me together with many other young mangers and told us that the UAE is capitalising on the people to have a sustainable future. We know that after many years the last oil vessel will leave the GCC, many people will be crying, we, the people of the UAE will be celebrating with the success of building green sustainable economy that will last for the future generations.

Al Tayer (2018) also emphasises the role of the leadership in developing sustainability as a key priority. The Dubai Supreme Council of Energy launched the Dubai Green Mobility Initiatives which aim to motivate organisations to use sustainable transport like hybrid and electric vehicles and reduce carbon emissions in ground transports, the second largest greenhouse gas emitter in Dubai. This is possible through encouraging electric or hybrid car use based on directive number 1 of 2016 issued by the Supreme Council of Energy to have at least 10% of all newly-purchased cars to be electric in a plan from the year of 2016-2020 as part of Dubai's Clean Energy Strategy 2050 which aims to give Dubai the lowest carbon footprint in the world and the Dubai Carbon Abatement strategy to cut carbon emissions by 16% by 2021. Such plans represent one example of how the three pillars of sustainability are pursued in the UAE through the proper leadership support, strategies, and directions. Lauermann (2019) found that the method of casting cities as laboratories for environmental policymaking and the process of linking the experiments to city-to-city policy networks, it became more possible for the city leaders to design sustainable city visions through sustainable strategy. In the following the study is going to present how the UAE is pursuing

sustainability through the main three pillars, what was achieved so far, and how this is reflected on the sustainability and legacy place of Expo2020.

5.5.1 The Economic Pillar

Looking to the economy as the first pillar of sustainability, the stability of the UAE macroeconomic environment is partially due to this diversification which allowed the economy to weather the double shock of lower oil and gas prices and reduced global trade (World Economic Forum 2018). Initially, this is a lesson that the UAE economists learned from the 1980s where the oil prices fell to less than USD 10 (average current price is around USD 60). This event compelled the Federal National Council to call on government to intensify nationwide efforts in order to diversify the UAE economy away from oil. This oil slump turned out to be a fortuitous event for the UAE as it motivated the policy makers to sharpen its focus on diversification (Ministry of Economy 2018). From this, the UAE started to become one of the most prolific oil producers yet with a strong nurturing of the non-oil sectors which made the UAE become the second largest economy in the Middle East. The UAE economy has eight more features to make the economy more stable once oil prices fluctuate or the global economy faces recession. These features are listed in Government.ae (2019) as following:

1- Strategic location: UAE location represents a bridge to connect Asia to Africa and Europe. Chinese businesses consider Dubai as a hub for trading in Africa, Western nationals use Dubai as a Middle Eastern hub, and Indian traders use the UAE to access the world.

2- Strong financial reserves: According to the international monetary fund forecasts, the gross official reserves of the UAE will rise from USD 76,8 billion

in 2015 to USD 118,4 in 2020 and the current account surplus is expected to rise from USD17.6 billion in 2015 to USD 33.4 billion in 2020. This strong financial reserve reflects the economic immunity of the UAE.

3- Large sovereign wealth fund: The Sovereign Wealth Fund Institute (SWFI 2018) ranked 'Abu Dhabi Investment Authority' (ADIA) as the fifth largest Sovereign Wealth Fund and Public Pension in the world, headed by the USA, Japan, Norway and China. Being in fifth place reflects how strong the economy is. However, ADIA is the largest in the UAE with USD 697 billion but not the only one. The Investment Corporation of Dubai has funds of more than USD233 billion, Mubadala Investment Company has around USD 226 billion and the Emirates Investment Authority has around USD 34 billion.

4- Promising investor home economics: The World Investment Report (2018) released by the United Nations Conference on Trade and Development (UNCTAD 2018) ranked the UAE as one of the top 20 home economies for global foreign direct investment (FDI).

5- Consistent government spending: The Global Competitiveness Index 2017-2018 released by the World Economic Forum (2018) ranked the UAE as the seventeenth top economy in the world yet the fifth in terms of infrastructure. The UAE ranked first in the world for the 'road quality' index, third in 'airport infrastructure and means of air transport quality' index and fourth in 'seaport infrastructure quality' index. It ranked sixteenth in terms of 'quality of electricity supply', and ranked first in the 'Government procurement of advanced technology products' index. These indices reflect the level of government spending on infrastructure. Dubai is spending more than AED 30 billion on infrastructure at the Expo site and the city and the UAE plans to spend

AED six billion on other major infrastructure developments across the country (Government.ae 2018).

6- Progressive policy of economic diversification: as stated above, the diversification of the UAE economy in key sectors like tourism, air transport, manufacturing and alternative energy helped the UAE end its dependency on the oil industries which accounted for less than 30% of the UAE GDP in 2014. This figure represents a massive development in this direction compared to 79% of GDP in 1980 (Government.ae 2018).

7- Free zones: Free economic zones are a designated area where companies are trading without the intervention of customs authorities and companies are charged lightly in order to encourage economic activity. Currently the UAE has around 45 free zones that contribute to 33% of the UAE's non-oil trade business in 2014 (Government.ae 2018).

8- Increased foreign direct investment (FDI): The UAE's success in attracting FDI stock and direct investment was also remarkable. The UAE developed from attracting USD 1.09 billion in 2000 to USD 63.8 billion in 2010 up to 129.9 billion in 2017. This success reflects the international trust in the UAE economy for fast liquidating investment. However, it is noticeable that the FDI flows as investment are considerably stable on the average of USD 10 billion per year as inflow for years 2012-2017 yet with an alerting FDI outflows that increased from USD 2.5 billion in 2012 to USD 16 billion in 2015 and USD 14 billion in 2017. This is a part of the 23% international decrease in FDI for USD 1.43 trillion.

Along with those eight features, in 2018 the UAE Central Bank assets reached around USD 114 billion compared to USD 110 billion in 2017. The gross assets of banks also

increased by 6.8% in 2018 to reach USD 784 billion compared to USD 733 billion in 2017 (John 2018) while the gross credit on the USD 458 billion and Lending to Stable Resources Ratio kept above 80% in the last two years. The banking sector in the UAE is playing another important role in investing; investment rose from around USD 51 billion in 2013 to USD 89 billion in 2018. This included debt securities, equities and held-to-maturity securities with other investments.

The Vision2021 National Agenda focus is on the UAE becoming the economic, tourist and commercial capital for more than two billion people by transitioning to a knowledge-based economy, promoting innovation and research and development, strengthening the regulatory framework for many key sectors, and encouraging high value-adding sectors (Vision2021.ae). The Vision also aims to provide a good life for the residences; place the UAE among the top countries in the world in income per capita; ensure high levels of national participation in the private sector workforce; be among the best in the world in entrepreneurship; and instill an entrepreneurial culture in schools and universities to foster generations endowed with leadership, creativity, responsibility and ambition. Lauermann (2019) indicated that city visions are viewed as highly speculative and they may never be delivered. However, these speculations maintain their appeal through employing planning tools to advance urban political strategies.

The strong economy of the UAE is the main secret of its current prosperity and high level of development. The country is one of the richest and fastest growing countries in the world and the economic sectors' contributions in GDP for 2017 are shown in Table 5.1, compared to 2010 real prices.

Economic Sector	Sector
Extractive Industries (Including Crude Oil and	29.50%
Wholesale and Retail Trade; Repair of Motor	11.70%
Financial and Insurance Activities	8.60%
Construction and Building	8.40%
Public Administration and Defence; Compulsory	5.80%
Real Estate Activities	5.70%
Transport and Storage	5.40%
Electricity, Gas and Water	3.20%
Information and Communications	2.90%
Professional, Scientific and Technical Activities	2.60%
Accommodation and Food Services Activities	2.20%
Administrative and Support Services Activities	1.90%
Other Sectors	3.90%

Table 5.1. The contribution of the economic sectors in 2017 at real prices of 2010 in the UAE (Government.ae 2019)

The UAE Ministry of the Economy has continued to develop many economic policies since 2015 in order to improve the country's resilience to global economic pressures in order to maintain sustainable growth. The UAE government has increased electricity and water tariffs and removed fuel subsidies, approved the federal budget to increase expenditure to boost non-oil growth by 5.6%, and promoted foreign investment beyond the free zones. It has encouraged competition, and introduced value-added tax (VAT). The key growth sectors in the UAE are as following:

1- *Tourism*: The UAE infrastructure for hosting tourism is unique in the world.

The UAE has two world-class airlines (Etihad and Emirates), and undertakes continuous upgrading of aviation infrastructure with the plan to develop Al Maktoum International airport in Dubai and Midfield terminal in Abu Dhabi. Dubai only expects the aviation industry to contribute 32% of its GDP by 2020 while the tourism and travel industries brought USD 43.3 billion to the UAE in 2016, which represents 12.1% of GDP (Ministry of Economy 2018). The Dubai Chamber of Commerce and Industry expected that the UAE's travel and tourism sector will keep rising to reach over USD56 billion in 2022 (Arabian Business 2017).

2- *Agriculture*: Currently farming land in the UAE is around 105,257 hectares, which poses a challenge to all the limited resources. Dates remain the primary local crop; however, the fresh vegetables sector is growing steadily, particularly in 2014 with 163% growth. The Ministry of Climate Change and the Environment is encouraging this growth by technical assistance, annual survey, and supply of agricultural materials. This growth represents a response to the Federal National Council in April 2017 to boost local food output and sustainability of farming activities in order to reduce reliance on imports. Currently the UAE is ranked first in the Arab region and twenty-third globally when it comes to food security as reported by Baldwin (2017). The reason behind this is due to the UAE's logistical infrastructure, high standards of food quality, large storage capacity and technologies, and a healthy domestic market as stated in the same reports.

3- *New energy market*: The author presents a case study about the UAE utilities sector. It is noteworthy that this sector's target is to achieve 50% from the total energy sources in 2050. DEWA study presented in Dewa sustainability report

shows that UAE still needs to invest USD 35 billion in order to meet the 17 GW plan. According to a report by Department of the Arab Petroleum Investments Corporation (APICORP 2017), the UAE has seen an increase in electricity consumption at an annual rate of 5% from 2012 to 2017, with an expected increase in demand from 5-6% every year until 2021, which puts this sector at the heart of the government energy strategy.

4- *Manufacturing*: This is the third largest sector in Dubai, representing around USD 11.2 billion per year and contributing 11% to the overall GDP (Ministry of Economy 2018). The growth in the UAE's manufacturing sector is well presented through the current income of 53% from the non-oil exports of the UAE.

From this we can see the ability of the UAE as a nation to remain steadfast and consistently buoyant in creating new opportunities for growth. The UAE is part of the globalised economy and will be affected by the global economic challenges; yet with the proactive efforts, strategies, mechanisms and financial tools, the economy remains stable and sustainable in many uncertain situations. Currently, the global economy is on the path of 'healing'. The International Monetary Fund (IMF) indicated that the global growth for 2018 remained close to 3.6%, up from 3.2% in 2016. The IMF Deputy Managing Director Mr. Tao Shang believes that such growth is 'weak'; however, the UAE continue its sustainable development growth and was ranked seventeenth on the Global Competitiveness Index (GCI) 2017-2018 published by the World Economic Forum (WEF 2017).

5.5.2 The Social Pillar

For the *social* pillar of sustainability, the estimated population of the UAE for the year

2016 by the Federal Authority for Competitiveness and Statistics is around 9.12 million people, of which 2.823 million are females and 6.298 million are males (Ministry of Economy 2018). The DSC figures for Dubai show the same gap between male and female –2.233 million males and 0.958 million females. This gap represents the type of society existing in the UAE where a significant part of the expatriates are construction workers whom are living without their families. However, the most significant figure is in the increase of the Dubai population from 0.183 million in 1975 to 0.862 million in 2000, and 2.003 million in 2011 up to 3.192 million in 2018. It is a city that has seen an increase of 20 times its original residences in 43 years. The other remarkable gap is in the number of Emiratis compared to non-Emiratis where Emiratis represent 0.254 million compared to 2.937 million non-Emiratis, who form less than 10% of the Dubai population. In those figures the study did not considered the 1.19 million workers in Dubai who reside outside the Emirates, or the temporary residents (DSC 2018). The DSC (2019) data presents the population by gender and age groups for the residents of Dubai where major citizens are in the age group between 20-49. An important note is that expatriates living in Dubai will never have permanent residency or UAE nationality no matter how long they live or invest in the UAE. This means that more than 90% of the current residents will leave the UAE at some point in time which indicates an unsustainable society. However, the author was able to sense many belonging activities from several expatriates as well as witnessing some activities for people living in the present, without considering the future, as they may leave.

Unemployment is classed as when people are without jobs but are actively looking for one. Unemployment is tested for people who are of working age, and have the ability and desire to work but do not have a job. Dubai labour force is active and the unemployment rates are managed to be at the lowest levels feasible – The DSC figures

showed that the current unemployment rate for the Emiratis and non-Emiratis is around

0.5%. The unemployment rate in Japan is 2.5%, in the United States it is 3.8%, and in

Germany it is 3.2%, based on the figures from the Country Economy. A criticism of

these numbers is that non-Emiratis who do not have job, must leave the country.

However, it still gives an indication about the type of active and busy society that Dubai

is. The labour force survey figures are shown in Table 5.2, below.

Economic Activity Status (%)							
	Labour Force (Economically Active)			Outside Labour Force (Non-Economically Active)			
Nationality	Employed	Unemployed	%	House wife	Full time student	Other	%
Emiratis Males	97.4	2.6	65.5	0	47.6	52.4	34.6
Emiratis Females	95.1	4.9	37.4	44.5	29.3	26.2	62.6
Total	96.6	3.4	51.1	29.1	35.3	35.3	48.9
Non Emiratis Males	99.8	0.2	95.9	0	65.2	34.8	4.1
Non Emiratis Females	98.8	1.2	55.7	76.3	13	10.7	44.3
Total	99.6	0.4	85.3	60.6	23.7	15.7	14.7
Total Males	99.7	0.3	94.6	0	60.3	39.7	5.4
Total Femals	98.5	1.5	53.6	71.2	15.6	13.2	46.4
Total	99.5	0.5	83.1	54.7	26	19.3	16.9

Table 5.2: Economic Activity Status, Percentage distribution of population 15 years and over by Nationality, Gender and Economic Activity Status – Emirate of Dubai (2017) (DSC)

The diversification of Dubai society is a great asset for this young city and potentially

makes it more sustainable in terms of the social pillar. Educating the society about the

Green economy is the cornerstone to ensuring business continuity and sustainability.

The universities of the UAE are taking part in this with multiple numbers of domestic

and foreign universities who are 'adding the sustainability emphasis into traditional

engineering, business, planning and environmental science disciplines and professions'

as stated by Michael Mortimer and Bruce Hull, two senior fellows from Virginia Tech's Center for Leadership in Global Sustainability. They added that science and technology are crucial for meeting the sustainability challenges, but alone they are inadequate. What is in short supply are leaders; graduates of programmes that have prepared them to tackle the human side of the equation. By delivering those programmes, the universities are preparing a new generation of UAE managers and leaders to work across boundaries, to find new social solutions, and to see problems from a systems perspective by being effective communicators who recognise what sustainability requires. In this way, a generation committed to sustainability within organisations in all sectors is created. This reflects the importance of leaders with a sustainability background to take future initiatives toward governments, business, and the NGO community. The two senior fellows concluded that higher education in Dubai requires two imminent considerations going beyond the technical training that students receive; the first one is to instill leadership skills, and the second one is to embed global competencies within graduates.

The Vision2021 sets out the framework of the UAE's growth in multiple areas. The UAE government formed the 'Ministry of Community Development' (MOCD) in order to improve the social development in the Emirates by achieving the objectives of the national agenda of the Emirates. The MOCD is responsible for many successful initiatives like denoting 2017 as the 'Year of Giving Initiatives' and denoting 2018 as the 'Year of Zayed' with "Masaai Al Khair" to provide home maintenance and renovation support for social security beneficiaries and low-income families. It also formed 'Volunteers.ae'.The MOCD vision is to have a coherent and responsible society involved in community development with values of equality, community partnership, excellence, innovation, and transparency. The work of the Ministry was

reflected in many notable figures; one example is scoring 86% in the Cohesive Society and Preserved Index. It also achieved 96% in the National Identity Index which measures the sense of belonging and national identity of residences. The UAE passport ranked number 1 in 2018 on the Global Passport Power Rank through ranking passports based on the number of countries that the passport allow their holder to enter without visa. , The UAE has achieved many competitive rankings in the WEF report for ranking the labor market efficiency, except for the female participation in the labour force. As mentioned earlier this reflects the gap in the numbers of female and male residents. This was reflected in the figures for participation in the labour force where the UAE ranked 121/137. Other figures relating to the labour force and employment are as following:

- Flexibility of wage determination: 8/137

- Pay and productivity: 4/137

- Effect of taxation on incentives to work: 3/137

- Country capacity to retain talent:2/137

- Country capacity to attract talent: 2/137

The United Nations states that more than 55% of the world's population are living in urban areas, a proportion expected to be increase to 68% by 2050. Therefore, cities have no other options than to move towards a green economy. As Dubai is looking to lead the green initiatives among cities, many initiatives have been introduced, such as the Smart City aiming to impact people positively and improve their quality of life.. The UAE decision-makers prioritise the needs of inhabitants while implementing technologies that create a smart sustainable city. To achieve this, in May 2015, Dubai signed a cooperation agreement with the International Telecommunication Union (ITU) to become the first city to assess the efficiency and sustainability of its urban

services related to city smartness and sustainability. ITU is the United Nations' specialised agency for information and communication technologies. It is the agency responsible for allocating global radio spectrum and satellite orbits, developing the technical standards that ensure that networks and technologies seamlessly interconnect, and improving the access of the communities worldwide. It is the agency's responsibility to protect and support the rights of everyone to communicate. The Dubai Smart City project forms an integral part of the ongoing standardisation efforts for smart sustainable cities that are part of the ITU. The ITU believes that the transition to a smart sustainable city is an ongoing evolving process where the Dubai Smart City pilot project was a crucial step towards the future implementation of the programme on a global scale.

5.5.3   The Environment Pillar

Dubai is the second largest Emirate of the UAE after Abu Dhabi; Dubai's urban area is around 3,885 SQKM. Dubai's climate is very hot and humid in the summer with temperatures reaching the mid-forties and humidity averaging over 90%. In winter, the weather is moderate with an average daytime temperature of 25 degrees Celsius. Near coastal areas, the humidity can average between 50% and60%. Rainfall in Dubai is infrequent and does not last for a long period; the average rainfall days are around five days per year.

The Environment Department in Dubai Municipality worked in improving the legislation and environmental standards that deal with environmental protection, conservation of natural resources, and coastal zone management and canals. One of the most important columns in the environmental legislation is to have the proper technical guidelines in place which the community and stakeholders have to observe and adhere

to. Without this, environment protection will not be possible and then will not contribute to achieving sustainable development for Dubai. The years 2016 and 2017 have three important policy circulations by Dubai Municipality regarding enforcing plastic product manufacturers to register degradable plastic products, register ground water well-drilling companies, and to install flow meters for groundwater wells (Dubai Municipality 2019).

RTA and DEWA are working on joint efforts to encourage communities to be greener. One of the initiatives is the electric cars; in 2018, DEWA announced that all green charges initiatives' registered users will be able to charge their electric vehicles in DEWA's green charges electric vehicles charging station free until the end of 2019. The RTA is also providing incentives for electric vehicles, which include free assigned parking, exemption from RTA electric vehicle registration and renewal fees, and exemption from Salik's tag fee (Dubai's road toll system). This is based on the collaboration of both entities in providing sustainable transport use which aims to reduce annual energy consumption rates (State of Green Economy Report 2018).

The UAE Vision 2021 was launched in 2010 at the closing of a Cabinet meeting by H.H. Sheikh Mohammed bin Rashid Al Maktoum, the Vice President and Prime Minister of the UAE, and the ruler of Dubai. Their agreed aim was to make the UAE among the best countries in the world by 2021 which represents the year where the UAE will reach the Golden Jubilee of the Union. Vision 2021 is mapped into six national priorities that represent the focus of the government action in those 11 years. The national priorities are represented in the Figure 5.2 below:

Figure 5.2: National Priorities (vision2021.ae)

In the Vision2021 national agenda, the UAE government sought to ensure sustainable development while preserving the environment and to ensure a perfect balance between economic and social development. This agenda focuses on improving the quality of air, preserving water resources, increasing the contribution of clean energy, and implementing green growth plans. In addition to these initiatives, this national agenda highlights the importance of infrastructure by aiming to increase the quality of airports, ports, road networks, and electricity of the UAE to be among the best in the world. Through these policy actions the UAE has increased the percentage of many indicators as following:

1- Waste management: The UAE measures the percentage of treated waste out of the total generated waste using various treatment methods like recycling, incineration, waste-to-energy, chemical treatment, and exporting for external treatment, expect for the landfill. In 2017, the UAE was able to treat 23.82% of total waste generated (Ministry of Climate Change and Environment). In the industrial area, Emirates Global Aluminium (EGA) is the largest industrial company in the UAE outside oil and gas which has turned waste into opportunity as stated by Salman Abdulla, the executive vice president of health, safety, sustainability environment and quality. He said that EGA is turning 100% of the waste into value and has a cleaner production system. The philosophy on minimising waste generation is named 'recycle-reuse-reduce' with an aim to reach a zero process waste—to-landfill as the current 80% waste generated from Jebel Ali smelter is been recycled while the Al Taweelah smelter is achieving around 50% at present. Salman Abdulla asserts that the sustainable waste recycling journey has just begun and they are partnering with many universities and research institutes to find solutions for other challenging material like the re-use of bauxite residue, which they are trying to turn ino a product through the new under-construction alumina refinery. The ground-breaking fundamental scientific research is always the starting point of those steps and aims to expand the boundaries of scientific knowledge.

2- Air Quality Index (AQI): This is an indicator developed by the US Environment Protection Agency (US EPA) that measures five main air pollutants: (i) nitrogen dioxide (NO2), (ii) carbon monoxide (CO), (iii) sulphur dioxide (SO2), (iv) particulates (PM), and (v) ground-level ozone (O3). Monitoring air quality is achieved through automated and manual-monitoring stations also known as continuous and non-continuous stations which collect the data. This index reflects the quality of air and how those five pollutants will impact on human health, how clean or polluted the

ambient air is, and the associated health effects that might be of concern. In 2017, the Ministry of Climate Change and Environment, in coordination with the National Centre for Meteorology and Seismology, indicated that the Emirates had achieved a score of 77%. The UAE was ranked as 'Moderate' for this index as the AQI is between 51 and 100. This figure reflects that the air quality is acceptable; however, there are moderate health concerns for a very small number of people (people unusually sensitive to ozone may experience respiratory symptoms).

3- Share of Clean Energy Contribution: This is the indicator that measures the contribution of clean energy sources (renewable, nuclear) to the total energy mix. Currently the percentage is relatively low; the case study of Utilities will illustrate this subject more. However it is important to know that the measurement of 2017 indicated a contribution of only 0.54%. This percentage is much higher in some of the major markets.

4- *Quality of overall infrastructure*: This indicator measures the overall level of infrastructure based on two perspectives: the first one is the transport infrastructure and the second one is the electricity and utilities infrastructure. Both subjects are going to be tested intensively in two separate case studies; however, it is worth mentioning that in 2018, the UAE was ranked fifteenth on the Global Competitiveness Report (GCR) from the World Economic Forum. The Report divided competitiveness into 12 pillars with many indicators. For the quality of infrastructure, it is worth mentioning that the UAE ranks number 1 in the quality of road, number 4 in the quality of infrastructure, and number 3 in the air transport infrastructure.

5.6 Reflection on Sustainability Pillars

The sustainable community target is to have an economically viable, environmentally sound and socially responsible society. Achieving such goals require a joint contribution from all of the participants from all sectors of the community such as agriculture and food systems, manufacturing and industry, small business, technology, water and energy, biodiversity, air and climate, civic engagement, justice and equity, and many, many more. The previous chapter was able to assess the sustainable development practices of the UAE in general. It is apparent that the country adopted many of those plans and practices before hosting or bidding to host a mega-event. However, during the assessment of the three pillars of economy, social and environment, the results indicate that in most of those secondary documents analyses, the key foundation for this progress was 'the wise leadership'.

The wise leadership is a terminology used by most of the people describing the motive behind taking certain steps, inspiring them, or even financing and facilitating the process 'The father of the nation' is another term that is referred to every time an event stakeholder refers to the initial sustainability concept. The 'father of the nation' is the way the Emiratis refer to H.H. Sheikh Zayed Al Nahyan who enjoyed getting out and meeting the local community, and who embraced the concept that the country's resources should be fully used to the benefit of all the people of the UAE.

The study proposes a success factor for sustainability named '**leadership**', without this, the three pillars will never receive equal prioritisation. Sheikh Zayed inspired the UAE people about the importance of the social pillar with many quotes, as follow:

Q1: "To treat every person, no matter what his creed or race, as a special soul, is a mark of Islam."

Q2: "Arab oil can never be dearer than Arab blood."

Q3: "No matter how many buildings, foundations, schools and hospitals we build, or how many bridges we raise, all these are material entities. The real spirit behind progress is the human spirit, the able man with his intellect and capabilities."

Q4: "The ruler, any ruler, is only there to serve his people and secure for them prosperity and progress. To achieve this, he should live among his people to feel their wishes and know their problems, and this cannot be achieved if he isolates himself from them."

Q5: "Every individual has to perform his duty. Man is mortal, but his work is not. Therefore, work is greater than wealth."

Q6: "The ruler should not have any barrier which separates him from his people."

From this we can see the role of the founder vision of the UAE in the current state of the sustainable development model that the country is preserving since its formation 48 years ago. Crises within the nation have always been limited and under control even during the 2008 international financial crisis from which the nation was able to recover quickly.

5.7 Expo2020 Legacy plan

Expo's legacy planners are always focused on the sectors that have high growth potential and could form the backbone for any economy to build on. Dubai economy has four high strategic industries: (i) education, (ii) transport and logistics, (iii) travel and tourism, and (iv) real estate. Those four industries are playing a major role in diversifying the economy of UAE, along with the manufacturing and agriculture industries, to reduce the reliance on the petroleum and oil sector. The legacy plan of

Expo2020 explored the potential technology that can be used in this sector; these technologies include "augmented reality", "Internet of Things" and the "Big Data" which can transform these industries. In addition, the Expo legacy plan identified many educational and cultural initiatives to complement the ecosystem envisaged by the Expo Organisers (Expo live 2016).

EXPO2020 will be an event to be remembered for a long time in Dubai, the whole United Arab Emirates (UAE), and probably the region. Her Excellency Reem Al Hashimy (UAE Minister of State for International Cooperation and the Director General Bureau for Expo Dubai 2020) stated, "We are connected through our hope for a brighter future", which reflects the role that Expo will play in the story of development for the UAE as an international player. She added: "Our hope is to engage the international community in seeking collective solutions to global challenges in our subtheme areas of opportunity, mobility, and sustainability", the three main themes that the bid of EXPO2020 was built on. Her Excellency believes that "we foresee a world with clean air to breathe and clean water to drink; a world where natural resources are conserved for tomorrow" (Expo Live 2016, p.4).

HE Reem Al Hashimy (UAE Minister of State for International Cooperation and the Director General Bureau for Expo Dubai 2020) (2016) is confident that the physical legacy of the event will remain part of the new city with its own unique infrastructure, facilities, and services, and confirms that the standards specified for this event will ensure compliance with the best international standards for sustainability and environmental protection. This promise includes a public commitment to use 50% renewable energy on the Expo site over the period of operation. Al Hashimy (2016) believes that Expo will bring sustainable benefits to the region as part of the lasting legacy and will create a significant stimulus to trade sectors. The social legacy of the

event is highly considered through volunteers drawn from across the UAE, and reflects the diversity of the community. Al Hashimy (2016) trusts that "the idea of partnership sits at the very heart of Expo2020 Dubai". She posits that the leadership of the Expo2020 team is guided by the belief that stakeholder partnership and people coming together generate innovation and progress. This will generate significant value for Expo2020 partners, the hosting destination, and UAE communities, in general.

Dubai's plan for its Expo legacy is backed by the strong legacy and experience with leading local companies like Emaar properties, Dubai World Trade Centre (DWTC), Emirates Airline, Dubai Ports (DP), and many more local successful companies. In 2015, Emaar Properties launched a global competition among 13 leading international architects to design the theme park. Fahy (2016) reported that Bjarke Ingels Group (BIG) who created the design for the "Opportunity Pavilion" had a design philosophy which reflects a "belief that contemporary urban life is a result of the confluence of cultural exchange, global economic trends and communication technologies." Deulgaonkar (2016) stated that BIG is known for its innovative approach to architecture and they are working on many masterplans internationally including the new headquarters for Google. Foster & Partners, an international design firm based in London, won the Mobility Pavilion contract, and Grimshaw Architects won the Sustainability Pavilion contract. Those three pavilions will form the centrepieces of the two-square-kilometre Expo site; this will surround the central Al Wasl Plaza which represents the heart of Expo2020. Hellmuth, Obata + Kassabaum (HOK) architects designed the master plan of the Expo2020 site (Deulgaonkar 2016). However, by recruiting all those international companies, Al Sammarae (2017) indicated that all the major pavilions are designed by leading international companies which have swept the boards and won the design competitions among all the local and regional architects.

Local architects, sadly, will not have the legacy of designing any major part of the Expo2020, and this is a missed opportunity for them.

His Excellency Mohamed Al Abbar, Expo Higher Committed Member and Chairman of Emaar properties said,

> "The winning theme pavilion designs further build on the UAE and Dubai's proven record in iconic architectural design, particularly when considering their long-term functionality, sustainability and contribution to Expo 2020's legacy and Dubai's long-term development" (Hill 2016).

Looking at the profiles of the designers demonstrates that Dubai is building something to stay and become part of the new emerging side of the City. The location of the site is at the edge of the Dubai-Abu Dhabi border. The two Emirates are working closely to employ the competitive advantage of both Emirates in order to get the most out of this event and build on it as a target to provide a better future for the UAE. Ames (2016) indicated that the expected budget for Expo2020 is expected to be between USD 8.1 and USD 8.7 billion according to a report compiled by the BNC network. The earlier prediction of the budget was approximately USD 7 billion compared to USD 1.46 billion cost for EXPO Milan; although this cost does not include the infrastructure costs.

Expo2020 is following the strategy of the utilitarian legacy plan by repurposing the exhibition's structures for public, institutional, or commercial use afterwards (Deng & Poon 2014). Expo2020 has a clear legacy plan which was announced in 2017. However, Deng and Poon (2014) contest that, based on the experiences from previous Expos (Seville, Lisbon, Hannover, and Zaragoza), the immediate transformation of the whole site into the legacy plan was virtually impossible. The main obstacle behind achieving this was due to the inevitable retrofitting process and the lag period between the merging of the built legacies into the established urban fabric and social system

function. Emaar Properties work on avoiding this by planning many huge property developments around the Expo site called Dubai south, an infrastructure development, and District 2020.

District 2020 is the official name of the Expo site after the completion of Expo. It will retain Expo2020's conference and exhibition centre through the development of the facilities into a new exhibition centre being developed by Dubai World Trade Center (DWTC) Limited Liabilities Company, the significant regional exhibition company. Design Mena (2016) indicates that the sustainability pavilion will be transformed into a children's science centre. District 2020 will feature a diverse selection of academic institutions, museums, and galleries. In addition, 135,000 square metres will be transformed into commercial space with flexible spaces ranging from hot desks and co-working spaces for small and medium enterprises into multi-building companies for large corporations. The 65,000 square metres will be for residential use, another 45,900 square metres will serve as parkland and 10 kilometres will be set aside for cycling tracks (Morgan 2017). The location of the site will encourage people to live in this area which is located in between four major highways, neighbouring Al Maktoum International Airport and is close to the upcoming Star Mall project.

The District2020 legacy plan of Expo2020 will include walkways and biking paths to invite people to be mobile and explore the city on foot or by bicycle. The telecommunication infrastructure will include smart services that embrace the latest available technologies, which will enable both a seamless virtual and physical experience. The dedicated metro station will be part of Route 2020 for Dubai Metro line with a promise to have the transition as soon as the world's fair draws to a close. Al Wasl Plaza will hold shows and concerts while also providing a relaxing space for people. District2020 is scheduled to commence on 11 April 2021 right after the

completion of Expo2020 as indicated by District2020 (2017). Morgan (2017) indicates that District2020 will reuse 80% of the Expo2020's site infrastructure through Dubai's legacy strategy; also worthy of note is that all these buildings will meet or exceed Leadership in Energy and Environmental Design (LEED) Gold standards (an international prestigious certificate for green building).

Al Hashimy (2016) explained how the site will be a lasting legacy of the importance of sustainability through the intended design of the venue and the commitment to use 50% of renewable energy on the Expo site over the period of operation. The role of volunteers in the success of Expo2020 is vital and will help to reflect the vast diversity of the community as well as spreading the globalisation cultures throughout the seven Emirates. Al Hashimy (2016) indicated that Expo2020 will seek to facilitate major opportunities for the young and for small and medium size enterprises, and is quoted as saying that "the idea of partnership is at the very heart of Expo2020 Dubai." Al Hashimy's final point was in believing that innovation and progress are the results of people coming together. Expo2020 will targets to create opportunities to generate significant value for the UAE.

5.8 Reflection on the Legacy Plan

The legacy considerations in Expo2020 reflect how far Dubai is planned to extend sustainable benefits well beyond the value of hosting the mega-event as an event. The Expo2020 is embedded within the total development plan of the city and many mega-projects are under construction. Those mega-projects are scattered over many sectors and include road infrastructure, residential buildings, airports, new communities, metro, and much more. Crossing next to the project site of Expo2020 was a repetitive

experience to see the impact that this project will have. As a professional person working in the construction field and having a research background, the study found that the construction site is similar to many other construction sites that are happening currently or that have been completed many years ago. Over time, the UAE has witnessed many mega-projects that were executed within limited time frames and budgets.

District2020 is a reflection of how Dubai is attempting to balance sustainability with legacy; in as much as Dubai's leadership wants to build this project in a sustainable way the legacy considerations are what really drive the current motive of building venues that will remain long after the event. The sales of the units inside the project are ongoing and those who have purchased them expect to take ownership of their units immediately after the event. Dubai public and private sectors are continually accumulating experience in planning, marketing, constructing, and delivering mega-projects. The rapid increase in the residents' numbers in Dubai over the past 30 years was mentioned earlier. Dubai is including this mega-event project within the portfolios of many mega-events and, despite the slow-down in the finance of many construction projects, Dubai is dealing with this mega-event as it did with many other mega-projects and it is planned to develop the economy in the same way they have done many times before. From this, the author is elaborating on the idea of awarding mega-events to cities or countries similar to what Dubai has in place: an overall development plan where the mega-event can be inserted within the portfolios of many other projects. The findings propose that the best way to ensure the capacity of the hosting destination to host the mega-event without damaging the existing business model or using the mega-event to attract investment and boost development is that any country or city bidding for a mega-event should have an ongoing development plan with a secured budget for

at least four times the cost of hosting the event. By having such financial resources, the risk of hosting the mega-event will eventually reduced and the project will be completed within the existing development plan.

The event also plays the role as a catalyst of change, particularly in the voluntary sector of the communities. Through the interviews and the secondary data, the culture of volunteering was initially not a common cultural behaviour for the Emiratis society where government used to hire people for different society jobs like crowds management or event attenders; however, the mega-event is bringing this to life and encouraging it in a conservatives Muslim soceity. However, many other important changes are happening in the society which the study did not been able to link directly to the hosting of the mega-event; these include electrical cars, solar power generation, construction regulation, public transport, and development or air and sea transport. In the following the author presents three case studies for the *construction, utilities*, and *transport* under the theme of sustainability practices of Expo2020 and tests how tangible and intangible legacies of the mega-event happen compared to what is being spent on sustainability.

5.9 Case Selection

Expo2020 case was selected based on the relevance to the research objectives as the study identified three main cases which are most affected by the hosting of the mega-event. Those three cases explore differences within and between the sectors and replicate the findings across the cases (Baxter & Jack 2008). The number of the cases was decided based on the theoretical framework, purposes, questions and theoretical propositions of the research as Yin (2017) indicated that these elements are what set the boundaries of case selection. The criteria of the case selection were based on sectors

that (i) will be affected by the hosting of Expo2020, (ii) will make direct contribution to the success of the event, and (iii) will have the heaviest investment in order to serve the event.

	Case 1	Case 2	Case 3
Title	Construction	Utilities	Transport
Scope	Core	Core	Support
Time line	7-17 years	5-9 years	2-25 years
Budgets	AED126 bn	AED 30 bn	AED 135 bn
Sectors	5	3	8

Table 5.3: A summary of the selected cases

Yin (2014) proposed that the selected cases should give a deep understanding of the topic under investigation in a real-life context which worked hard to achieve. The investigation of these three case studies allow to identify what constitutes the role of hosting a mega-event over these sectors and find the impact of hosting a mega-event for the first time under a strong commitment to sustainability. As the three sectors are going to leave a strong legacy, the study has the opportunity to test sustainability and legacy in Expo2020 in depth and contribute to existing knowledge in hosting mega-events through the extensive case study of Dubai. Each case study has many semi-structured interviews, documentary reviews and observations. The role of secondary data was vital in this case study and many findings were built on the secondary data and confirmed through primary data. All of the interviews were conducted with key people who are directly involved in Expo2020 or contributing to it. The challenges of completing this research before the mega-event is completed is another point to consider and will be explained in the results.

5.10 Impact of Vision 2015 on the Three Case Studies

In the narrative of the Expo2020 case study, the study endeavours to present the

situation of Dubai and the UAE through the development plan and sustainability, and assess how Dubai was progressing with or without the mega-event. A significant point in this development plan was the Dubai Strategic Vision2015 announced on the 3rd February 2007, almost five years before Dubai secured Expo2020 and three years before bidding for the event. The decision-makers in the UAE understand that this will require the implementation of international standards and best practices in the details of the residents' lives, work, institutions, and society. H.H. Sheikh Mohammed announced this vision under the theme 'Dubai… where the future begins'. This Vision was a re-envisioning of the Vision 2010 plan as Sheikh Mohammed stated that in 2005 'we achieved the plan set for 2010' and Vision 2015 was a revision of Vision 2010 by following the same logic and taking into account the global financial crisis. H.H. Sheikh Mohammed said:

> "In 2000, the plan was to increase GDP to \$30 billion by 2010. This figure was exceeded in 2005, with GDP reaching \$37 billion. The plan also included an increase of income per capita to \$23,000 by the year 2010. In 2005 the average income per capita reached \$31,000. In other words, in five years we exceeded the economic targets that were originally planned for a 10-year period."

Vision 2015 included many initiatives in order to ensure sustainable development of the infrastructure and environment sectors. The plan sets out four strategic objectives:

1- *Sustainable Urban Development*: The construction sector in the UAE is the spine of the development of the country. The plan calls for a strategic urban planning that optimises the use of the land in order to preserve the natural resources while developing. This involves comprehensive and integrated planning of the elements of urban development. In addition, this planning promotes the policies for providing affordable houses for the local Emiratis,

ensures public services and facilities for growth, and plans to upgrade and ensure enforcement of the existing labour housing policies.

2- *Sustainable Energy, Electricity, and Water supply*: The strategic plan aims to develop an innovative framework to integrate policy, secure a sustainable supply, and implement initiatives in order to manage the demand.

3- *Sustainable Transport*: The Vision aims to provide an integrated road and transportation system that helps people and goods movements while improving the safety levels for all the system users. In order to achieve that, the Vision aims to address the congestion problems, accommodate future needs, increase the share of public transport, implement initiatives to reduce private vehicles, increase road capacity and road network systems, manage the demand, consolidate accident and emergency management, and improve drivers' behaviour.

4- *Sustainable Environment*: The Vision set environmental targets that aim to ensure a safe and clean environment which involves aligning environmental regulations with international standards, developing and applying the enforcement mechanisms, integrating environment-related issues with the development policies and programmes, and raise the environmental awareness level.

The following three case studies cover those sectors and test how they are improving based on the current situation of the Expo2020 and how this Vision that had another revision for Vision2021 was completed. By considering the two visions, the study aims to present the role of the leadership and sustainable development plans in hosting sustainable mega-event, and the importance of applying the legacy plan of Expo2020 which presents a significant aspect from the development plan of the city. In addition,

this thesis aims to present the balance between sustainability and legacy in any mega-event and discuss the rationale of recommending a revision for the pre-requisition to be fulfilled before event owner allow certain cities to bid for a mega-event.

5.11 Case Study One: Construction

5.11.1 Case Narrative

The construction sector in the UAE was described previously in this research as the spine of the economy. This sector is interrelated with the three pillars of sustainability. A senior projects director for a large contracting company described this sector as follows:

> The construction sector is feeding the economy of the UAE for many years. We are living in a large construction site called Dubai. I am doing my job since more than 20 years and moving from one job to another. No doubt that this sector developed a lot in terms of professionalism, quality, and speed. However, the most significant achievement in this sector will remain the trend toward being sustainable. We change many construction methodologies in the last ten years, and we keep doing so every time the market requirements improve toward more sustainable practices (Participant 25).

The objective of the construction sector is to provide a reliable, efficient and sustainable sector that can supply the UAE with the required facilities like infrastructure, hotels, buildings, villas, offices, and public transport to internationally accepted standards. Expo2020 construction site and services building is part of the construction process to host this event. The application of the latest green design requirements was followed. Staples (2018) reported that the 'Sustainability Pavilion', one of the main buildings in the Expo2020 site, is designed to generate 22,000 litres of water per day, and 4GWH of electricity per year which exceeds the building requirement to operate. In addition to that, Expo management aimed to ensure that all

the permanent buildings at the site would receive a LEED (Leadership in Energy and Environmental Design developed by the United States Green Building Council) Gold Standards. In the legacy phase, this specific building is going to be recycled as a centre for science and for children. The design of this pavilion aimed to achieve LEED platinum; therefore, the bidding contractors for this pavilion were given a set of sustainable strategies that their bids must adhere to. Ahmad Al-Khatib, the Exp2020 Dubai's Vice-president of Real Estate and Delivery said, 'Our legacy for sustainability, preparing for that legacy started from the day we won the Expo…. At least 50% of all the site's energy is coming from renewable sources'. Al-Khatib added,

> Since that announcement I have been personally approached by a lot of other organizations across the country wanting to meet to see how we are doing this so they can adopt the same approach in building roads and parking spaces.

In addition, the Emirates News Agency (WAM) reported that Dubai received a platinum rating in LEED for cities in 2018, which made Dubai the first city in the Arab world to be awarded with this prestigious certification. Sheikh Hamdan, the Crown Prince of Dubai and the Chairman of Dubai Executive Council, expressed happiness that Dubai received this certificate and gave his assurance that Dubai aims to consolidate its positions as a global hub for sustainable development.

The selection of the construction sector for an in-depth analysis to explore the role of construction practices in building a strong legacy and achieving sustainability. In order to find so, a system to identify the construction practices over the sector in the UAE in general was generated, not only in the Expo site. The rationale for this comes from the fact that the construction site of Expo2020 is under the spotlight and sustainability practices are expected. However, if those practices are not adopted in other projects or if sustainability requirements are not followed within minimum acceptable requirements, the overall sustainability of the UAE will not be achieved. Further, the

long-lasting impact of the legacy plan has to be the inspiration of the current construction sector as much as it inspires and serves the future generations. Through this, the study provides a list of recommendations in order to create a proactive framework for hosting sustainable mega-events that future hosts may apply. There is little doubt that Dubai public and private sectors have learned from previous mega-events, particularly from the impact of the pressure of deadlines. To address this, the site is going to be ready well before the event's opening in 2020 as the real estate and development team briefed HH Sheikh Mohammed Bin Rashid during his visit to the site on 3 December 2018, reported by Wam (2018).

Dubai extended the development of the 4.38 square kilometres site of District2020 into a more comprehensive national development of Dubai South and linked this new mega-development via the extension of Dubai Metro and four major UAE highways. By doing so, Dubai is planning to transform this area into a new national business facility and a new Dubai Exhibition Centre. In 2018, the workers on site exceeded 15,000 and logged in over 16 million hours of work; however, at the peak the construction workers are expected to be around 35,000 as reported by Badam (2018). Dubai is executing this mega-project based on the same model as any other mega-projects completed earlier. This point of view was consistently agreed with by many projects managers over different construction sites outside the Expo site. The construction case contributed productively and meaningfully to answering the research questions and assessing the objectives through the four research propositions. However, for the first proposition, the study proposed two critical success factors for sustainability as advised by many participants. The two success factors that assisted Expo2020 with being sustainable and building a strong legacy are 'design' and 'leadership'. A further explanation is provided in the case study below.

5.11.2 Interview, Document Review, and Observation Results

The results present the interpretations of interviews, documents review, and observation in the following section. The report of the findings is structured around sustainability pillars over the project lifecycle, legacy considerations, and changes in the construction methodology, finding the sectors where sustainability is lacking, and spreading the sustainability awareness to the community. Those aspects were discussed earlier in the literature review through previous mega-events.

The sample in the construction case includes five projects managers in different projects across Dubai, one key person from the construction team in the Expo2020 site team, the Head of Sustainability Operations Real Estate and Delivery in Expo2020, the Construction Manager at one pavilion, the Head of Design Management at Masdar city, the general manager of Shames Power Company, one team member from the Legacy team in the sustainability pavilion in Expo2020, one team member from the Legacy department in Youth Team for Expo2020, Fiona Pelham, and Mr. Ruari Maybank. All gave their understanding of how the construction sector has developed since Expo2020 started along with the sustainability and legacy considerations. Some of those interviews' data were used in more than one case study.

The role of the secondary data in the sustainability in construction was equally as important as the primary data because the case is a contemporary event. The secondary data were beneficial and gave much useful information, and broadened the view of the researcher because the accessibility to further the number of Expo2020 construction team who were interviewed was limited. Those data are collected from the newspapers, press releases, and content from the different entities' internal and external documents

releases, from the research on the companies' websites, from the documents presented in different exhibitions, and from the documents collected from the Expo site.

5.11.2.1 Sustainability Pillars in Construction

The interviews with the project managers had many similarities and words frequencies. When asked for the sustainability definition in construction, many of the responses included the common three pillars; however, during the conversation, several projects managers consistently referred to two success factors that play a critical role in achieving sustainability, Design and Leadership. Below Figure 5.3 is a screenshot from the word frequency criteria using NVivo

Word	Length	Count	Weighted Percentage ⌄
expo	4	300	1.15%
dubai	5	291	1.12%
sustainability	14	290	1.11%
design	6	243	0.93%
sustainable	11	215	0.83%
project	7	198	0.76%
energy	6	185	0.71%
event	5	182	0.70%
one	3	178	0.68%
legacy	6	171	0.66%
leadership	10	170	0.65%
people	6	166	0.64%
now	3	147	0.56%
well	4	146	0.56%
uae	3	142	0.55%
2020	4	137	0.53%
different	9	126	0.48%
think	5	120	0.46%
development	11	117	0.45%
way	3	115	0.44%

Figure 5.3: Word Frequency Criteria from the construction case study

The interview with Participant 8, Director in a large architect firm and former utilities project sponsor for the Olympic Delivery Authority ODA in London OG2012 was remarkable. The literature review on the sustainability and legacy practices in OG2012 was carried out and the lessons learned from this mega-event. However, from his position and presence in the event and his current job in the Middle East, Participant 8 highlighted many similarities and differences between the UK and Dubai. Participant 8 said that sustainability gained its importance in both countries as "the aspects of sustainability which has been developed come out of necessity for decades not only in the environment but also for sustainable community and sustainable organization and culture." Holding a senior position in one leading international architect's firm, Participant 8 declared that sustainable design and planning is the crucial element to achieve sustainability. In addition, he emphasised the role of government in setting a chain of approval for construction that considers sustainability. In the UK, the approval process is as follows: "Building Regulation 2006B" has to mandate a requirement to produce a report with environment impact aspects before allowing the construction of any facilities; then the mayor of London has to get the approval of the London Development Agency (LDO). London is further divided into several different boroughs each of which has a mayor. Participant 8 indicates that the driver of sustainability is the leadership of the country and the city, governance of sustainability and design considerations, along with the UK community, which will not accept an unsustainable project. However, balancing between what you build for a mega-event and what you build with legacy considerations remain vital for a successful mega-event. Participant 8 indicated that a proper legacy plan has to be set in the design to produce infrastructure for the next 30 years with a commercial return on investment set carefully with the

market interest, boundaries of investment and commercial viability, rules and regulation and the sustainability objectives. A fair criticism received by a peer review on the above indicated that interviewing senior engineers on construction projects will always lead to a discussion about designs and leadership.

5.11.2.2 Legacy Considerations

The project life cycle implications for the legacy considerations were remarkable. Dubai South, a new city located between the Expo2020 site and Al Maktoum international airport is a reflection of the capability of Dubai in constructing sustainable communities. However, Participant 16 indicated that one of the most remarkable expected legacies for the Expo2020 will be the 'Volunteering spirit.' Expo2020 was targeting to involve 30,000 volunteers to cover 16 million volunteering hours across 173 days in welcoming the world. However, the head of volunteering in Expo2020, Abeer Al Hosani, stated to Arabian Business on 8 March 2019 (Bridge 2019) that

> The fact that we have already reached 50,000 registrations shows how eager the people of the UAE are to give back to their communities and participate in this global event. As the face of Expo2020 Dubai, volunteers will play an essential role in welcoming the world to the UAE for our region's first ever World Expo.

The terms 'legacy' and 'sustainability' in mega-events was considered in the last three year and generated a consensus that legacy has multiple pillars like sustainability. As much as sustainability has social pillars, legacy also has social pillar. Therefore, failure to use the potential of mega-events in generating legacy in the social pillars, the hosting city will be losing a major potential out of those events. In line with this, Participant 8 indicated the following:

> The legacy value combined is part of sustainable communities for what will

> be built and left after the event… the legacy and sustainability have a cross over in several places, having a green, lean and mean construction is very important in achieving both… However, for public sustainability it is about reducing CO_2 while you and I know that sustainability is more about sustainable communities, but in order to be more meaningful in communicating with the public and press, the legacy is much easier to talk about in terms of tangible construction.

Participants 8, 9 and 12 share this view about the overlaying meaning and mission for sustainability and legacy. A major part in achieving sustainability over the project life cycle will be to have a set legacy plan that will remain for 30 years by building what the future generation will require in this period and within the boundaries of the existing resources. Secondary data played a significant role in emphasising the role of the Expo2020 plan in creating a long-lasting legacy for the Expo site under the name of district2020.ae. This website was continuously updating how the companies are taking part in the future legacy plan and how the plan is encountered in the design of Expo2020. Participant 14 is the Head of Sustainability Operations Real Estate and Delivery in Expo2020 and explained that the site team is using the events that happened in the last 20 years as a benchmark, with a specific focus on Millan Expo2015 and London OG2012. She said,

> We do not want to repeat mistakes that commonly happen in mega-events and we are looking forward to host a unique event. We have many people coming from those events working with us. We are using the experience gained in those events in order to get benefits from the best practices applied yet still use the lessons learned from those events to enhance our event…. Dubai is a good place for the expatriates to come and live and this is helping us in getting talents who worked in previous mega-events and employ their experience to enhance our event.

Legacy considerations in the mega-event were presented earlier through Iraldo et al. (2015). Conditions include taking legacy and sustainability into consideration at the very beginning of the process, integrating the process into ordinary governance, stakeholder involvement, raising awareness, setting performance monitoring systems

during the ELC, and creating sustainability and legacy ambassadors. Those points were investigated and codes from each interview are presented in Table 5.4.

Table 5.4: Legacy considerations in the construction case study of each participant

Participant	Legacy Considerations
1	Thinking about creating legacy more than thinking about spreading profit share for the company shareholders. I am looking for the stakeholders' benefits more than the shareholders only.
2	Inspired by a vision that Expo2020 will continue to foster innovation and create meaningful partnership beyond Expo2020 not only for the UAE, but for the region. Stakeholder involvement in sustainability plan may remain the most precious legacy after the completion of the event.
3	We want to deliver an Expo that will amaze the world while leaving a meaningful and impactful legacy inspired by the highs and lows of previous events. As much as we want to deliver a successful mega-event, we want to create a thriving community for decades to come. The Expo site will be transferred at the legacy stage into a relaxed, campus-style business community that present a destination for the multinational corporations to join with local technology pioneers. District2020 will have a combination of offices, retails, residential and leisure developments equipped by the latest technology for years to come. We are looking for the Expo2010 role in transforming Shanghai into an international business and tourism hub, acting as catalyst of change through the public transport system, roads and massive infrastructure.
4	We want to build utilities based on proper design that will achieve legacy yet create legacy for years to come after Expo.
5	The legacy plan for Expo2020 should look like Dubai: Fast, charming and have nothing impossible.

8	Designing an Event with a legacy plan will require a plan for the building legacy and the construction to adhere to for the surrounding communities, as we are digging to set new electricity or sewage lines, we don't want to do the same after 10 years.

Legacy should have multiple layers: first deliver an exceptional event while the world is watching; second, deliver the event in a sustainable way, have an excellent safety record, provide an inclusive event, complete the legacy plan you designed ahead of the event, and most importantly engage your stakeholders in your legacy plan. |
| 14 | Legacy is a concept to help us avoid wasting resources by building what we don't use, we are looking to transform this site into a city. Without giving equal importance to the three pillars of sustainability, we will not be able to do so.

Expo is one of the catalysts that will help us to meet the ambitious target of reducing carbon emissions.

Leaders of the UAE understand the definition of sustainability in the Brundtland report. We don't want to take away the chance from the future generation because our current generation wasn't wise in consuming the UAE resources.

In the construction of Expo2020, we are building for the future and borrow it for the six months of the event. For this I told you that legacy and sustainability are one thing. |
| 16 | Legacy is about designing a project that will be commercially viable for the present and the future. It should have the capability to be resized based on the situation. |
| 17 | Our projects are commercially feasible with and without a mega-event. Creating a long-lasting legacy of a mega-event starts from building what you really need. |
| 23 | The leadership in the project learned from previous events' mistakes in letting the time pressure of the project lead into unsustainable acts. Expo2020 is going to be handed over one year ahead of the event. We have no excuse for any unsustainable acts.

As the UAE market is into sustainability for more than 10 years, it's much easier to get those resources, including human resources, without paying high premium for this; this is an accumulation legacy that Expo2020 will emphasise. |

5.11.2.3 Green Construction

Through the analysis of the interviews, observation, documents' reviews like minutes of meetings, staff emails, published documents, and reports, it was noticed that the development of sustainability considerations in the UAE construction sector were still missing the 'spirit of accountability' to be shared by different layers of stakeholders. Participant 19 said the following:

> Most of my workers are coming from Asia without proper training on sustainability. I witness some carpenter cut a full-length plywood sheet to cover a small part of the slab. The education level of those workers will not allow them to have this spirit of accountability. I am giving extensive seminars for the staff yet with the high turnover level, I am not confident that they share the same vision of top management.

In relation to improved sustainability performance, most of the participants in the construction field shared that the impact of Dubai Municipality's updates in regulation was vital in achieving better sustainability considerations. The chain of construction approvals has to go for 'Green Building' approval on the design ahead of the construction. This approval will set out the specific materials that will be used in construction, and how those materials will perform together in order to achieve the requirement of the green building. The Dubai Municipality set those rules as an enhancement for the previous construction codes and the revised codes of the Green Building Council. During the researcher's observation in five mega-construction sites in Dubai other than Expo2020, most of the engineers, even the junior ones, are aware of those regulations and how important they are to achieve if the project is to succeed. Many of them stated that without those rules, the kick-off of the site was not possible. Even so, they agreed that the delivery of the project would not be possible without civil defense approval on the safety requirements of the building and proof that the construction obeys the green building requirements.

5.11.2.4 Sustainable Design

The practices and regulations that were repeated by the participants and collected from the secondary data in how Dubai regularised the construction sector through Dubai Strategic Plan 2015 was classified. This plan aimed to make the green building practices mandatory in order to adapt the best environment-friendly international standards, to keep Dubai as a lively city, to maintain a sustainable development process, and to achieve a clean pollution-free environment. Those practices and regulation are categorised as follow:

- Resource Effectiveness: Energy

- Resource Effectiveness: Water

- Accessibility and Indoor Environmental Quality

- Ecology and Planning

- Management

- Transport

- Pollution

- Waste Management

- Construction Materials

Dubai's leadership aims to create and maintain buildings that perform highly in the challenging environment of the GCC. The discussion on water and energy resource effectiveness and transportation are going to be kept for the second and third case studies. By having a vision to enhance public health and enhance the urban planning to be more sustainable, Dubai adopted those rules in order to create an excellent city that provides high standards of success and sustainable supply for the needs of the existing population and future generations.

Accessibility and Indoor Environmental Quality

In all of the construction sites visited before and during the study, he observed that those buildings and facilities respect the rights of Special Needs users in accessing and engaging with the building functions. This right is protected through administrative resolution No. 125-2001. Participant 19 alerted about many other important indoor environmental qualities that each building should have:

> Sustainable design should take into consideration the accessibility of the buildings for the wheelchairs, designated car parking reserved for people with special needs, bicycle accessibility and storage zone, mobility inside the building through suitable-sized passenger lifts, entrance ramps, automatic door openings, and shaded and safe areas for the pedestrian. In addition, designers should consider the building direction, air ventilation, façade percentage, natural daylight penetration, light fixtures and automatic controls. We always target to have a daylight factor of at least 1% for all occupied spaces which will improve health and comfort in the building. In our design we also want to limit the unified glare rating and have light sources with appropriate colour rending indices. We want 60% of the net area to have a direct line of sight through glazed windows and the distance to any workspace from the nearest window to be less than 8 metres in distance.

The study discussed many other indoor environmental-conforming design criteria with other participants and came across subjects like the fresh air supply in the ventilated or air-conditioned spaces. The social pillar of sustainability is respected in most of the designs. Three participants agreed that the best rate is to have 12 litres per person per second if smoking is banned. In case smoking is permitted, the fresh air supply rate should be 32 litres per person per second. The participants also agreed that many new requirements applied in the last few years include building compliance with volatile organic compound (VOC) which was defined by the green building regulation to be below 300 micrograms/ mt^2, the formaldehyde to be below 0.08 parts per million, and the suspended particulates to be below 150 micrograms/ mt^2. Those requirements have to be achieved and tested through a certified air testing company accredited by the Dubai Municipality before occupation of the building. In addition, it is common in all the buildings in Dubai to pay service charges for maintenance of common areas and security. Those companies are setting inspection programmes for all types of

machinery which reduces the cost of energy operation and increases the lifetime of the machinery. The green building regulation targets a thermal comfort level of temperature to be between 22.5 and 25.5 degrees Celsius while humidity is to be between 30% and 60%. All the contractors should ensure that the heating, ventilation, and air conditions system (HVAC) should be able to achieve the above figures for at least 95% per year. By this, the Dubai construction practices are respecting the social pillar of sustainability, being economically viable and still respect the environmental targets in reducing the carbon footprint. Four different participants assured that they plan to have an HVAC system to exceed the requirements and keep one unit in standby mode in case of the failure of any unit. District cooling, introduced by many participants as the latest technology in centralised production and distribution of cooling energy, is a fast-growing industry in the UAE that can replace any air conditioning system and benefit from the economy of scale. Expo2020 will be cooled based on the district cooling plant.

Expo2020 is designed to be a pedestrian-friendly zone as confirmed by Mr. Ahmed Al Khatib who declared that the Master Plan was changed 24 times in order to improve the accessibility. The planners mapped the arrival gates and entrances to the Expo without the need for motorised vehicles inside the site. Mr. Ahmed's statement to *The National* as reported by Badam (2017) follows:

> For the whole expo there will be no cars, it's all pedestrianised area. It will be very easily accessible to everything. We have studied the whole expo site very well, we studied the walking distances, the shading, accessibility for different type of users. Not only that; we looked at it from the children's perspective and for the elderly as well.

Further details on the accessibility through transport means is discussed in the case study two.

Ecology and Planning

It is widely observed that most of the villas in Dubai have palm trees. The study found that this is a regulation from the Government of Dubai that 25% of the planted area of a building or villa should utilise plants and trees that can adapt to Dubai's climate. Specifically, villas have to have at least one palm tree. During his interview, Participant 15, Mr. Nasser Al Shaiba – Director of the Dubai Supreme Council of Energy for HSEQ & Climate Change – supplied a study about the right plants and trees that should be planted in the UAE. This study is based on ranking the trees, shrubs, ground covers, succulents, climbers and vines based on each one's tolerance of drought, salinity and wind along with how much those plants will require water and light. Plants like Leptadenia, Date Palm, Ghaf, Athel tree, Yucca, Chinese Jujuba, and Zygophyllum are the best plants for the Dubai environment. Those plants can resist drought, grow in high-salinity soil, resist wind and strong light, and still have a low water requirement. The observation of the massive farms of date palm and ghaf, and along most of the major highways was significant, the UAE has a strategy to plant a forest belt around the roads to stop sand movements and increase road safety.

Expo 2020 site took the above into consideration in the design and planning stage for the event. Currently local plants like date palms are being tended to in an on-site nursery in which there are 13,000 mature trees and 300,000 shrubs as confirmed by Ahmed al Khatib to *The National* in 18 October 2018 (Badam 2018)

> We have tried as much as possible to make our landscaping unique by using a lot of local plants… we built our nursery on site to make sure the plants are mature and healthy by the time of the event. Having a nursery on site helps because the plants have already adapted to the area and have acclimatised.

Expo2020 site is designed to have 45,000 mt^2 of green areas which will help the environment to reduce the temperature.

Management

Four participants stated that handing over a building in Dubai after completion is challenging as many entities have to ensure that multiple subjects area addressed. Dubai Civil Defence and Dubai Municipality have to check the building during and after completion to ensure safety requirements, fire fighting and evacuation systems are up to the best international practices and that the construction is done as per the approved plan. However, before Expo2020, many criticisms through the western press were raised against the UAE for the workers' welfare and the working conditions which were fairly described by three participants as 'not up to the western expectations.'

Dubai Expo2020 site is at present one of the largest construction projects in the country. With 190 countries that have confirmed their participation in the event, thousands of workers (40,000 workers during peak construction) are building the structure for the 4.38 km2 site that will be transformed into District 2020. The welfare of the worker in Expo2020 Dubai is described by Emma Seymour, the vice president of worker's welfare as the "number one priority". She published the following statement in *Construction Week* on 11 February 2019:

> We all deserve to live and work in a safe and healthy environment, which is why Expo2020 Dubai, with the support of governmental and construction partners, is committed to advancing worker welfare and health, safety, quality, and environment (HSQE) standards for everyone involved in the next World Expo.

Seymour compared the expected work hours on Expo2020 to OG2012 and found that Expo2020 will have 50 million more working hours. In total, the working hours will be around 130 million with 10 main contractors and 200 sub-contractors to make the site ready to accommodate 25 million visitors between October 2020 and April 2021. Expo2020 gained the commitment from all the stakeholders to share core values of 'care, respect, and pride'. Seymour described the Expo2020 Dubai ecosystem as a

worker welfare team that regularly monitors and audits contractors working on the Expo2020 site for the worker's welfare.

The management system to achieve workers' welfare started from the bidding stage where companies bidding for a contract at Expo 2020 have to complete a questionnaire about the worker's welfare practices and agree to be audited in this regard. After awarding and before the contractor starts work on the site, another audit will take place within three months ahead in order to ensure that standards are maintained. If not, the contracts will not remain valid.

For the management of the sustainability commitments, Expo2020 appointed consultants to monitor sustainability goals and achievements and reporting the results globally in order to ensure honestly that the commitments are achieved.

Many other construction sites applying health and safety requirements were visited. During his visits to the construction sites, all the workers were wearing safety helmets, shoes, and safety jackets. Fences to keep the site isolated from the surrounding area protected all the construction sites. To access any construction site, a visitor needs to report to the security gate about their visit to the site and who they are going to meet. A full safety kit was purchased and kept it in the car before any site visit as entering a construction site without safety gear is prohibited. In a few sites, the site people directed visitors to a safety induction session before accessing the site. Those safety inductions included rules on how to act on site, where to walk, what to do in case of fire and to ensure that you fulfilling your safety requirements. The study considers those activities as part of achieving the social pillar of sustainability by ensuring the health and safety of the construction site stakeholders. Participant 20 told that an accident on site might cause severe project delay and several complications with the

authorities. He said,

> we need to avoid any injury for the benefit of everyone.

On the other side, technology in construction was well observed as well. The Building Information Modelling (BIM) process is an intelligent 3D model-based process which helps architecture, engineering, and construction (AEC professionals) to gain tools for a more efficient plan and design, to construct and manage buildings and infrastructure. BIM helps in producing a digital representation for the complete physical and functional characteristics of a built asset. This digital representation will include all the required information for construction, logistics, design, budgets, operations, maintenance, and schedules. The Dubai Municipality Circular (196) in 2013 and (207) in 2015 mandated the use of BIM for specific projects including any building above 20 floors, hospitals, universities, government projects, foreign offices and any construction above 200,000 ft^2. Four participants who are project managers in mega-constructions in the UAE confirmed that they are using this programme and it is vital for those projects. Participant 19 said:

> We can see the projects in terms of engineering, process, and time. We can coordinate the activities and create a manual for the building after completion. It helps us manage the construction process on actual timing and planning ahead for different activities. It is vital for after the completion stage. It has all the building details. BIM brought about a revolution in the construction process.

Participant 20 agreed on the role of BIM in changing the construction methods and the coordination between different activities in the real-time model.

> BIM is the new revolution in the construction process. The UAE is always ahead of everyone else in the region in adopting new technology. I believe that in a few years this is going to be mandatory. BIM helped us significantly to reduce the design errors, oversights, improve productivity, digitise the construction process, reduce construction costs, and ensure precise delivery times. Once we are behind the schedule, we can see in 4D how we can recoup this in the future. The fourth D is the time dimension.

Many approaches was made to the Expo2020 BIM leader's office without being able to secure an interview. However, as Expo2020 is using BIM, it reflects what type of construction process is being followed and how the contractors are ensuring that they can deliver the project on time without cost overruns. BIM will help project management to ensure that the buildings' systems are operating efficiently after handover and give the building a user guide for information like: building services information, emergency strategy, energy and environment strategy, water use, material used, waste policy, and fire plan.

Pollution

The study came across different types of pollution during this research. The air pollution consideration is standard; other terminologies used in Dubai include noise pollution, water pollution, architectural pollution, and night-time light pollution. In 2017, Dubai Municipality launched the Air Quality Strategy 2012-2017 with a budget of Dh500 million, aiming to make Dubai among the world's best air quality cities through different initiatives and air quality monitoring. This strategy aims to make the surrounding air of Dubai comply with the global specification and standards, and this will have an impact on the environmental and health fields and reduce the pollutants that adversely affect public health. On 20 October 2018, the Ministry of Climate Change and the Environment launched Station Number 42. Dr. Al Zeyoudi, the Minister, spoke to the *Gulf News:*

> In the UAE, air quality is a priority given the direct and indirect implications it can have on health, the economy, and the environment. The National Agenda of the UAE Vision 2021 outlines as one of its objectives the improvement of the air quality by 90% over current levels by 2021…. Air monitoring stations keep air pollution in check, mainly around urban areas that see far higher concentration levels of pollutants. The readings they provide play a vital role in making informed decisions to help the nation achieve its targets. We are confident we will see enhanced projects and initiatives that aim to cut down the levels of pollutants emitted into the air we

breathe.

Masdar city is a mixed-use development initiated in 2006 in the capital city Abu Dhabi,

designed to be a sustainable city and adopt the latest design technology. The leadership

of the UAE had long pushed to construct such a project. During the summer time, the

usual temperatures outside this city were above 45°C, while walking in the streets of

this city was comfortable and the open air was an acceptable temperature. By

interviewing the Masdar city stakeholder, it was possible to understand the role of the

design in creating such comfort. The British architectural firm Foster and Partners are

the designer of the city, and used the ancient cities' methods on the design. Masdar city

design includes cooling methods like using the traditional Arab wind tower model,

square shaped city, narrow and short roads along with shading and sustainable

materials. The Head of Design in Masdar city (Participant 11) said:

> When we started the project in 2008, the sustainability was a vogue word, we started
> the project concentrating very hard on doing everything very green and efficient in
> energy and still economically valuable; yet the main concern was to know to what
> extent we could be environmental sustainable. We were trying to push the limits on
> how much we can be sustainable, how much we can reduce construction waste, how
> much we can reduce water and energy. Our first building Masdar Institute construction
> was an evolutionary process yet expensive. With later buildings, like Siemens building,
> the design was taking more things into consideration. Siemens Building was able to
> get LEED platinum rating and still remains one of our most profitable buildings.

Participant 11 was looking at Expo2020 as an opportunity for the UAE to showcase

how a country with harsh environment can be sustainable. He was expecting that many

visitors to Expo2020 will come to see Masdar city and how it is designed. He also

believes that the UAE leaders are the main sponsors of the project as they believe that

sustainability is no longer an option – it is a must.

Further observation took place in other construction sites in Dubai and noticed many

sustainability practices. Dubai Green Building Regulation set rules against the isolation

of the pollutant sources by ensuring the installation of separate air extractions systems in order to create negative pressure and ensure that fumes or chemicals will not enter into the rooms. In many construction sites, it was observed fine water sprays in the site in order to control dust even with construction people wearing masks on their faces. It was common to drive on to a construction site behind a water tank spraying water slowly on the construction road to reduce dust. All those roads are surrounded by safety nets to guide the driver to the right places to drive on the construction site. It was informed by many participants that no burning of materials is allowed on site and each site has a waste treatment method.

Waste management

Many participants was asked about what they do with the construction waste; most of them reported they were sub-contracting this for companies that have license to do so. However, only few of them knew what those companies were doing with the waste. Expo2020 site differed from other construction sites in this point; the waste management was given significant consideration in this site. Participant 14 confirmed that by the end of 2017, the Expo2020 construction site diverted more than 370,000 tons of constructed waste generated through the construction process from landfill to Dubai Municipality and Bee'ah (Sharjah-based company) in order to recycle the construction materials. In addition, the car parking of Expo2020 has more than 30,000 car parking spaces. Participant 14 said,

> Constructing a large car park in conventional ways has an environmental impact. In Expo2020 we are in partnership with Dubai Municipality to have the surface of the car park made from recycled tyres. By Doing so, we will be able to use recyclable materials sourced by Dubai Municipality, reduce the environmental impact of this construction, and inspire other developer to follow this sustainable construction method for the future projects. This is how Expo2020 is being a catalyst of change and not only a showcase of sustainability practices.

Furthermore, the current waste is being used in the landfill; this observation was possible by finding the location of the landfill site However, Dubai currently has a plan to divert 50% of the waste going to landfills into waste segregation plants that are being built in Al Bayada and Al Gusais. These plants started operations in 2018 according to Saseendran (2018), who reported that the plants have contracts for selling recyclables inside and outside the country. The two plants together will have the processing capacity of between 3,000 and 5,000 tonnes of domestic waste daily. By 2021 Dubai aims to divert more than 50% of the waste that would normally go to landfill sites to the waste segregation plants. The balance of the waste will be used in another plant that is being developed under the technology of waste-to-energy plants called 'Wastenizer.' The project will have the capacity to treat 5,000 tonnes of solid waste, which will generate 185 MW of electricity through innovative, effective self-ignition catalyst e-stones driven by renewable energy. By having three plants in operation, Dubai will be able to divert 75% of total waste from landfills within the next 3 years into those two types of waste treatments. However, it is important to state that Dubai plans to steer 100% of the city's waste away from landfills by 2030. The driving power of this initiative comes from the leadership of Dubai through the vision of Sheikh Mohammad Bin Rashid, who launched the 10X project in order to place Dubai years ahead of the rest of the world. Abu Dhabi has a project under development called 'TAQA,' located near the Mussafah Sea Port, owned by Abu Dhabi National Energy Company that has a 100 MW facility which will help to reduce CO_2 emissions by more than one million tons per year. The third plant located in Warsan 2 is planned to be the largest in the Middle East and aims to protect the environment from methane emitted by landfills. Sharjah and Ras Al Khaimah also have plants in operation and under construction.

Construction Materials

The site visits observations led to understand the process of selecting construction materials. All the materials used on the construction site follow a specific approval process starting from submitting materials' safety data sheets, manufacturers' company profiles, materials' samples, and materials' mock-up. By following this process, many construction managers confirmed that they would control the quality of materials supplied to the site. Also, it was observed that there were completed apartments on a construction site, which the construction people stated is a benchmark for them. A benchmark is a flat being built on site to show the end-user how the contractor is going to deliver the final projects. It includes materials being used, the finishing quality and material relation on an actual scale. The materials have to be submitted to the consultant of the project and are approved by the leading developer of the project. The consultant usually provides a vendor list for each element. Those vendor lists have three favoured suppliers for a specific item. If the contractor wants to submit materials from suppliers not included in the vendor list, he has to submit a justification for the reason for doing so. Learned this process by asking participants 17, 18, 20 and 21 about how they ensured that the material being used coming from sustainable resources and was up to the required standards. Ahmed Al-Khatib spoke to the *Khaleej Times* on 21 January 21 (Abbas 2018), stating:

> Our Expo legacy is the rollout of new sustainability practices across the UAE. In terms of site-wise sustainably targets, we have focused on two main objectives – to protect natural resources through design and promote the use of sustainable materials in terms of environmental, social and economic impacts. We have sourced sustainable materials for contractors and consultants. We also look at importing materials from nearby locations to reduce carbon emissions.

The participants continuously reiterated the role of the design and material used in the overall sustainability practices, and reflected on some materials that were selected

because of the performance and not the only the way they look. One of the essential elements that participants highlighted was the role of walls, facades and roof in isolating the building from the surrounding areas. It was noticed that all the glass being used is a double glass panel. He asked participants 17 and 18 about this and they advised that this glass is coated through a semi-nuclear technology called sputter coating technology which uses the particles of several metals including silver to control the energy transfer through the glass. The aluminium being used as well was found to be thermally broken. By researching the meaning of this, it was observed that the aluminium profiles are high energy-transferring materials. In order to control this transfer, a piece of UPVC works as a bridge between the outer panes and the inner panes of the aluminium profiles in order to stop the energy transfer from outside to inside. The aluminium and glass materials work together to reduce the energy transfer to allow natural daylight and give a spacious feeling for the people living inside the building. The walls are made from external and internal walls separated by types of foam in order to reduce the energy transfer from outside to inside. The same methods are being applied for the roof. By having all those elements working together, the consultant of the job is preparing an 'energy model' for the building ahead of construction and is designing how those materials are going to perform in order to protect the inhabitants of the site in the future.

5.11.2.5 Into the construction in Dubai

Many large construction sites were visited during the period of the research. Based on the size and value of the projects, the following five construction sites were selected to be included in the research, the rationale of each site selection is listed below:

1- Expo2020: The highest contributor to the construction site responsible for the

sustainability of construction in Expo2020, which is the venue site itself. BNC network, a MENA-based project research and intelligence provider estimated the value of Expo2020 for projects related to the event to be Dh121 billion while Global consultancy EY's published report expected that hosting Expo2020 will contribute by Dh122.6 billion to the UAE economy and will support 900,000 full-time equivalent jobs. Najeeb Mohammed Al-Ali, the executive director of the Dubai Expo 2020 Bureau advised that the exact cost of direct and indirect investment in buildings, infrastructure and other assets of Expo would exceed Dh 40 Billion. Expo2020 is a massive construction site that is located in the south side of the city.

2- Meydan One: Mega-project that is based on developing a new commercial and residential area near to the centre of the city. The selection of this site is based on the value and size of the project which is estimated between Dh25 and Dh30 billion and the type of the development. It contains the construction of a massive mall, infrastructure, yet most importantly, many private developers whom are developing their projects within Dubai Municipality rules and regulations yet without the direction of Dubai leaders.

3- Dubai Creek Harbour: Another new city on the west side of Dubai. a large construction site by Emaar with overall costs of Dh20 billion includes a tower that is going to be the tallest tower in the world by beating the Burj Khalifa, the current tallest tower in the world. The project is going to be the home of 200,000 people. Emaar, the developer, was ranked among the world's top 10 most valuable real estate brands in 2018 according to Brand Financing rankings. The selection of this site represents a mix of development between the developing companies belong to the government, the private developers, a

new area that was similar to Expo2020 site before the event, and a project that is intended to be sustainable but does not have a direct impact from Expo2020.

4- Blue Waters Island: a large man-made island with a cost of Dh 8 billion that has the largest observation wheel developed by Meeras, another large property developer in the UAE. The selection of this site is based on the type of developer who is different from the one involved in Expo2020, it is a massive project and the construction project itself has multiple complications, but these are not similar to the complications inherent to the Expo2020 site.

5- Marsa Al Arab: a large development by Dubai Holding for the value of Dh 6 billion intended to be completed before Expo2020. This project is based on the legacy created over ten years ago with the current Burj al Arab development and Madinat Jumeirah Resort, a well-known place for entertainment, hospitality, retail, tourism and lifestyle. The location of the project is on Dubai's coast side and is being developed away from the Expo2020 site.

Despite the fact that Expo2020 site is currently the biggest in the region, it is not the only one. Dubai projects not related to Expo2020 are estimated to have more significant value than the Expo project itself. During a drive along al Khalil road, a road that crosses Dubai in between from the east to the south. It is easy to count more than 50 different construction sites including three malls, many towers, and villas. This construction boom benefited from hosting Expo2020 and use it as a catalyst for development. The investment in the infrastructure is the most visible investment of a government; once a government spends on infrastructure, it stimulates the economic cycle of the country and generates further business. However, it has been noticed that currently, Dubai's developers are not targeting the luxury properties only with many projects that are targeting medium-to-low housing costs. Dubai development

understands that to have sustainable growth, the different market sectors have to be targeted. Conversely, the UAE market is considered as a stable market with steady growth rates and government stability. Having this at hand means that the investors from around the world are competing in this market. However, the further competition puts pressure on the contractor's margin and made their projects more complicated.

5.11.3 Sustainability in Construction Checklist

Shi et al. (2012) proposed a checklist for promoting sustainability in the construction field at the programme level. The study went through this checklist and the responses and findings are as follows:

1- *Organisational responsibility used to achieve sustainable construction*: A dedicated sustainability team than one member being interviewed in this research confirm that the responsibility of this team is to ensure the best sustainability practices is being deployed in the Expo2020 construction site.

2- *Sustainable construction goals*: The Expo2020 construction site selected to set sustainability as a theme to support not only Expo2020 but also Dubai Plan 2021, the UAE Vision 2021, and United Nation's 2030 Agenda for Sustainable Development. In order to do so, the sustainability goals set a target to (i) Generate Clean Energy through renewable resources in addition to reducing overall consumption of energy. (ii) Reduce Water Consumption by using smart controls for metering and irrigation along with minimised the potable water consumption, employing an innovative system like converting moisture in the air into water, and using a cement and concrete remix that requires 7% less water consumption. (iii) Promoting Natural Solutions by having 75%

concourse shaded by green canopies containing mostly local and adaptive species. (iv) Minimise Carbon Footprint by adopting a mitigation strategy to offset greenhouse gases and encourage public transport initiatives which will continue to reduce the carbon footprint after the event. (v) Using Sustainable Building Materials by a strong emphasis on sustainable building materials and local materials in addition to retaining 80% of the permanent construction for the post Expo. (vi) Reducing Waste by diverting 85% of all waste from landfill to recycle, reuse, and repurpose.

3- *Land use plan*: The Expo2020 site is part of the Dubai 2020 Urban Masterplan set by Dubai Municipality that plans the growth trajectory of Dubai and determines how to use Dubai's land.

4- *Energy and water saving design, plans and operation*: The Expo2020 site is combining passive strategies with cutting-edge technologies and innovative solutions to reduce demands on energy, water, and materials. Najeeb al Ali, executive director of Dubai Expo2020 Bureau, gave an example about the smart building and smart grid technology that will be complemented by passive strategies to reduce the power consumption by 20%. Dubai Municipality and DEWA have a green energy and water strategy that will be discussed in the second case study.

5- *Guidelines for service design*: Expo2020 is being constructed using BIM as advised earlier. In addition to this, the site is going to be one of the most connected places on earth by adopting the 5G network support for Expo2020 and its legacy development name 'District 2020' with an edge over other mega-events as well as other significant developments.

6- *Guidelines for reuse of buildings and structures*: The Expo2020 legacy plan is

that the site is going to be transformed into District 2020. Further discussion on this point is carried out in the legacy chapter.

7- *Plan for sustainable transport*: The transport plan is going to be discussed in the third case study for this thesis.

8- *Construction waste management*: Expo2020 has a waste management plan for the construction process as advised earlier in this chapter. On 14 January 2019, Expo 2020 took a significant step towards its target of reducing the diverting of waste to landfill into below 85% by joining forces with Dulsco as reported by Bridge (2019). Dulsco will process waste from the event itself by using organic material composting solutions like turning food waste into fertilisers, diverting waste streams to create biofuels, and converting plastic into a variety of products. Dulsco is also evaluating the opportunity to use the waste-to-energy process, which will contribute to the legacy of Expo2020.

9- *Demolition plan to save energy, water, reuse of materials resulting from demolition and waste management*: It was not possible to obtain any information on this subject.

From the above checklist, we can see that the Expo2020 site has achieved most of the requirements needed to ensure a sustainable construction project. Expo2020 will achieve at least LEED Gold certification for all the permanent buildings and obtain ISO 20121 for sustainable event management. The chair of ISO 20121 Committee was interviewed, Participant 13 who advised that the difference between *sustainability* and *sustainable development* is the word, 'development'. It is how one develops and maintains the balance between the social, economy and environment pillars. In addition, Pelham advised that few researchers are considering the concept of business excellence once they talk about sustainability; she considers business excellence

practices as part of the sustainable development pillars. By doing so, the mega-event management should reach a place where they do not pay more to be sustainable; it is a matter of the business management process overall. Research observation and day to day life in Dubai, confirms that the government of Dubai is engaging in numerous projects and initiatives to achieve business excellence in the government entities, security, and citizens services.

5.11.4 Sustainability Awareness

Besides the finding of the sustainability practices and legacy considerations during the hosting of Expo2020, the study was examining the extent that the mega-event stakeholders are aware about the sustainability considerations, Table 5.5 below presents how participants ranked the importance of sustainability and legacy considerations when requested to rank them in the interviews.

Table 5.5: Sustainability and legacy awareness

Sustainability and Legacy Awareness in Construction	Importance		
	Low	Medium	High
Be economically viable	0	4	8
Be socially responsible	2	3	7
Be environmentally responsible	1	1	10
Create tangible legacy	1	2	9

Create intangible legacy	4	0	8
Leadership role	0	2	10
Design importance	0	2	10

The results show that most of the participants understand the sustainability pillars and proposed the role of leadership and design as important success factors to include in the study. They stated that these pillars should be added to future mega-events to consider as key considerations in order to achieve sustainable development. The participants also always reminded not to separate legacy and sustainability. Many of the participants were looking for the legacy as the outcome of the proper sustainability practices. Pehlham (Participant 13) said the following:

> Sustainability is about what you do every day; legacy is about what happens in the future because of what you are doing today. So if you are taking sustainable action today and if you are doing a project where 100 people plant trees or 50 people are educated… then in 2 years they will be trees and people doing something different. Legacy and sustainability are to be completely tightened and can't be moved. After the completion of London OG2012 by 5 years now, we're not talking about legacy anymore; we are talking about what will happen after this, as sustainability practices are implemented.

The study at this point confirms that the leadership of Expo2020 has an understanding about the importance of sustainability in mega-events and wants this event to be a showcase of the UAE's sustainability considerations as an international player that makes a contribution to the overall plan by hosting a mega-event designed properly to be sustainable.

5.11.5 Conclusion to Construction Case study

The study was able to review the sustainability and legacy considerations of the Expo2020 through different resources and methods, despite the fact that this is a piece of contemporary research that is happening for the first time in the MENA region and most of the participants are busy with the event's preparation. Implementing the research during those years of preparation provided numerous opportunities to observe how things are being done instead of simply reading or hearing about them. Table 5.6 below summarises the results of this section based on the available sources of information.

Table 5.6: Case Study 1: Summary of the Results (Sustainability and Legacy in Construction) according to the Source of Information

Sustainability	
Economic pillar	
Interviews	- All the participants agreed that without having a profitable business model, sustainability could not be achieved.
	- Expo2020 represents an economic opportunity for Dubai to continue along the sustainable growth path.
	- Most of the participants agreed that sustainability goals are communicated, awareness is high, and stakeholders are committed.
	- Most of the participants advised that sustainability is not as expensive as it used to be.
	- The participants agreed that Dubai is attracting international expatriates from different backgrounds with its competitive salaries.
	- Participants consider Expo2020 a reflection on the success of Dubai in attracting investors from around the world.
Review of the	- Role of sustainability in the economic growth was published in several resources.

documents	- Dubai's economy was communicated as highly diversified.
	- Leadership emphasises the future of the UAE as an international player.
	- Dubai was able to finance the event successfully.
	- Expo2020 created infrastructure for future economy including steps like dredging Dubai Creek, Jebel Ali free zone growth and being a hub for UAE economic growth.
	- 25 million visitors will come in to the emirate during of the Expo spending millions on tickets, merchandise, accommodation, transport and food.
	- Expo site integration with Dubai Exhibition Center (DEC) will be at the core of the legacy plan for Expo2020 inside District 2020.
Researcher Observation	- Construction sites were always surrounded by fens and designated access gates protected by security, which reflects how important the access to the sites was.
	- The participants were well prepared for the interviews and provide several documents along with what they were saying.
	- An optimistic view was dominant for the Expo2020 with some uncertainty about what will happen after in terms of growth.
	- Construction sites not related to Expo2020 still reflect the sustainable growth of the city.
Social Pillar	
Interviews	- Most of the participants agreed that Dubai is taking major steps to be socially responsible during the event and in general.
	- Most of the participants agreed that Dubai is progressing toward a better life for its residentss.
	- Most of the participants confirmed that Dubai is livable and consider staying there after the event.
	- Expo2020 was able to create jobs and wealth for the

	residents.
Review of the documents	- The ruler of Dubai was always communicating the family values, the love of the UAE people, and the happiness consideration. - Expo2020 is a catalyst of change for the behaviour of UAE residents towards a more sustainable life. Educating the youth about sustainability, adopting daily sustainable steps and volunteering are the best examples of changes in behaviour. - Expo2020 will have an impact on the future of the UAE for years to come. - Expo2020 supports the small- and medium-sized enterprises (SMEs) by having contractors worth Dh 4.7 billion. - The UAE will bring together 190 nations and spread the message of tolerance.
Observations	- Happiness logo was spread over many governmental and private entities. - Ranking the services of governmental entities was always possible. - All the offices that the researcher visited were clean, respectful and welcoming, and admit natural daylight.
Environmental pillar	
Interviews	- The majority of the participants agreed that being environmentally responsible is no longer an option. - Authority rules and regulations played a major role in enforcing the environmental considerations in the construction.
Review of the documents	- The plan for reducing the carbon footprint is highly communicated. - The awareness of environment protection has common consensus.

Observation	- Recycling bins are located over public places in Dubai; however, home trash is not a sorted waste. - Dubai invests substantially in the green appearance of the city. - Heavy traffic was surrounding the Expo2020 site in the morning and afternoon. - Expo2020 construction was viewed from two major roads yet site accessibility was limited to construction people and people with special permission.
Leadership success factor	
Interviews	- The participants shared the love and respect to the UAE leaders - The participants agreed that the UAE is lucky to have such leaders with vision to be sustainable. - It was commonly noticed that people memorise some sayings of the UAE leaders.
Review of the documents	- The UAE leaders are communicating sustainability considerations very often. - The leadership vision is explained and the rationale behind it is given. - The growth of the UAE is based on the political stability of the country.
Observations	- There are not as many posters of the UAE leaders as there used to be years back. - The Dubai leaders are very close to the people and well respected. - UAE leaders were able to transform the southern area of Dubai from an empty desert into a new development and investment destination.
Design success factor	
Interviews	- The participants agreed that nothing is being constructed in Dubai before previous approval from the Dubai

	Municipality.
	- The participants agreed that project design is getting enough attention and construction should happen based on the architects' approved shop drawings.
	- Legacy of the Expo2020 to stay for 30-50 years after the event.
	- The District 2020 is designed to be the city of the future that can inspire the future generations.
Review of documents	- The UAE gave the design of Expo2020 for international firms.
	- The design of each pavilion reflects the rationale behind it and is linked to the three Expo2020 themes.
	- District 2020 design is created to get the most from Expo2020 for the legacy phase.
Observations	- The construction in the UAE is always based on approved materials submitted through submittal files and actual size mock-up before construction.
	- The design of many buildings is unique and attractive and creating an identity for Dubai.
	- The experience of the people in construction sites is based on local and international projects.

5.11.6 Case Summary

The construction part of hosting a mega-event is one of the pressuring sectors in the sustainability model of any country. Going through this case study showed that Dubai is managing this part correctly. As the research took place during the significant three years' preparation and is going to be published before the completion day of the completion of construction for Expo2020, Dubai has learned significantly from the

previous failures and successes of mega-events. Dubai learned how to face the criticism of high spending and justify spending billions in order to host a time-limited event by showcasing the legacy part of the Expo2020 through a new city called District 2020. The selected location is in an empty area of desert located between Dubai and Abu Dhabi, and is on the opposite side of the typical development areas between Dubai and Sharjah. Dubai is also getting benefits from this hub in order to develop the area surrounding the city through new significant developments like Dubai South, Al Maktoum Airport, Dubai Industrial City, and Dubai Logistics City, among other initiatives. Dubai already has a strong strategic development plan, inserting a mega-event within this development plan makes it more viable, attractive, and profitable. Expo2020 became a catalyst of change for Dubai South, and this part has become the most attractive location for investment in Dubai. Dubai is developing projects at values that exceed Expo2020 costs at the same time. This is a significant reason why Dubai was able to accommodate the spending on this project within the UAE budget without disturbing the development of the country or putting pressure on its financial resources. The UAE government is managing the wealth of the country in a proper way through the federal government and the local governments.

The construction case of Dubai Expo2020 should over time prove to be an enlightening case study for future mega-event bidders wanting to learn how to plan mega-event construction and identify for what they have to instigate before bidding for Expo events. A mega-event should be used as a catalyst of change reflecting what the city is doing. Expo2020 is changing Dubai South by transforming the full region into a development hub that is attracting investors from all over the world. The event itself provides an opportunity for Dubai to achieve a better economic and social environment. All of this was possible through the innovative designs and planning for

the events along with the UAE leadership who are forward-thinking about the legacy that they are going to leave for the future generations as much as they think of the current one.

5.12 Case study two: Utilities

5.12.1 Case Narrative

The selected theme of Expo2020 – *Connecting Minds, Creating the Future* – is a reflection of the belief of the UAE leadership in the power of humanity in solving problems jointly, especially sustainability. Expo2020 is forming a platform to encourage creativity, innovation and collaboration in the three main areas of the sub-themes of this event – opportunity, mobility, and sustainability. However, hosting a mega-event for six months places tremendous pressure on the utilities for the hosting destination which requires a proper legacy plan to benefit from this increase in development for the future generation. The challenge of meeting this extra capacity may require building what the country does not need afterwards, so the development plan should only be set out to serve the event. The sole supplier of water and electricity in the Emirate of Dubai is the Dubai Water and Electricity Authority (DEWA), an entity owned entirely by the Government of Dubai. The DEWA owns, operates, and maintains power stations and desalination plants, aquifers, power and water transmission lines, and power and water distribution networks in Dubai. This represents a massive job for one entity; failure to be sustainable will not only affect the utility supply or Dubai, it will affect the sustainability model of the whole UAE.

DEWA aims to be among the best utilities provider through efficiency, reliability,

green economy and sustainability as stated by HE Saeed Mohammed Al Tayer, the Vice Chairman of the Dubai Supreme Council of Energy, MD and CEO of DEWA, and the chairman of the World Green Economy Summit in his interview published in the *State of Green Economy Report* (2018). Al Tayer added that DEWA is securing the supply through diversification of the energy mix. The clean energy will provide 7% of Dubai's total power output from clean energy by 2020, and this is expected to reach 25% in 2030 and 75% in 2050. Currently, the DEWA power station and water desalination stations are mainly fuelled by natural gas. In the previous case study, the role of the leadership and sustainable design along with the social, economic and environmental pillars in reaching sustainability was effectively presented. In this case study, the same pillars are going to be discussed by stating how Dubai is preparing to face the increase in demand, have the right investment, create customer satisfaction, and build utilities to environmentally serve the future generations; consistent with DEWA's motto which states 'for generations to come'.

DEWA's plans to reduce the consumption on the demand side are being implemented before Expo2020. DEWA aims to reduce the power and water consumption by 30% by 2030 through the following 8 programmes as set by Al Tayer:

1- Building Regulations: It was discussed in the previous case study about how Dubai Municipality regulations are being implemented to have more green buildings through sustainable designs, materials selection and sustainability considerations.

2- Building Retrofits: DEWA established a demand side management company called Etihad ESCO. The role of this company is to support the improvement of energy efficiency in over 30,000 existing buildings in Dubai by retrofitting them. This plan's value and accumulative costs are estimated at AED 30 billion

up to 2030 while the present value of saving is estimated at AED 82 billion which should leave the DSM plan with a positive net economic impact of net present value of AED 52 billion.

3- District Central Cooling: DEWA owns 70% of the Emirates Central Cooling System Corporation (EMPOWER), a major provider of district cooling services in the region.

4- Water Reuse.

5- Efficient Irrigation.

6- Specifications of Energy Efficiency: Selecting the construction materials that will reduce the water and electricity consumption.

7- Outdoor lighting.

8- Shams initiatives to install solar panels on houses and buildings.

The UAE has a national wide strategy that aims to achieve 50% dependence on clean energy by 2050. These ambitious targets are planned through multiple projects, Shams One in Abu Dhabi is one of those ambitious projects and using Concentrated Solar Power (CSP) plants. The construction for this plant started in 2008 as an initiative of Masdar and reflects the UAE leaders' vision for achieving sustainability that was established way before Expo2020 was planned. During the 2008-2013 cycle, the following objectives were identified along with the main challenges as presented in Table 5.7

Table 5.7: DEWA main objectives and challenges

Objectives	Challenges
Enhance sustainable development of Dubai.	Have a sustainable supply with increase in production and reduce in demand.

Incorporate sustainability strategy in all DEWA activities.	Ensure consistent availability of water and electricity.
Become an innovative world-class utilities supplier.	Ensure everyone's happiness and adopt best practices in social responsibilities along with implementing the best international standards.
Transform Dubai into a global hub for clean energy and green economy.	Provide 75% of the UAE energy from sustainable resources in 2050.
Forming a climate change and sustainability department.	Maintain efficient costing and revenue while boosting investment and driving economic growth while minimising environmental footprint and limiting the consumption of natural resources. DEWA should do that while keeping high standards of corporate governance, business ethics and social responsibility to all the stakeholders.
Increase electricity system availability and reliability and reducing water line losses and emissions and support Dubai communities.	Hosting Expo2020 on the side of the city which requires further supply for water and electricity for limited time and longer distance.

In order to achieve its objectives and face the challenges mentioned above, DEWA entered into several partnerships in Dubai with talented players like the Dubai Carbon Center of Excellence, specialists in providing consultancy for renewable energy projects. DEWA also partnered with RWE, a leading German electricity utility firm to form the RWE Power International Middle East (RWE PI ME). DEWA also owns 25% of the DUCAB High Voltage Cable System, a high-voltage cable manufacturer and supplier.

The Sustainable Development Goals (SDGs), set in August 2015 after negotiation in the Open Working Group (OWG) of the United Nations General Assembly (UNGA) where the UAE held a seat, represent a mutual effort of humanity to achieve sustainable development. The UAE volunteered the adaptation of the 2030 Agenda for Sustainable Development by pledging to protect the human rights in accessing clean energy,

affordable food, quality education and healthcare, sustainable economic growth, and a health ecosystem for all residences. The UAE's National Committee on SDGs set three principles for stakeholder engagement strategy: these were '*aware*' by defining the challenges, the stakeholders and the role of the SDGs, '*engage*' by selecting the communication tools, identify the national and international initiatives, and '*maintain*' which represents the reporting tools along with supporting the stakeholders through coaching and motivation. One of the central national priorities published in the UAE and the 2030 Agenda for Sustainable development is as follows:

> Ensuring economic and social development with an appreciation for environmental sustainability is a key priority for the UAE. The Vision 2021 National Agenda focuses on improving the quality of air, preserving water resources, increasing the contribution of clean energy and implementing green growth plans. The Agenda also highlights the importance of infrastructure and aims for the UAE to be among the best in the world in the quality of airports, ports, road infrastructure, electricity, and telecommunications infrastructure. (p. 11)

From this we can see the central role of the utilities in the overall sustainability commitments that the UAE pledged to the United Nations in its efforts to create a sustainable world for the future generations.

5.12.2 Interview, Document Review, Observation results

The results presented in this case study are the interpretation of the collected data from interviews, documents review, and observation. The report of the findings is structured around the sustainability targets that DEWA set for Dubai to monitor how hosting Expo2020 will influence those targets, how the mega-event will create a long-lasting legacy for Dubai, and review whether Dubai is following the optimal spending cost for hosting the event. It is also structured around how DEWA creates a stakeholder framework for sustainability, and how the ongoing development plan for Dubai influences the development of Expo2020. The sample, in this case, includes eight

participants in total, four participants from DEWA including two specialists in sustainability, one from the Strategy and Business Development Department for new business development and the second from the Climate Change and Sustainability Department. The other two participants from DEWA did not allow to state their positions. In addition to this, the interviewed data collection process include two participants from Dubai Carbon; the first is Head of Programmes, and the second is an experienced project manager and team leader. From the Dubai Supreme Council, the Director of HSEQ and the Climate Change Supreme Council of Energy was interviewed. The other two interviewees are the general manager of Shams Power Company and the Business Development Director of Masdar whom was always welcoming researchers in the departments mentioned above; they had no problems with access, and experienced a very welcoming environment. Some interviewees were well prepared for the interview as if it was an exam. In addition to those interviews, around 50 documents including the 'DEWA sustainability report for four different years,' the 'state of green economy' reports, many press releases, and the companies' websites was collected.

5.12.3 DEWA and Sustainability

The sustainable supply and production of utilities is a challenging task that requires a vision, leadership, and collaboration between different entities. DEWA and Expo2020 discovered this at an early stage and set a mutual vision to partner together in order to provide this global event with electricity and water during the six months of the event, excluding the electricity generated on site. The power supply of the event is going to be produced in Mohammed bin Rashid Al Maktoum Solar Park, the largest single-site solar park in the world, which intends to generate 5,000 megawatts of clean energy by 2030. This park is enabling DEWA and Dubai to meet the increase in Dubai's

electricity requirements in a sustainable way and continue the improvement of the electricity infrastructure. Expo2020 management is looking to have this event as a showcase for the possibilities in renewable energy by supplying 50% of the required power through different renewable energy sources. Those sources include the Sustainability Pavilion, which the study wrote about in the construction case study. The investment in such infrastructure is putting pressure on the funding sources, with an investment of USD1.16 billion allocated by DEWA for infrastructure projects to support Expo2020.

In order to understand the stakeholder framework of utilities in Dubai, The Supreme Council of Energy in Dubai implemented the Dubai Carbon Abatement Strategy (CAS) with the following stakeholders in order to achieve the sustainability in all the pillars. The stakeholders' relations are presented in the following figure 5.4.
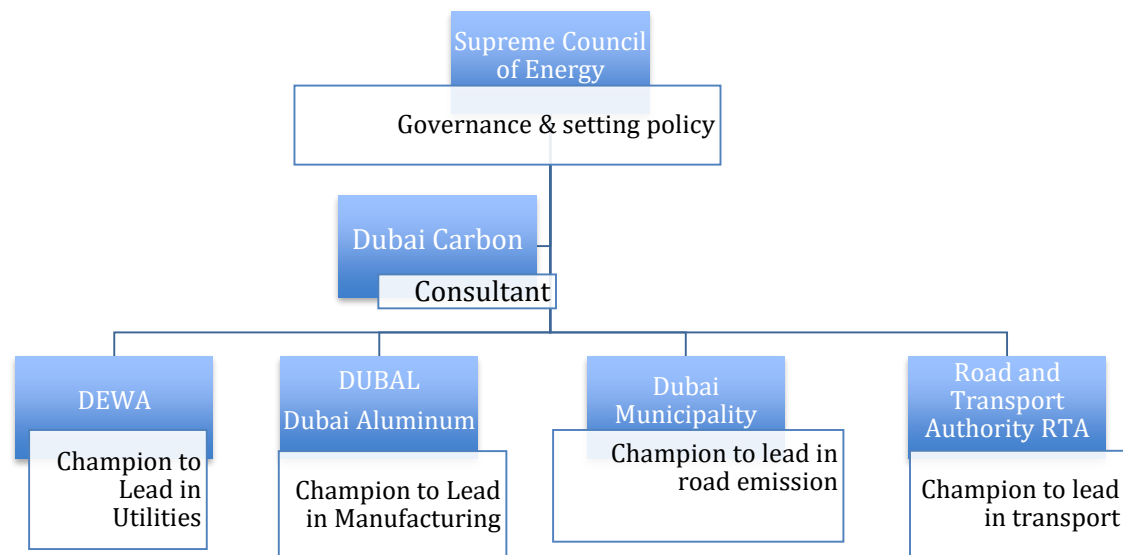
Figure 5.4. Stakeholders in Dubai with largest influence on emission reduction

During this research, no single interview was conducted with any key stakeholder from Dubal or from the Dubai Municipality for multiple reasons. However, the information collected through secondary data like the companies' websites and the documents are given in exhibitions, and some press releases. That information was sufficient to serve the point that will conclude at the end of this case. The other interviews were held with critical stakeholders from the above entities. In addition, three interviews were completed in Masdar City and Shams Power Company (a particular purpose vehicle: 80% owned by Masdar and 20% owned by Total) in order to understand the role of leadership and design in the overall sustainability model without the direct impact of Expo2020. Those two companies are located in Abu Dhabi and not affected directly by Expo2020 as the entities in Dubai are. During the interviews with DEWA stakeholders, the interviewees made reference many times to the three pillars of sustainability, asserting that they did not think about just profit or just the environment. By the end of 2015, DEWA had nearly 11,000 employees, most of who were, and continue to be, engineers. This is a big social component. Any decision taken in DEWA considers the three pillars equally. Two interviewees stated that since 2012, DEWA began to apply the sustainability triple bottom lines (STBL) in the corporate strategy in a systematic way. The interviewees were talking as sustainability consultants who understand the sustainability considerations in depth. Participant 4 stated:

> We have aligned the triple bottom line into the corporate strategy, we are not thinking only about financial success or about how to be environmentally friendly. It has to consider the social aspects. As you know, just considering the financial aspect would only mean profit for others, for us it's the financial stability that will ensure economic sustainability in each decision in the organisation, it will sustain the future of the organisation and the families of the employees working in DEWA….as those families are living and working here, the environmental aspect is very important as we are an organisation of utilities and you understand how big our impact on the environment.

Dubai leadership's vision is to have a future as a green, healthy and smart city of innovators and entrepreneurs. DEWA plays a pivotal role in achieving this vision by implementing cutting edge ideas, investing in the infrastructure of the city, and creating a sustainable environment. Al Tayer, CEO and MD of DEWA since 1992 who has led DEWA to become one of the most distinguished utilities providers in all aspects worldwide, indicated the following in the *State of the Green Economy Report 2019* published by Dubai Carbon:

> DEWA has adopted sustainability as an essential part of its vision and at the heart of its business strategy. It is also committed to issuing the Global Reporting Initiative (GRI G4) sustainability report. DEWA not only provides electricity and water services to the highest levels of quality, efficiency, and reliability, but also contributes to supporting the economic, environment and social development of Dubai and the UAE as a whole. The steps taken by DEWA coincide with its commitment to protect the environment and preserve natural resources and sustainable development. In line with the aspirations of the wise leadership, DEWA organizes many activities and events, around the world, to enhance interaction with various groups in the society, and contribute to building a better future for future generation. (p. 23)

By copying the following from the head of DEWA, this reflects the importance of sustainability in the core business of DEWA. Adherence to the triple bottom line is reflected in different levels of the organisation and the leadership influence aims to give Dubai a progressive position as a global model for clean energy and a green economy.

Participant 15 indicated that Dubai's efforts to become a green city is an objective that the leadership adopted long before Expo or the international trends of sustainability. With the limited natural resources, sustainability for the UAE is a must and not a luxury. He advised that Strategy 2030 was in place even before bidding for the Expo began, as the role of the Supreme Council of Energy since it started in 2009 was to

provide different kinds of energy and ensure sustainable supply that will meet the increase in demand. The first priority for Dubai was to secure sufficient supplies; second, the leadership implemented a portfolio of different types of energy in order not to rely on just one supplier. By opening up competition in the market, prices are often more prone to fall. This represents an important challenge for the energy market as the economic side of production is very important regarding its impact on the overall performance of the UAE economy aiming to move away from vulnerability tofluctuations in energy prices. Those plans represent the core value of sustainability through the three pillars.

5.12.3.1 Economic Pillar of Utilities Sustainability

In order to have sustainable utilities, DEWA should be able to oversee profitable entities that have sufficient funds to run without the support of the government. On 13 January 2018, DEWA approved a budget of USD 7.1 billion compared to USD 6.6 billion in 2017 and included investment in conventional and non-conventional energy sources along with investment in strategic innovation, R&D, renewable energy, green energy, smart grid, energy efficiency, demand side management and other projects as announced by Al Tayer, who stated,

> The budget supports the vision of our leadership to provide residences and residents with excellent services in a smart and well-connected city, which is recognised as a world model for developing clean energy, inspiring innovation and creativity and promoting sustainability.

Participant 5 highlighted the importance of financial stability in the utility business and advised that the best way to achieve this sustainability is to have diversification of energy sources. She added that any decision in the organisation should consider the

economic pillar as well as the other two pillars, but the company has to have a robust economic model to survive. Participant 4 indicated that all the financial documents of DEWA are published online as part of the transparency policy. Those figures was checked and found that the total comprehensive income of DEWA increased from AED 6,521 billion in 2017 to AED 7 billion in 2018 with all the new projects and initiatives that the company is spending on. The cash and cash equivalents at the end of the year grew to AED 3,203 billion in 2018 compared to AED 2,311 billion in 2017. Those are figures published in the consolidated financial statement for the year ending 31 December 2018 audited by one of the Big 4 firms, PWC.

The water and electricity supply costs affect the overall competitiveness of the economy. In 2011, the Supreme Energy Council in Dubai adjusted the electricity and water tariffs for all DEWA customers by adding fuel surcharges and introducing the slab tariff system. This step was taken to promote efficient consumption and control the change in fuel prices, which will create a further sustainability model for DEWA as well as DEWA stakeholders. DEWA estimated an average consumption of 20,000 kW/h per person annually; and a gargantuan 130 gallons of water consumption per year; and charged 20 fills per unit for electricity, and three fills per unit for water. If the user has excess water or electricity consumption, DEWA will increase the rates. Participant 4 advised that this is one of the most effective methods in controlling the demand side. She agreed that the solution in having sustainable utilities would never lie in a continuous increase in the supply side. It is essential to control the demand side as well in order to keep the utilities consumption per person within recommended and achieved international figures.

Participant 15 spoke about the passive method employed in saving energy, which involves the use of a natural solution in reducing energy use, like planting trees or using shade. He said that a technological solution is always recommended as long as it comes with acceptable costs and low maintenance requirements. He believes that no one has a magic stick to provide one sustainable solution for little cost; it is about a continuous development process. He believes that more important than building a sustainable Expo is to learn from the new technology that is being introduced, and disseminate it extensively throughout the UAE if it is found to be feasible. The UAE is enjoying the benefits of diversification with more than 240 nationalities living and working there. This diversity represents a chance for humanity to come together and work towards a solution for the future, which represents the real value of Expo. However, Participant 15 gave many examples of the importance of returning to one's roots, being inspired by the ancient cities of the UAE, and learning from their environmental practices. He advised to visit Al Badiyah Mosque, the oldest mosque in the UAE. He advised that this mosque was built from natural materials like stones and mud bricks coated with whitewashed plaster. The natural air conditioning system used in this mosque is achieved by using dead reef coral, very lightweight materials that help in forming thermal and acoustic performance. Participant 15 provided many documents about the carbon abatement strategy that Dubai is adopting in order to reduce the carbon footprint of the event. A large number of visitors will still impose pressure on the sustainability model of the city, yet he believes that what Dubai is doing through the green building regulation and codes of practice for the new buildings as well as the renovation of the old buildings to become greener will reduce negative impacts. He believes that with the solar parks, the electric cars, the green coal, the gas turbines using in producing

electricity, and all the new initiatives, Dubai will be able to provide a sustainable model for hosting the mega-event.

5.12.3.2 Social Pillar of Utilities Sustainability

The World Bank figures show that the population of UAE exceeded 9.5 million residences in 2018. This is almost double the official number of residents in 2008, at 4.8 million. Dubai is estimated to be home to around one-third of the entire population of the UAE; the population clock on Dubai Statistics Center's website showed the population at 3.264 million in May 2019. By having a sustainable supply of utilities in Dubai, one-third from the utilities in the UAE is going to be secured as being sustainable. Abu Dhabi, also home to around one-third of the UAE population, set many initiatives and strategies to achieve sustainability. Environment Vision 2030 for the emirates of Abu Dhabi is part of the 2030 Agenda for sustainable development. It includes five main priority areas: (i) minimise the impact of climate change; (ii) achieve clean air and reduce noise pollution by contributing to safe and healthy living conditions; (iii) manage the water sources efficiently; (iv) protect the biodiversity, habitats and cultural heritage, and (v) manage waste in order to create value and optimise the material flows and wastage management.

The stakeholder management in DEWA plays a major role in the social pillar of sustainability. In order to do so, DEWA set the objectives related to stakeholders in the *DEWA Sustainability Report 2015* as follow:

- Having stakeholder engagement workshops for the key stakeholders
- Defining the value proposition of each stakeholder group

- Addressing and responding to the stakeholders' needs and expectations

- Identifying any new opportunities for collaboration with all the stakeholders to improve sustainability

- Establishing community initiatives in order to benefits DEWA, Dubai, and the UAE

The stakeholder engagement plan for DEWA stakeholders includes the steps indicated in the figure 5.5 below

Figure 5.5: DEWA stakeholder Engagement Activities (DEWA Sustainability Report 2015)

Inform
- Awareness sessions
- Marketing campaigns
- Media events, students visits and roads shows
- Corporate strategy presentation sessions

Consult
- Collection information about happiness surveys for all the stakeholders group
- Communications through different means
- Collecting data through surveys and customer feedback.

Involve
- One to one meeting
- Supplier engagements
- Seminars
- Mystery shoppers

Collaborate
- Sustainability Stakeholder workshop
- Joint Ventures
- Public Private partnership

Empower
- Continuous support for Government policy and regulation

DEWA has the sustainability considerations embedded in vision, mission, motto, and corporate value. It is essential that DEWA maintain effective communication with all the stakeholders in order to ensure that all the sustainability considerations are addressed. The best way to ensure this is through stakeholder surveys that assess this effectiveness. Each group of stakeholders will have different questions that the stakeholder satisfaction surveys will reveal. In 2015, the majority of DEWA stakeholders was highly aware of DEWA's annual sustainability report and highly satisfied with their sustainability performance. By ensuring their stakeholders have awareness and are happy, DEWA can maintain and improve the current sustainability position.

Participant 6 highlighted fundamental social aspects of the PV production of electricity that few people are aware of. The social elements of this production include bringing the production of the electricity to places that are distant from the city. This is going to create an economic cycle for this region and help the people to remain where they live. This represents a significant social contribution as most of the conventional electricity production sites are located next to the coast where the population is dense. As the UAE has plenty of empty deserts, projects like Shams One is located in the western region near to Madinat Zayed, MBR solar park is located in Seih Al Dahal on the outskirts of Dubai, and Sweihan Photovoltaic Independent Power project is located in the western region as well. Those projects are bringing jobs to these remote areas and helping people to create an economic cycle where they live instead of having to relocate to the city in order to find a job.

DEWA has many social initiatives like the Pledge Campaign to ensure the spread of the culture of sustainability across society, which lead to further innovation in this area and create a common consensus about the importance of sustainability. DEWA is also sending employees to participate in climate change programmes around the world every year. The rationale for this is to achieve sustainable development based on knowledge, innovation, and sustainable green growth. Further, DEWA has implemented several strategies internally in order to reduce electricity consumption and was able to save 1,344 WGh in the past seven years along with 5.6 billion gallons of water. This saving within the DEWA premises represents the awareness of the 11,000 employees, which reflected in reducing the emissions of CO_2 by 714,000 tons.

DEWA has initiated many social activities in order to reduce energy demand in Dubai by 30% in 2030 compared to the business as usual scenario. In 2015, those initiatives were able to reduce the consumption rate of electricity per capita to 13,626 kWh, which represents a reduction of 17% compared with figures for 2012. Water consumption was also reduced by 47% between these same two years. In order to achieve these figures, DEWA applied initiatives of having awareness campaigns in order to educate the public on the importance of conservation and the best practices in electricity and waste consumption usage. This was achieved through educating the clients on the monthly consumption slab-wise, helping them to track consumption through an e-service portal, and benchmarking the consumption of the customers' CO_2 footprints. DEWA was able to achieve this by using the DEWA website, broadcast emails and SMS messages, brochures, and educational programmes for different stakeholders. By doing so, DEWA was able to change stakeholder behaviour by making them understand their consumption and helping them to identify methods of reducing this consumption

including electricity and water audits which included visiting several administrative buildings, offices, shopping centres, and residential buildings. The last step was in distributing free energy-saving devices to the audience including efficient home devices like energy-saving lamps, and water-flow reducers. In addition to this, many smart, eco-friendly home appliance awards were given to winners in DEWA's environmental events. The impact of those programmes was observed in his house consumption, during the purchase of any new home appliances as these will be rated based on consumption level, and in the overall awareness about the importance to reduce consumption for environment purposes before the economy side.

5.12.3.3 Environmental Pillar of Utilities sustainability

The efforts of DEWA and Dubai leadership in achieving sustainable supply was reflected by the Dubai Declaration of 2017, which included the launching of Mohammed bin Rashid Al Maktoum Solar Park. This solar park represents a concrete example of the efforts that are being taken in order to achieve sustainable utilities. It is the largest single-site solar park in the world based on the Independent Power Producer (IPP) model. The park plans to have a total capacity of 1,000 megawatts (MW) by 2020 and 5,000 MW by 2030. It was very impressive to learn how the UAE built such an environment for investing in the solar energy much faster than most of the countries in the region.

For this reason, Masdar City and Shams Power Company was visited. Both entities are located in Abu Dhabi. The rationale of this visit was to check whether Dubai is building such facilities to improve the image of the UAE as one of the major oil

producers or if it is coming from a deep faith about the importance of sustainability. The results of this visit include the observations, the documents collected and the interviews with Participant 1, – the General Manager of Shams Power Company, Participant 6 – the Director of Business Growth for Clean Energy, and Participant 11, – the head of design management who was originally interviewed for the Construction case yet helped to conclude this case as well. The three participants changed the perspective of in how the UAE is looking for sustainability. Participant 6 indicated the role of the leadership vision to have a sustainable future for future generation as the oil and gas are non-sustainable energy sources. However, the most critical statement was as follows:

> The structure of the power market is being restructured, the importance of oil is getting lower, new sources of energy are quickly penetrating the market. So in order to maintain the international position we have right now, we have to enter the market of energy sustainable resources. This was the leaders' vision for years and thanks to God we achieved that in the last few years. Masdar started in 2006, and we did many projects that were expensive at that time, yet we learned from them. Today we are in 2017, Masdar is a major international player in the sustainable energy market and we are able to produce, in some cases, energy from sustainable resources even cheaper than the non-renewable energy sources.

This statement reflects the vision of the UAE leaders and how they have built a market that is ready to face the challenges of the energy market. One of the major challenges is the infrastructure readiness and the availability of the people who understand this business sector. Participant 1 indicated how hard it was to find engineers with sustainability degrees or who came from a renewable energy background back in 2008 when Shams Power Company started. He told about the sustainability concept as well and how it was so vogue by that time. However, he believes that they paid high to have a market ready to serve, now the UAE have many contractors whom have the experience to build renewable energy stations, have the people to maintain and to

compete internationally in the cost of this. Participant (1) indicate that in 2008 the Concentrated Solar Power (CSP) cost of producing energy was cheaper than the Photovoltaic system (PV). Shams One, the solo project of the Shams Power Company is the only project in the Gulf region whom bring the first proven track record of the parabolic trough technology in the region while it is estimated that more than 5,000 MW of CSP capacity is being developed currently in USA and Spain. However Participant (1) never hide the challenges of running such plants in the UAE and he advised that this is part of the learning cycle. Currently Masdar and Shams One are becoming a source of knowledge in this field and their development helped them to win roles in Mohammad bin Rashid Solar Park to build the plants at the lowest cost in the world, with USD 2.99 cent for each kilowatt/hour, Participant 6 comments on this figure.

> This is an even cheaper price than what you can achieve by producing energy through conventional methods of gas or fossil oil, so there is a very important economic side for this. This is how you can achieve sustainability, the three pillars have to be considered along with proper design to build what you intend in the vision and get the support from leadership. Beside this, Dubai has announced very ambitious goals in the solar power side, this is a pioneering process of Dubai in achieving sustainability, pioneering in reducing the emissions of CO_2 and this entire process is coming in an economic viable system which led to start and create those projects.

DEWA tried to ensure that the effective environment management process for sustainability is being achieved. In order to do so, DEWA implemented an ISO-14001 certification for environmental management system for corporate level from 2006 and for the generation division from 1998. This certification helped DEWA ensure continuous improvement in all the environmental management impacts. The British Safety Council (BSC) which awarded DEWA 5 star certification for the environment for five continuous years recognised this success. DEWA initiated multiple practices before any construction that includes conducting environmental impact assessment prior to constructing any new project. Those assessments are being complemented by

independent consultants that use international standards with targets to ensure a healthy marine ecosystem, wastewater discharge points to identify any potentially harmful algal blooms, and maintain the populations of marine organisms, and ensure that they are applying the best practices for health, safety, environment, and security.

The water supply represents a big challenge in the UAE with most of the water used coming from the desalination of the Arabian Gulf seawater through Jebel Ali Power and Desalination Complex. DEWA is committed to maintaining water quality for the stakeholders and the marine water resources. However, the quality of the seawater intake can be interrupted through the rise of seawater temperatures, oil spills, algal blooms, seasonal seaweeds, and high turbidity due to industrial development, as of the DEWA Report 2015. If the water intake is of low quality, the cost of production and the amount of energy required increase. This requires proper management and continuous monitoring systems which DEWA processes. DEWA currently produces 470 Million Imperial Gallons per Day (MIGD) for 750,596 customers. Participant 15 stated:

> We are using more than 400 MIGD in summer, most of this coming from the water desalination using the MSF. This is a high consumption rate yet we have to accept the fact that this is affected by the hot weather in summer. We have to live with this and give best practices.

The three main desalination processes are (i) multi-stage flashing (MSF), (ii) the multi-effect desalination process (MED), and reverse osmosis desalination (RO). DEWA initially depended on the MSF technology with a limited portion to come through the RO technology. In March 2018, DEWA awarded a contract of USD 237 million for a seawater reverse osmosis-based desalination plant in Jebel Ali. The plants will be commissioned by May 2020 in order to meet the reserve margin criterion for the peak

water demand in Expo2020 and beyond. The new plant is based on RO which requires 90% less energy than the MSF does. The power of this station is going to come from the MBR Solar Park which will help in reducing the footprint of the desalination process and contribute to Dubai's Cleaner Energy Strategy 2050. The following statement was given by Al Tayer during this announcement by DEWA (2018):

> This project is in line with our decoupling plans for water desalination and power production and water desalination using solar energy. The big projects launched by DEWA have contributed in reducing the production cost of electricity through solar energy on a global level, and we continue to decouple electricity production from water desalination to obtain 100% desalinated water using a mix of clean energy and waste heat by 2030. This will allow Dubai to exceed global targets for using clean energy to desalinate water. Reverse osmosis will help expand our production capacity to 305 million gallons of desalinated water per day by 2030. Eventually, reverse osmosis will produce 41% compared to its current share of 5%, so we will be able to produce 750 million gallons of desalinated water per day by 2030, compared to our current capacity of 470 million gallons per day. Also, increasing the operational efficiency of the decoupling process will save around AED 13 billion and reduce 43 tons of carbon emissions by 2030.

By having this RO plant in progress by 2020, the carbon footprint of the water desalination process will be significantly reduced and DEWA will present a showcase about the ability to adapt to the weather of the UAE in supplying enough water of a high quality and still without affecting the environmental sustainability pillars.

5.12.3.4 Leadership and Sustainability

The UAE founder Sheikh Zayed remains an inspiration to the country long after his passing. The World Green Economy Summit 2018 held in Dubai had a session about his role in achieving the Dubai green economy and found that this would not have been possible without his vision. In his time, Sheikh Zayed was unique among his peers in supporting environmental considerations, education, and economic prosperity. Participant 26, a senior local person told many stories about how Sheikh Zayed valued

the environment and looked to have a prosperous country by converting the revenue received from oil to sustainable development. He guided to some roads in Al Ain where the actual plan was diverted in order to protect one tree or how Sheikh Zayed envisioned the UAE as a green and prospering country. Participant 26 believes that Sheikh Zayed rooted the sustainability considerations in the UAE generation long ago.

The path of Dubai toward a green economy has been supported by several innovative initiatives and strategies laid out by the UAE leadership over several decades. The UAE Vision 2012, Dubai Plan 2021, UAE Green Agenda 2030, Dubai Clean Energy Strategy 2050, and the UAE Centennial 2071 have allowed the UAE to draw a clear path towards a sustainable future by assuring continuous economic growth and still respecting the aim to make the global capital a green economy.

HH Sheikh Mohammed Bin Rashid Al Maktoum often communicates his belief in the power of youth for developing the sustainable future of the UAE and the region. He once observed:

> Youth are the powerhouse of any nation and its hope for building a better tomorrow as nations are built and the future shaped by youth, capitalising on their abilities and skills. They are the driving force behind any nation's progress and advancement. We invest in youth to achieve the progress that we aspire to and steadily pave the way for a prosperous future for current and coming generation.

In the same direction on considering the future generation while preserving energy and being sustainable now, Sheikh Mohammed Bin Rashid stated the following:

> We recognise that preserving our energy resources will be one of the greatest challenges in our drive towards sustainable development. This, however, will not materialise unless the different facets of our society adopt energy conservation

principles in their core value. The future generation will be the chief beneficiary of our achievement and the best judge of what we accomplish in this field.

This statement reflects the core value of sustainability and the consideration of the future generations held by the leadership of the UAE and how this is helping the sustainability model that is being implemented.

5.12.3.5 Design of Sustainability

The sustainability pavilion in Expo2020 represents an example of how a design can be sustainable. The building has a very innovative design that will allow it to be self-sustaining in both water and energy as advised by Marjan Faraidooni, the Vice President of Legacy Development and Impact for Expo2020 Dubai. The canopy of the pavilion measures 120 metres in diameter and will use solar power to generate electricity during the day while using special treated surfaces to collect water from the air at night. The sustainability pavilion will be able to generate 4 GWh of energy every year and reduce the amount of water needs by 75%. This building is part of the District 2020 which aims to reuse 80% of Expo2020's built environment, to remain for generations to come. This is going to help improve the design of future buildings to be self-sustaining. In addition, the Expo2020 Smart Site is driving sustainability considerations in Dubai by serving the smart city initiatives launched in Dubai Smart City in 2013 and Smart Dubai 2021. Sheikh Mohammed Bin Rashid is behind the strategy to answer the forces of changes that continue to shape the cities and give priority to people's happiness as its ultimate success indicator. Dubai is promoting the use of technological advancement in order to benefit the city's residents, economy, and resources. He stated:

> We are making Dubai the happiest city on earth by embracing technology innovation making Dubai a more seamless, safe, efficient and personalised city experience for all residents and visitors.

This vision reflects the leadership's mentality behind the city through the continuous improvement in making UAE society more cohesive and happy. This is going to be reflected in the future of the city by optimising the resources for maximum efficient, providing integrated seamless services, and protecting both people and information which will create the most enriched life and business experience possible for all.

The green building regulation discussed in the construction case has its impact on the utilities as well by increasing the performance of the building which will lead to less cooling and lighting consumption. Since 2015, all buildings constructed follow high standards in environment protection. Most of them depend on the district cooling and used appliances and lighting systems that meet government standards. In addition, the UAE completed the first water-to-energy project which set a plan to have zero waste to landfill by 2020 and a national target of diverting 75% of solid waste from landfill to Masdar. Also, there are plans to build the first Carbon Capture and Storage (CCS) facility in the UAE. All those initiatives and strategies reflect how serious the sustainability model of the UAE is in terms of utilities and how small the impact of hosting Expo2020 will be on those plans.

5.12.3.6 Dubai Sustainability Targets

Dubai set many ambitious sustainability targets; those targets include achieving 7% of its energy from renewable sources by 2020, 25 per cent in 2030 and 75% by 2050.

Waleed Salman, the Chairman of Dubai Carbon Center of Excellence said during the fifth edition of the World Green Economy Summit that

> We will achieve these goals and more, thanks to our unflagging drive within the country, and our commitment to communication and collaborating with other governments.

The green building regulations aim to keep Dubai a healthy city with a clean and pollution-free environment in cooperation with DEWA with specific guidelines and regulation criteria structured in a way to reduce water, electricity, and energy consumption and save around USD 2.7 billion by 2030. The observation in the field of construction found that the market accepts those regulations and complies with them to a great extent. However, some who hold the old fashioned mentality continue to criticise these initiatives; yet the Dubai Municipality makes it impossible for any project owner to have a completion certificate without fulfilling the requirements of the green building regulation. By having this message spread in the market, many architects and designers reviewed their designs and worked with the main contractors to achieve those requirements as failure to do so will impact all the projects' stakeholders.

With the specific goals just to serve Expo2020 site, DEWA built three 132/11 kv substations, with 45 km of high-voltage cables costing around USD 120 million. the substations were named Sustainability, Mobility and Opportunity. Those names are after the three subthemes of Expo2020. HH Sheikh Ahmed bin Saeed al Maktoum, the Chairman of Expo2020 Dubai Higher Committee stated the following on this subject during the signing of the Memorandum of Understanding (MoU) with DEWA in 2017:

> We share many of the common goals of DEWA, especially in the realm of sustainable energy, and it is fitting that we will be working together. Together we will work on ensuring the environmental impact of Expo is kept to the minimum possible. We have moved from the relationship of client-supplier to that of partners. This agreement opens up many opportunities as we share knowledge and experience in a joint effort to maximise our reliance on clean energy, such as solar power.

By having the leadership of Expo2020 emphasize the role of the utilities in achieving the sustainability goals of the Expo2020, DEWA set the targets on achieving even more than what is required to have a sustainable event. The rationale behind this comes from the financial capability of DEWA along with the increase in the number of residents in Dubai, as well as the new District2020 and Dubai South developments which are taking place next to Al Maktoum Airport. These agendas, along with the proper planning and leadership, led to these overall sustainability targets and plans for utilities.

5.12.3.7 The UAE Investments in Energy

The Arab Petroleum Investments Corporation (APICORP) is a multilateral development bank wholly owned by the 11 member states of the Organization of Arab Petroleum Exporting Countries (OAPEC). APICORP mission is in developing the Arab energy sector by adopting creative, value-adding solutions based on a commercial basis and value maximisation. Its services include equity investment, debt financing, financial advisory and energy research service. APICORP estimates that the UAE will need to invest a minimum of USD35 billion to meet the expected requirement of 17 GW required in the medium term. The UAE strategy aims to invest around USD 163 billion by 2050 to meet the energy demand and ensure the sustainable growth of the country's economy. The same strategy aims to increase the efficiency of energy used by individuals and organisations by 40% in 2050; this will lead to savings of around USD 190 billion (DEWA). Expo2020 energy requirements will be part of the legacy

of this event in contributing to the overall requirements of the UAE in the upcoming years. The overall requirements of utilities supplies compared to the increase in the number of UAE residences and requirements for energy will remain at the minimum level compared to what Expo2020 investments require. Currently, the UAE is executing projects with at least 10.4 GW new capacity including Abu Dhabi's Barakah nuclear power plant which is expected to be online before 2020 with four nuclear reactors. This project is expected to contribute 5.6 GW in total which represents around 41% of the new capacity between 2017 and 2023 as advised by APICORP. The gas-based power generation is expected to represent 21% while the PV and CSP projects will contribute around 20 % of the UAE's new capacity, leaving the balance of 18% to the coal production basis. The Hassyan Clean Coal Power project is based on the IPP model, and will generate 2,400 MW when operating by 2020. DEWA advised that this project is unique in the region and applying the highest international standards which will help DEWA to achieve its future goals while still promoting renewable sources of energy that are environment-friendly.

Shams One, the project of Shams Power Company is the only CSP project running since 2014 in the Al Dhafra region of Abu Dhabi constructed at a costs of USD 600 million and producing 100 MW of clear energy. Construction on the Sweihan Photovoltaic Independent Power project in Abu Dhabi started in May 2017 and the plant is expected to give a capacity of 1.17 GW, potentially making it the world's biggest solar PV plant when completed with tariff costs of USD 2.94 cents per kWh. This is going to be the lowest ever level side cost of electricity (LCOE) bid for a solar power project. This plant is expected to offset approximately seven million tons of CO_2/year and provide power sufficient to supply around 195,000 homes (Power

Technology 2019). The Mohammed Bin Rashid Al Maktoum Solar Park will be the second largest solar park with a plant capacity of 1,000 MW by 2020, and 5,000 MW by 2030 using a range of PV and CSP technology to provide clean energy with an investment of around USD 13 billion. Currently, the 13MW Phase I that was completed in 2013 and the 200MW Phase II that came online in early 2017 are supplying Dubai with clean energy, while Phase III was awarded to a consortium led by Masdar's earlier plans to bring 800MW on line by 2020. This contract reflects the vision of the leadership in building a proper infrastructure of clean energy which will help the UAE to maintain its position in the energy market as Masdar is currently competing with the international companies in providing clean energy technology at competitive prices. In addition, the ACWA Power and Shanghai Electric company was awarded a contract to build the world's largest CSP project with a generating capacity of 700MW which will constitute Phase IV of the Dubai Solar Park. Sterling and Wilson, a company based in India, are constructing the Sweihan Solar Park. These two large solar parks reflect the actual vision of the UAE to depend on renewable energy and achieve a sustainable future. APICORP advised that the other GCC countries can draw some important lessons from the UAE's journey towards clear energy.

Another important investment in sustainability Dubai is implementing is the application of Blockchain, a technology that can be used wherever a transaction is taking place. This technology offers unique opportunities in sectors like managing carbon credits, reporting sustainability in large companies, green transport, and supply chain management to reduce waste. It will help in green financing by selling and purchasing carbon credit in an efficient and transparent way. This technology also has a social impact on the sustainability model by improving decentralisation and transparency and eliminating the middleman, which will save on transportation,

storage, and other costs. Currently, Dubai has a strategy to migrate all visa applications, bill payments, and license renewables into Blockchain by 2020. This is going to accrue saving of USD1.5 billion and reduce 25.1 million man hours, representing another investment for turning Dubai into a sustainable city. In February 2018, HH Sheikh Hamdan bin Mohammed Al Maktoum the Crown Prince of Dubai, launched the Dubai Paperless Strategy which aims to make all internal and external government transactions 100% digital and completely paperless. In order to achieve this, Wesam Lootah, the CEO at the Smart Dubai Government Establishment advised that Dubai is to eliminate paperwork and digitise all transactions. In order to do so, more than 1600 city services were converted into 72 end-to-end customer journeys which will be completed on a single platform. The contribution of the Dubai paperless strategy will be in saving enough money to feed four million children and save on cutting down 130,000 trees. Also, this initiative will reduce the need to physically submit the documents from one government entity to another, which will reduce the cars on roads leading to fewer carbon emissions. Those types of initiatives reflect the leadership's mentality in serving the people, the trust in the utilities of the city in the sustainable and efficient supply, and the vision of Dubai as a city for the future.

5.12.4 DEWA Framework for Sustainability Checklist

In order to achieve sustainability in utilities, the provider should cover the different pillars of sustainability and test those considerations over the ELC. As Dubai's needs for energy are growing every year with the increase of the residential and commercial buildings in the Emirate, it became very difficult to justify the investments that DEWA is making for the overall requirements of Dubai and against what is being invested for hosting EXPO2020. DEWA make it very clear regarding the three stations

(Sustainability, Mobility, Opportunity) named after the three main themes of Expo2020 that they were primarily built to serve the site. However, it is impossible to see the impact of the event in Dubai outside the Expo site, particularly with the ongoing development plans. Many of the stakeholders interviewed for this research agreed about the importance of hosting a mega-event. However, all agreed that Dubai is known for hosting large numbers of visitors and it has become an international destination. They believe that all Dubai needs to do to host Expo2020 successfully is to control the flow of the visitors over the six months of the events. The expected 25 million visitors should be distributed over the six months and the event will be like business as usual for Dubai. In order to maintain the sustainability system in Dubai for the utilities supplies, the study adopted the overall considerations of sustainability from DEWA in order to create the following sustainability checklist:

1- Economic Aspects

- Availability and reliability of water and electricity.

- Economic and market presence

- System efficiency

- Programmes for demand-side management

- Applying best procurement practices

2- Social Aspects

- Health and safety observance for all of the stakeholders

- Stakeholder happiness

- Emergency plans and readiness for disaster

- Continuous training and education for different stakeholders

- Emiratisation

- Anti-corruption

- Labour/management good relationship

- Labour Practices

3- Environmental Aspects

- Research and development in green energy

- Compliance with local laws and international standards for the environment

- Plans to reduce emissions

- Supplier environment awareness and assessments

- Environmental impact of product and service

- Effluents and waste

DEWA scored high in the above checklist except on two points - the *effluents and waste* and the *anti-corruption* while the availability of water and electricity scored top. Many interviewees agreed about most of the components of the checklist that will help in achieving sustainability. However, Participant 4 advised that such a checklist may be used for companies that need to defend their position while DEWA, the company that has applied the triple—bottom-line since 2012, is in the position to advise other utilities suppliers on how to be sustainable and not be questioned. Participant 5 advised that Expo2020 will help in shining a light on the efforts that DEWA is making in order to be more sustainable and serve Dubai's stakeholders better. However, most of DEWA's relations with Expo2020 are through a specific team and not as an organisation in general. Participant 15, a director from the Supreme Council of Energy, viewed sustainability as a synonym for life.

> You cannot ask a person why you want to live, it is the same, you cannot ask DEWA why you want to be sustainable. It is coming from the roots of ancient culture that viewed sustainability and resources conservation as important as life for them.

Participant 15 also spoke about the development of Seir Banyas Island where all the old houses were facing south. The old port was facing south; all the houses' windows and doors were facing south. He was appointed to find a solution for a hotel that had been built on the island and was having many problems with the sea waves and was not withstanding the environmental condition. If this hotel had been built on the south side of the island, nothing would have gone wrong, he said,

> Just like our ancestors were doing. In order to solve the issue there, we built very expensive wave breakers and we changed in the design of the hotel. Still you see that it's not 100% as it should be, yet it reflects the importance of design in being sustainable. Design should be rooted back to previous sustainability practices like using the burjeels, a tower to collect the fresh air from above. These old practices may contribute to the current technology and ensure better sustainability considerations.

5.12.5 Case Summary

The study endeavoured to shed light on the practices of DEWA through a case study assessing how the solo utilities supplier in Dubai is prepared for the mega-event. DEWA represents a combination of the efficient planning of governmental entities that run utilities with the mentality of a private business, which ensures sustainability considerations across all of the pillars. Many important points are presented in this case, including the *economic* pillar where the study revealed how DEWA is planning to serve Expo2020 without having unrealistic investment that will leave the entity owing large debts. DEWA plans to serve the event as it serves the mega-projects, and plans to host the massive expected volume of visitors in the same way they planned for the increased capacity in Dubai. Having a mega-event within a large development plan also contributes to the overall legacy considerations, where the country is building what the future generations will need. For the *social* pillar, DEWA is a role model in the way it manages its stakeholders and how the framework of this management is working. Demonstration of the importance of including the social pillar in the

sustainability framework is connected to the fact that the rulers of Dubai are not selected based on election. In other words, those leaders want the country to be first place in everything. This motive is embedded in the leadership's commitment to serve the UAE, a commitment rooted since the days of the late Sheikh Zayed. Furthermore, the UAE is one of the important international players in reducing emissions and one of the countries that signed the commitment to the 2016 Paris Accord. This agreement aims to strengthen the global response to the threat of climate change by joining efforts in order to keep the increase of the global temperature to below two degrees Celsius. The UAE represents one of the responsible international players, and DEWA's plans for 2030 and Dubai's plans for 2050 illustrate how serious the UAE is in relation to sustainability.

The leadership of the UAE and Dubai along with the Dubai Supreme Council of Energy and DEWA was able to present an example of a sustainable utilities provider that can meet the requirements of an event the size of Expo2020 while still being sustainable. Serving Dubai stakeholders in a sustainable way will build a strong legacy for the city. The decision of not writing a specific paragraph on the legacy in utilities is based on the reality that those investments in infrastructure will be there for generations to come and will be part of the city's development legacy more so than the event's legacy. After this case study research period, the vision of the Supreme Council of Energy is making Dubai a role model for the world in energy security and efficiency, which also is being implemented through various projects ongoing in 2019. Dubai plans ahead for excess capacity and reserves, thus showing how responsible the people making the decisions in the city are. The Dubai leadership has engaged in numerous action demonstrating their commitment to sustainability is enlightened and progressive as evidenced through the practices and achievements of the utilities industry.

5.13 Case study three: Mobility

5.13.1 Case Narrative

Sustainable transport is the third challenge that any mega-event may face, and remains one of the most pressured sectors in the overall sustainability considerations. Dubai's Road and Transport Authority (RTA) is the sole agency responsible for providing and meeting all transport, roads and traffic requirements in Dubai, between Dubai and other Emirates, and between Dubai and the neighbouring countries in order to ensure an advanced sustainable integrated ground transport system which serves the vision of Dubai and meets the goals of the government's agenda. Dubai Airports is the agency responsible for air transport while the Dubai Ports World is the agency responsible for the sea transport. The RTA was founded in 2005 and is responsible for the following: Buses, Taxis, Inter-city Transport, Roads Engineering, Registration and Licensing, Marine Transport, Commercial Ads on the Right of Way, Public Buses, Roads Beautification, Roads and Parking, and Rail Projects. Thus, the RTA is responsible for providing and managing all the ground transportation means in Dubai, and making it more sustainable. This is advanced by setting Dubai's future through the right policies and legislations, adopting new technology and implementing best practices to serve the RTA stakeholders. Dubai Airports is responsible for providing a safe and sustainable environment for the air transport sector while Dubai Ports World operates 78 marine and inland terminals in 40 countries along with Jebel Ali Port. In this chapter, the study assesses how sustainable the transport system is in the three areas, to what extent Dubai's development plan has helped the city to plan for a legacy of Expo2020, and how this event acts as a catalyst for change in Dubai. The transport sustainable

stakeholder management framework was identified and checked how far it is been considered. In addition, he will recommend some sustainability considerations for the transport system during the ELC and examine how the legacy considerations of RTA were part of the overall sustainability plan which will ensure Dubai has a long-lasting impact well after the completion of the event.

The sustainability in transport is very challenging for every hosting destination. In this case, Dubai has to be ready to host 25 million visitors: that represents the entire Australian population passing through Expo2020's gates during the six months of the event. This massive challenge is addressed in Expo2020 through the mobility theme of the event as Dubai is looking to build a strong legacy in transport during this event. Dubai's infrastructure is planned to amaze the world in the future. The thesis plan to interview key stakeholders from different entities that contribute to the mobility of visitors in Expo2020 was achieved. The sustainability considerations in transport are a vital sector for the UAE Agenda 2030 for sustainable development which viewed transportation as one of the strategic sectors in the UAE along with education, health, water, renewable energy, space, and technology.

These case study findings have helped answer the research questions of this thesis. The three main entities in the Dubai transport case study are investigated based on the sustainability considerations for mobility during previous mega-events. The legacy considerations in transportation represent a major legacy for any mega-event with the upgrade of those means in order to meet the high demand in a short period. However, the main challenge in transportation remains in achieving optimal spending on transport projects without building what Dubai does not require – the challenge is to have a sustainable transport system with high stakeholder engagement that addresses

the different pillars of sustainability.

5.13.2. Interviews, Documentary Reviews, and Observation Results

This case study tests the sustainability considerations for the transportation during the ECL of Expo2020 and the efforts being made to host this project successfully. The case study report will present the finding of the collected data along with interpretations for those data. The data collected through interviews, direct observation of the construction sites and secondary data sources. The secondary data were collected from the published websites online as well as the documents collected from the RTA office, conferences, and during the visits to the interviewees.

The sample for the transportation case study comprises six participants. Two are from the senior management of RTA – the first is the Manager for the sustainability and future section and the second is another director who declined to state his position in the research. The third participant is from the construction team of the bridges that are connecting Expo2020 with the highway. In addition, the researcher interviewed one key person from Dubai Ports World and another one from Dubai Airports in unofficial interviews where they answered most of the researcher's questions, although they did not allow him to voice-record them. The data collected from the interview with Participant 8 contributed to the finding of this research as much as it did for the construction case.

The aim of the interviews was to understand if the sustainability consideration in construction will be for the overall ELC; how those sustainability considerations shape the legacy of Expo2020; and whether the legacy is going to have a long-lasting impact. The study wanted to understand the sustainability targets that were set for each stage along with examining the environmental and cultural constraints that currently

constrain Dubai from being more sustainable. The transport sector represents the most visible legacy for hosting a mega-event; however, an important question remains which is whether the hosting spending cost compared to event-related spending for environmental sustainability and legacy outcome remain at the optimal level. In addition, the social pillar in sustainable transport represents a key success factor as poor engagement of transport stakeholders will lead to a failure in the overall sustainability system. It was able to obtain the view of the key stakeholder in the transport sector while the user of the existing transport system was not tested in this interview. The research relied on the figures of transport entities in order to assess how to what extent the stakeholders are engaged.

5.13.3 RTA Sustainability plans, goals, and objectives

With a vision to have 'safe smooth transport for all' the RTA is putting the sustainability strategy into action in order to achieve health and safety, green economy and environmental sustainability in transport. Dubai Government allocated 21% from the overall 2018 expenditures as a budget for the infrastructure projects which reflects the importance given by the leadership to transport. As the UAE is hosting Expo2020 for the first time in the region, H.H Sheikh Mohammed bin Rashid announced this figure during a visit to the Dubai Metro Red Line to Expo2020 site and expressed that investment in infrastructure is the main drive for the economy of Dubai. He added that those infrastructure projects in Dubai and the UAE are a key part of the country's comprehensive development plan which will play a pivotal role in enhancing the economic environment. In addition to this, his Highness added that happiness and welfare of the community are high-priority strategic objectives for the government. By

having high-quality infrastructure, the investors and tourists will be attracted further to Dubai which will enhance the country's position as a selected destination for living and working in. H.E Mattar Al Tayer, the Director General and Chairman of the Board of Executive Directors of RTA added that this large investment reflects the leadership's determination to improve such projects and meet the ambitious objectives of Dubai Transport. The RTA represents the government arm of the ground transport in Dubai. This agency set many ambitious objectives that the research presents below.

5.13.3.1 Smart Dubai

Smart Dubai is one of the RTA's strategic goals that aim to foster connectivity, integration, cooperation and information management in order to achieve pioneering in digital transformation. Smart Government is the second objective of Smart Dubai while the development of smart solutions for mobility is the third one. In order to achieve these, RTA launched many initiatives to enable development of smart enterprises, enhance online services, and implement plans to shift into smart traffic and public transportation.

The RTA worked intensively to develop smart solutions for ground transport. Participant 28 from the team working in RTA project to serve Expo2020 spoke about many MoUs that the RTA signed with global start-up companies. These are: (i) Einride from Sweden specialised in autonomous transport services which is testing autonomous taxis on dedicated routes in Dubai Silicon Oasis, which intends to facilitate the movement of mass transport; (ii) Opinsta LTD from the UK specialised in asset management for tracking solutions; and (iii) SWIN, a company from the USA specialised in artificial intelligence applications which help to streamline entities' data. Participant 28 advised that those MoUs signed in 2018 are part of the RTA's effort to

contribute to the leadership goal in depending on innovations to change the government's business style which will strongly influence the sustainability of Dubai across different fields. Participant 29 from the Rail Operations Management indicated that the RTA has more than 173 digital services and nine applications that help Dubai's stakeholders. Those services are designated as 83 services to help road users, 31 services to support public transport, and 59 services to back the business centre. Those services include using mobile phones to help passengers while driving, riding the metro and buses, and booking taxi. Other services are free Wi-Fi in the 10,800 cabs, smart cameras in the taxicabs to monitor movement of taxi drivers and objects in the interior and to the exterior of the vehicle, Smart Car Rental fleets, paying for parking and find parking locations, registering new users, accessing corporate services, as well as checking the tolling system named Salik balance and recharging. Yet more services include locating the nearest RTA Customer Happiness centre, getting vehicle registrations renewed, and calculating green points collected by using public transport which includes personal contribution to reducing the carbon dioxide emissions. All these are helping the RTA in providing an integrated digital experience for sustainable growth of the transport industry. In 2015 the RTA announced it was the first government entity in Dubai to transform all the services into smart apps in order to help Dubai progress towards the smartest city in the world. Transport and mobility covers at least 25-30% of the whole city's transition toward smart government (Shahbandari 2015).

5.13.3.2 Integrated Dubai

As part of the RTA responsibility in planning and providing requirements for different

forms of ground mobility in Dubai, the RTA set a strategic objective to enhance

integration between transportation planning and urban planning. Participant 6 from the

RTA Sustainability and Future section informed how this process is going in Dubai, as

follows:

> Any transport project that we have goes through a traffic impact study, we look at how the project will affect the transportation around the site and to certain limits beyond that site, and we call that the contribution area. Using the example of having a mall in the city; this will not affect the access to the mall, only a certain area around the mall will be affected. We give each developer a full study in how to mitigate those impacts and they have to give us feedback on how their design will respond for this. Once approved, we give the go-ahead to the projects include cost sharing. We have a model called the 'Dubai transport model' where we use a specific software for that called 'VISSIM'. Basically it is one solution to ensure the integration between land use and land development integration for the transport.

Hosting Expo2020 location on the outskirts of the city helped in developing the area

around through a dynamic and modern planning initiative. The RTA's investments in

road infrastructure aims to make roads and transport systems friendly for all. For this,

Phases 5 and 6 of the roads planned to serve the Expo project was awarded at a cost of

USD 171 million to ensure a smooth traffic flow that will help Expo2020 visitors and

future projects in the area. It includes improving the Jebel Ali-Lehbab road intersection

with Emirates road and the access to the Expo site. H. E. Al Tayer stated:

> The improvement of roads leading to Expo is one of the big projects currently undertaken by RTA to serve the needs of hosting Expo2020 in Dubai. Due to the massive nature of the project, it had been split into six phases to ensure the timely completion of work, well before the opening of Expo. Contracts of the previous four phases have already been awarded.

The six phases of developing the roads around the Expo site emphasise the role of

design and leadership in achieve a sustainable transport system. The observation of the

work in those sites and completed and witnessed special planning to manage the traffic

in a convenient way. He witnessed smooth traffic flow in the site on 90% of his visits.

Foster social responsibility of the development through serving the urban development

of the area surrounding Expo2020. The massive construction plans will serve 680,000 individuals in 2020, aside from Expo visitors, and 1.2 million by 2030 which will contribute to the urban, economic, and residential development in Dubai South and the surrounding areas as advised by the RTA. In addition, the RTA continually reviews the mobility best practices around the world which aim to make cities more people-friendly, develop policies, and measure impacts of different initiatives. One of the new transport routes in Dubai as observed is the cycling track that is embedded in the RTA cycling master plan. The RTA plans to construct this 234-kilometre track between 2018 and 2020; Once this has been completed, the total cycle track distance in Dubai will be around 500 kilometres. In addition, the RTA worked to maintain the UAE identity embedded in the transport projects as part of the social responsibility process. However, the following strategic goals contribute further in the social pillar of sustainability.

5.13.3.3 People's Happiness

Participant 6 indicated that the RTA considers stakeholder happiness as a contributor to the social pillar of sustainability, as many people also care about environment. When the RTA considers those two points, it helps in pleasing stakeholders, which will contribute to the economic side by empowering investment and gaining people's trust. The transport system is a major contributor to the growth of the city and includes different convenient transportation means. The RTA understands that such priority goes beyond what a transportation authority usually does.

The RTA set objectives in ensuring pioneering services for all by developing comprehensive roadmaps for customer services and customer interaction channels, encouraging distance-based services, and improving third-party customer service

providers. The main goal of those initiatives is to ensure harmony with customers. On 30 March 2019, the RTA released the results of the community happiness index scores for 2018 – these came in at 89%, a rise of 11% compared to 2017. The RTA reached those figures RTA based on different pillars like awareness, road safety, culture, government services, transport costs, availability of the service, and many other indicators. The following table 5.8 shows community happiness levels in different transport methods.

Table 5.8: Transport Community Happiness

Dubai Tram	82.8%
Marine	86.9%
Dubai Bus	88.5%
Dubai Metro	88.6%
Dubai Taxi	91,7%

The RTA conducted this community happiness survey in order to understand the client's needs and improve the services which aim to deliver a best-in-class customer experience for different transport stakeholders. Another pillar of sustainability is being represented by the investment in ensuring data privacy and data security.

5.13.3.4 Smooth Transport for All

Encouraging shared mobility and public transport is one of the main objectives of the RTA. In order to achieve this, the RTA's investment for servicing Expo2020 was for building the Metro red line that connects the Metro to the Expo site. There are seven stations on this line; five elevated and two underground. By November 2018, the project completion rate was 53%. By March 2019, the RTA announced that 70% of the 15-kilometre Metro red line which connects Nakheel Harbour and Tower to the Expo2020 site was achieved. The Expo station which represents the closest station to the Expo2020 site has a capacity of 522 thousand passengers per day in both directions

and expects to handle millions of passengers during the six months of hosting Expo2020. It was observed as well the completion of the Route 2020 in May 2019, and Participant 26 stated,

> We have executed several mega-projects in Dubai and we completely understand the pressure of the deadlines. We knew that we cannot compromise on quality, extra cost, or sustainability considerations to finish the project on time. Previously, our leadership was setting those deadlines; however, in Expo2020, the entire world will be watching to see if Dubai will meet the committed dates. We set our targets to complete all the infrastructure and Expo2020 site months before the event in order to have enough testing and commissioning time. For the Route 2020, we are planning to have a test-run for the new metro line in February 2020.

Participant 29 spoke about the importance of building society's reliance on the public transport system. The RTA is working to ensure that the public transit services are running smoothly, constantly and seamlessly. The RTA plan is to have a continuous development for the public transport network. Dubai Metro represents the spine of the public network system in Dubai along with Dubai Buses. Participant 29 indicates that with the growing numbers of daily passengers, Dubai Metro has become a convenient mobility method for Dubai residents and visitors.

Participant 7 spoke often about the importance of considering the legacy in transport. She advised that the RTA wants to provide the most sustainable mobility to Expo2020 yet without spending on unnecessary infrastructure or the investment that does not have a legacy plan. Participant 7 commented that Dubai is learning from practices outside: it monitors and evaluates what others have achieved and takes it from this point by tailoring solutions that fit the UAE. An example is the Public Bus: the RTA is purchasing 143 deluxe intercity buses with 79 double-decker and 94 medium-sized buses. Those 316 buses represent an investment of USD 126.3 million featuring Euro 5 and Euro 6 engines which comply with the European emission standards and are used

for the first time in the region. By having those buses, the RTA fleet will reach 2,085 before Expo2020. This investment is contributing in making high-quality public transport an ideal mobility choice which is expected to raise the share of public transport to 30% 2030. Participant 7 advised that these investments have a strong environmental impact by reducing the carbon footprint of transport through low emission and optimised use of energy.

Intelligent Traffic Solutions (ITS) by the RTA target to manage the demand side and reduce congestion in Dubai's roads through electronic traffic systems, intelligent traffic studies and design, operation through observation of the traffic movement, active sensors, set traffic databases, and implementing a toll collection system. The residents of Dubai have doubled in the last 12 years while traffic congestion has reduced significantly. In March 2019, the RTA revealed that the traffic control hub located in Al Barsha is nearly a quarter completed. This smart traffic system that cost USD 160.6 million will help the RTA to raise the coverage of the smart system from 11% to 60%. This will reduce the time taken to detect accidents and congestion on road by ensuring that all the roads covered by the smart system will receive a quick response. This system will be vital during Expo2020 by providing instant traffic information to all stakeholders via messaging signs and smart apps.

The RTA plan 'almasar' is a five-year strategy, from 2017 to 2022, that aims to pave the internal roads of 16 residential areas with plantation and landscaping which contributes to the environment and green economy strategy of the city. The RTA stakeholder engagement process involves identifying all the stakeholders through interest, being affected and potentially being affected and assessing how the RTA can influence them. The RTA's aim through stakeholder engagement to understand their concerns, build strategic future decision on their feedback and ensure sustainability

activities.

The pillars of sustainability are being addressed in the RTA's strategy by ensuring customer satisfaction which will raise people's happiness, give accessibility for people of determination, and enhance customer health and safety through advanced infrastructure and continuous improvement. RTA should keep looking at these factors while transporting around 1.49 million passengers daily, with a growth in roadways by 354% compared to 1991. The country will have 5.3 million vehicle registrations by 2020, 500 million rail passengers by 2020 and 292 million taxi passengers. This rapidly growing transport network requires planning and management of resources along with flexible designs and leadership support.

5.13.3.5 Safety and Environmental Sustainability

The boundaries of environmental sustainability for the RTA are set through leadership requirements contained within Vision 2021, Dubai Plan 2021, Expo2020 and the UAE's commitment in 2017 to the SDGs. From this, the RTA is continuously improving its environmental performance. Participant 29 expressed the value of sustainability for the RTA by continuously striving to improve environmental performance in different ways, through energy conservation measures, through promoting public transport, through emissions management, through climate change prevention measures, or through the waste management activities. In addition, the RTA is being sustainable through providing a safe and healthy workplace for employees and contractors, improving safety on the roads, and limiting the impact on the environment. In 2017, the RTA exceeded the set target of reducing the greenhouse gas emissions per passenger (kg CO_2/passenger) to 1.06. Further, the RTA has set targets to achieve 1051 (kWh/lighted lane km) for the rate of improvement in street lighting efficiency and was

able to achieve 876 in 2018, which represents a challenging figure that is yet to be improved.

The RTA is considered to be at the forefront of the environmental sustainability in the region by demonstrating its commitment to environment considerations through embedding environmental goals into the RTA strategy. Participant 29 stated,

> We keep continuous work in ensuring environmental performance and reducing our impacts on the environment. We comply with international relative standards, with direction of local and federal governments; we comply with the Vision 2021 and the National Climate Change Plan 2050. In addition to this, we contribute to the Carbon Abatement Strategy 2021. Expo2020 for us is going to be a breakthrough for the nation and we want to ensure the progress in transportation links by investing around USD 4 billion in sustainable transport to ensure we bring the Expo site to the highest standards through world-class roads and infrastructure that can meet the capacity requirement. The RTA will serve Expo through 724 buses, 2,900 taxicabs, and 14 bus stations along with the metro line. We achieved energy management system certification ISO50001:2011 for the first time in 2013 and we continue to comply with this certificate which reflects our effort to achieve an accountable entity. I forget to tell you about the outdoor lighting programme which represents a part of the demand side management 2030 where we are using LED lighting figures to replace existing ones by 75% and continuously working in having more efficient LED lights on the roads.

The RTA is fostering environmental sustainability in transport by different initiatives like converting 50% of its vehicles into electric or hybrid by 2021 to reach 2280 cars compared to 147 cars in 2015. The innovation in bus operations helped the RTA to see a remarkable reduction in the footprint per passenger from 0.54 litres per passenger in 2014 down to 0.44 litres per passenger in 2017. The RTA is also complying with the Paperless Strategy 2021 by increasing the number of non-face-to-face channels for licensing agency services which will help to reduce the number of visits to customer services; this resulted in a saving of 19,571 tCO_2 in 2017 from being emitted. Dubai Metro has been in operation since 2009 while Dubai Trams entered service in 2014. Both initiatives of the Rail Agency by the RTA were able to contribute to sustainable transport through average daily ridership of over 550,000 passengers for the metro and 17,000 for the tram. This has helped offset 341,000 tCO_2 annually and helped Dubai to

achieve better energy efficiency compared to 75,000 tCO$_2$ in 2010. The following Table 5.9 represents the improvement in sustainability considerations of emission reduction contributed by the public transport. The public transport was able to contribute in carbon emission avoidance of 341,000 tones of CO$_2$ which represent a major development once compare it with 2010 figure on 75,000 tCO$_2$. The table below is evidence for how seriously Dubai is taking the sustainability pillars since these numbers indicate the extent of reliance of society on public transport, the impact on the UAE economy, and the impact on the environment by this amount of emission reduction.

2010	2011	2012	2013	2014	2015	2016	2017
75k	130k	190K	235K	281k	306k	327k	341k

Table 5.9 RTA figures of estimated carbon emissions avoided as a result of using Dubai Metro instead of private vehicles (tCO$_2$ emissions)

Participant 29 indicated that the RTA has a department called the Safety Risk Regulation and Planning Department (SRRPD) with a specific mission to manage the RTA's environmental performance, ensure best energy consumption performance, and ensure innovation for all the subjects related to mobility sustainability and transport infrastructure. The SRRPD represents a reflection of the commitment of the RTA in creating a sustainable transport operation system and improving societal value which will directly impact on reducing the transport footprint. As a result of those efforts, the RTA received several Green World Awards in 2017 for environment, national initiatives and sustainability.

The RTA strives to reduce the emissions from the transport operations in a challenging industry that is based on mobile combustion and electricity consumption; which represents almost 99% of the total carbon emissions. The Dubai Supreme Council provided emission calculators to give specific figures for the emission factors for RTA tCO_2 emissions.

With all the efforts being done by the RTA, the 2017 figures represent an increase compared to the figures of 2014 where the total emissions was 780,106. However, the reason behind that is due to the increase of transport operations between those two years. The study looked to find the figures for total greenhouse gas (GHG) emissions from public transport per passenger and was able to find that this figures dropped from 1.26 ($kgCO_2$ e/passenger) in 2014 to 1.07 ($kgCO_2$ e/passenger) in 2017. Those figures represent a great achievement and reflect the seriousness of the sustainability steps being taken by the RTA.

The RTA's health and safety considerations are another essential part of its business strategy. Most of the interviewees indicated that this consideration is implemented to the best of their ability through awareness measures, continuous focus on improving performance, risk management and risk mitigation plans, and recognition of the importance of health and safety consideration in the overall sustainability model. The RTA Safety and Environmental Management System (RSEMS) is adopting the OHSAS 18001:2007 international standards for risk management approach which the RTA applies throughout its organisation and projects. In addition, intensive and continuous health and safety training programme is being given to RTA stakeholders in order to ensure that new and existing employees are assigned with task procedures,

and manuals for handling dangerous equipment through understanding their roles and responsibility. The RTA has a specific department to calculate safety performance called Equivalent Fatality Rate (EFR). This department tests the safety performance at a strategic level. The testing is based on the total employee man-hours against the equivalent fatalities. In 2017, RTA witnessed tremendous success by reducing the equivalent fatalities by 25% compared to the previous year. This reflects the commitment of the RTA toward health and safety, which represents a reflection of the social pillar of sustainability. Other important social indices are represented in the employees' satisfaction, nationalisations, employee turnover, society's satisfaction and the customer satisfaction index. In 2017, the RTA was able to exceed the performance in all those indices compared to the targets set in the strategy. During his visits to the RTA, many significant social sustainability considerations was observed like the diversification and the women's welfare in the workforce. Participant 6 indicated that women have a committee in the RTA that aims to support women in developing their capabilities while maintaining a balance between work and family responsibilities. It offers a dedicated nursery for children of RTA's employees, gym, and female taxi drivers.

5.13.3.6 Financial Sustainability

The RTA has achieved all those above sustainability steps by the good backup in the economic sustainability. The efficient public transportation plan and investment strategy is reflected through the success of the RTA in financing this massive infrastructure development without any serious seb-backs. Used public transport in several European and Asian countries can confirm that the level of luxury in Dubai public transport is above that of transport in the other locations. Public transport in Dubai is a world-class transport infrastructure that meets the demands of different

stakeholders at affordable costs. The RTA is providing this massive development in infrastructure and still maintains good revenue which contributes to the UAE economy in different ways. In 2017, the RTA officially announced an increase of 10.5% in revenues while achieving 100 percent of projects that was planned. Dubai water canal is one of the most expensive projects completed in an area not related to Expo2020 through a partnership between RTA and two main developers in Dubai (Meydan & Merass) at a total cost of USD735 million. This represents the productive partnership with the private sector. Completing this project while preparing for Expo2020 reflects the vision and financial position of Dubai's government and the RTA. It has three vehicle bridges and a ramp along with five footbridges. This project extends the waterfront of Dubai by 6.4 kilometres along with the economic benefits, and improves the quality of water in Dubai Creek by 33%. It has become a new attractive hub for tourists. Financing RTA targets in a sustainable manner reflects the leadership's strategy for mobility in Dubai. Without this, the RTA will incur big debts that they will not be able to pay in the years to come.

The RTA maximises and diversifies revenues by having non-fare revenues like advertising, bus rental, concessions, real estate commercialisation, revenues generated from Metro station naming rights, alternative financing, roads monetisation, the public transport cards named Nol cards, and other resources. A recent joint research study between the RTA and Henley Business school, Reading University (UK) between September 2009 and the end of 2016 showed that Dubai Metro was able to realise a return of 1.6 AED for every 1 AED spent on this project through direct and indirect impacts of the USD 11.1 billion investment. Dubai Metro currently has 79 trains, with a further 35 trains to join the network before Expo2020 and 15 trains to serve Route 2020 with total construction costs of USD 2.88 billion. During 2008-2009, the

difficulty of completing this big project was apparent while the world was going through a financial crisis. The return on investment is expected to reach a figure between 2.5 AED in 2020 and 4.3 AED in 2030. Comparing this ratio with Athena Metro line estimated at 1.17 in 30 years, Stockholm Metro estimated at 8.5 in 50 years, and Dublin Express train estimated between 2.1 and 2.7 in 32 years reflects the good financial planning and benefits of the RTA. The study indicated that this USD 11.1 billion investment of RTA will be able to realise accumulated benefits of USD 31.3 billion in 2020 and USD 63 billion in 2030. The average ridership of Dubai Metro is currently 600,000 passengers while the capacity of each metro is around 643 people. The investment in infrastructure like roads and public transport usually comes as support for the economic, social and tourist activities which help boost the local economy and enhance country GDP as indicated by Al Tayr. In this case, RTA was able to generate high return on investment and still achieve the other pillars, which reflects a high level of financial efficiency. The RTA has invested more than USD 27 billion in infrastructure and development of mass transit systems since 2005.

5.13.3.7 Advance RTA

With all the above-mentioned current objectives and plans that the RTA is implementing in the ground transport sector in Dubai, it is important to note that the RTA has a continuous development plan to transfer Dubai into a global hub for futuristic mobility means. One of those plans comes as part of the future transport strategy to convert 25% of the transport means into smart and driverless mobility means by 2030: through the Dubai Autonomous Transportation Strategy. Dubai is going to host the Dubai World Congress in October 2019 in order to bring experts in the field of self-driving technology together under the patronage of HH Sheikh Hamdan bin Mohammed Al Maktoum. Dubai Self-Driving Transportation Strategy is

expected to bring around USD 6 billion as annual economic revenue in several sectors, cut the cost of transportation by 44% reduce environmental pollution, generate USD 4.89 billion as annual economic returns through the improvement of the transportation sector by 2030, and also reduce the traffic accidents and losses by 12% and increase productivity of the individuals by 13%. This strategy represents a strong reflection on the sustainability considerations through multiple pillars; it will bring economic revenues in several sectors, reduce carbon emissions, reduce accidents, and raise productivity.

A key success factor for the RTA in general and critical for this strategy is attracting, developing and retaining talent. Self-Driving Transport (SDT) brings multiple potential benefits:

(i) SDT will improve road safety as most of the highway crashes are a result of human error. The computer in the self-driving car will be able to react much faster than a human and thus reduce accidents.

(ii) SDT will reduce the needs for parking spaces as it will increase the ridesharing and change the traveller's habits.

(iii) SDT will be able to integrate control centres, roadside equipment and other vehicles which will ease the traffic, improve performance of transport operations, and increase the reliability of public transport.

(iv) SDT will improve the streamlined mapping and journeys which will decrease fuel expenses and change car ownership from a single to a shared model. This will decrease mobility costs by 44%.

(v) SDT will decrease pollution by having many vehicles as electric cars. The design

of those vehicles is to be environmentally friendly, and encourage ridesharing to shift towards public transport.

(vi) SDT will improve productivity by giving the drivers the ability to spend time working while the SD system is transporting them. This system will maximise passenger productivity, give them workstations, sleeping pods, and infotainment units. The SDT represents a reflection of how to use technology to increase the sustainability considerations in transport. Dubai will maintain this strategy after Expo2020 which reflects the intention of Dubai's government sustainability considerations for and after Expo2020.

5.13.3.8 Assets Sustainability

The population of Dubai is expected to double by 2030 which represents a challenge for the public transport services and give a rationale for the legacy considerations of RTA projects related to Expo2020. Dubai has to be able to serve 25 million visitors in a period of six months and to maintain the services on the demand for urban mobility. The RTA's organisational structure is based on the multiple agency model principle which simplifies the decision process.

The RTA strives to implement world-class transport policies and legislations in order to provide public transport experience through a sustainable approach. On 25 January2019, the RTA became the first UAE government entity to obtain ISO certification in facility management which reflects the compliance of the agency with international standards of asset management and sustainability. This certification is in addition to having ISO14001 certification for its environment management system. The RTA manages the demand side as well through different policies and legislations that favour mass transit rather than single-occupant vehicles through a proactive

system. The RTA strategy goes beyond infrastructure projects to enhance the road network, develop the public transport systems, increase cyclist networks, implement different policies to overcome congestion, and promote sustainable transport and enhance traffic safety awareness. The RTA disseminates this heavy load across multiple agencies in order to enhance system, process and governance as following:

(i) **Strategy and Corporate Governance** (SCG) sector aims to sustain the organisation's excellence initiatives.

(ii) **Corporate Technology Support Services** (CTSS) sector is the proactive agency that works towards meeting the requirements of Dubai Government in initiatives like Government Plan, Dubai Smart City Plan, Expo2020, and Dubai 2021 plan. The CTSS aim to adopt best-quality services to customers' practices, implement technological solutions, ensure best levels of integration, information security, and resources optimisation, and governance of technical system.

(iii) **Corporate Administrative Support Services** (CASS) sector aims to raise the stakeholders' happiness and ensure pioneering services.

(iv) **Public Transport Agency** (PTA) is responsible for building the public transport network that set plans for ground and marine public transport through different means.

(v) **Traffic and Roads Agency** (TRA) is responsible for providing a seamless travel experience and connecting Dubai through planning, designing, constructing and maintaining the road networks.

(vi) **Rail Agency** (RA) responsible for establishing and delivering best railway facilities across Dubai and building a modern network for years to come including developing, operating, maintaining and selection of location.

(vii) **Licensing Agency** (LA) responsible for licensing drivers and vehicles and work in improving drivers' performance and vehicle safety in order to provide a better transport environment.

(viii) **Dubai Taxi Corporation** (DTC) responsible for providing different kinds of services and customer care to meet highest levels of transportation quality standards.

In 2017 the RTA announced officially that the assets performance targets achieved 99.4%, the optimised assets value reached 1.2% and the assets managed efficiently and effectively reached 101.9%. Those figures reflect enhanced efficient and effective assets management for the overall public and ground transport system in Dubai. Overall, the Dubai road network has been extended by 62% from 8715 km in 2005 to 23084 km in 2018, and the rate of fatalities reduced from 21.9 per 100 thousand of population in 2005 to only 2.3 per 100 thousand of the population in 2018 as of RTA official figures. Expo2020 remains a challenge with the number of the visitors yet Dubai has the right transport agency to deal with the transport challenge in a sustainable method. Dubai's transport strategy reflects the leadership's vision in transforming Dubai into an international hub that applies the latest technology in mobility as well as providing an attractive business environment. The transport system observation in Dubai confirms that this city has great leadership behind the considerations of sustainability, the respect of the passengers, the management of transport and traffic, and the continuous development of those systems.

5.13.4 Dubai Ports

Dubai Ports World (DP) is the maritime logistics company that is headquartered in the UAE and provides remarkable connectivity and infrastructure across transport modes. DP World has global operations with 78 marine terminals over 50 related business

located in 40 different countries across six continents including Jebel Ali Port. DP World's vision in contributing to the future of the world trade is targeted by connecting communities through trade and economic prosperity. Participant 27 from DP World management explained the development of DP World as follows.

> God blesses DP World in having such a great location and leadership in Dubai. Initially Dubai history was based on trade; we started in 1972 at Port Rashid. DP World is building on this legacy and using it in the modern era. We are now a leading global trade enabler. We have more than 45,000 people working in ports and facilities managed by DP World across the 78 terminals. We have Jebel Ali Port, we have Hamdan bin Mohammed Cruise Terminal at Mina Rashid, we have the largest man-made harbour, and we handle more than 19 million 20-foot-equivalent unit containers. DP World is making history by having the most productive port in the world. DP World built this success with the partnership with our stakeholders especially Jebel Ali Free Zone. DP world is bringing the global trade concepts into one of the most growing regions. DP World sustainability is embedded in the heart of our operations by ensuring that every step we take will lead to a long-lasting positive impact on environment, economy, and society.

The year 2018 is viewed as the period of strategic growth for DP World in multiple fields including smarter trade using data-driven logistics, designing acquisitions strategies to increase the global business footprint, using innovation initiatives to find competitive trade solutions, and adopting sustainable value creation for all the stakeholders. DP World is engaging with all the stakeholders through the company's vision by changing the organisational structure in order to implement new technological changes. Furthermore, the gross capacity of DP World throughout the business portfolio grew by 2.9% to reach 90.8 Twenty-Foot Equivalent Units (TEU) compared to 88.2 TEU in 2017. The sustainable growth of the company is targeting to have 100 million TEU by 2020. DP World's plans to expand the company's portfolio further through different investments, acquisitions, and partnerships led the company to invest around USD 3.5 billion in 2018. The Return on Capital Employed (ROCE) is a key measure of how well the investment strategy is delivering the value for the

shareholders. In 2018 the ROCE was 8.4% compared to 7.1% in 2014. The Earnings per Share (EPS) also increased from USD 81.4 cents in 2014 to USD153.0 cents in 2018. Those figures reflect the economic sustainability of the company. In the environmental considerations, DP World is committed to preventing and minimising any negative impact on the environment. The company culture believes that attitudes of doing responsible business are the only ways to ensure sustainable corporate success. DP World became the first company of it is type to join the World Ocean Council which combines efforts from different stakeholders in order to protect the oceans. In 2018 the carbon intensity decreased to 14.9% from 15.8% in 2014 despite the company's growth and corresponding increase in energy use. The figure that reflects this improvement is viewed by the reduction of kilograms of carbon

dioxide equivalent per 20-foot-equivalent unit; this figure decreased by 5% between 2014 and 2018. The energy consumption as well, which remains a key performance indicator in reducing the carbon footprint of the company, was reduced by 13% in the last four years. In 2018, the company was able to offset more than 55,738 tonnes of CO_2 emissions by using renewable energy sources to invest in low-carbon fuels like liquefied natural gas. This reduction is aligned with the government strategy to achieve green economy. DP World is executing a solar power programme in the UAE which will be able to generate clear energy to power 4,600 homes on completion. In 2018, the company launched the first green storage and warehouse facilities with plans to install 88,000 solar panels in Phase one.

Socially, DP World enhances the health and safety consideration by increase safety awareness which helped in reducing the lost time inquiry by 9% from 3.2 in 2017 to 2.9 in 2018. Emiratisation in DP World aims to attract the brightest UAE nationals through the 20Xel programme. In 2018, DP World formed a new talent acquisition

team that aimed to attract and retain the best talent and offered them continuous personal development opportunities to grow. The company also launched multiple initiatives in diversification and inclusion that promote gender equality within the organisation, strengthen the company culture, and positively impact the people around the world. DP World also has a global education programme that continues to educate students across the world by teaching them the basics of global trade and logistics. The number of participants increased to over 17,000 students in 2018.

Furthermore, the revenue of the DP World as of the public published financial statement reflects a continuous development of the group profit. Table 5.10 show the Revenue in USD million.

Year	2014	2015	2016	2017	2018
Revenue	3,411 m	3,968 m	4,163 m	4,715 m	5,646 m

Table 5.10. DP World Revenue (Source: DP World Annual Report 2018)

DP World continues to generate high levels of cash flow which are helping the company to work in increasing the current portfolio through acquisitions and partnership in port-related maritime, transportation and logistics sectors through revolutionary new technologies. DP World and SMS group revolutionise the way containers are handled through their joint venture high bay container-storing system in Jebel Ali Terminal 4 project which is expected to be ready before Expo2020. This system is expected to increase the capacity of the port by 200% compared to a conventional container terminal. It helps stack containers on individual rack compartments instead of directly stacking them on top of each other. This will allow

access to each container without the need to move another one which will improve speed and energy efficiency, increase safety, and reduce costs.

Sultan Ahmed Bin Sulayem, the DP World group chairman and Chief Executive Officer, stated that commitment to sustainability is clear in the vision and strategy of DP World by looking to the future through the company's role in delivering societal and economic benefits. He stated:

> For us sustainability means that our business is part of the answer in addressing some of the world's hardest challenges by driving sustainable and inclusive economic growth, to which everyone can contribute and where we can create a better future for everyone… We believe working in a sustainable and responsible way is essential to build a strong business for our customers, our people and our society. The UN sustainable development goals (SDGs) are important to DP World and fit with our intention to work in a sustainable and responsible way.

Hosting Expo2020 and DP World have led to increase in operations which mutually benefit the Dubai economy. Jebel Ali Port experienced a steady upward movement with demand on the non-containerised cargo which contributes to nearly a quarter of total port volumes as advised by Mohammed Al Muallem, senior VP and managing director for the UAE in DP World. He still expects that this demand for handling break-bulk and special project cargo will continue to raise sharply in the months ahead hosting Expo2020. One of the major shipments was the massive dome with trellis framework weighing around 2,265 tonnes for Al Wasl Plaza in the centre of Expo2020. It will have an enclosed space of 724,000 cubic metres, 65 metres tall and a diameter of 150 metres once it is fully assembled. The structure was shipped through Jebel Ali Port from Italy and moved to the Expo venue by road. DP World infrastructure made this dream possible for Dubai. Al Wasl is the figurative centrepiece of the Expo2020 in the Expo design connecting the three themed pavilions together and acting as a central hub for the Expo.

In 2016, DP World became the third official partner for the Expo2020 in Dubai after Emirates Airline and the national telecommunication company Etisalat. Jebel Ali port, located 10 kilometres away from the Expo site is named as the premier global trade partner for Expo2020. Participant 27 reflected on this relationship as a mutual benefit outcome as DP World will play a major role in the supply chain for Expo while serving nearly 3.2 billion people. Expo2020 and DP World are acting as the gateway to one of the most significant geo-economic areas with a GDP of more than USD 6.5 trillion. The study observed the remarkable partnership between different entities in Dubai which reflects the leadership vision. Each entity strives to contribute further to the growth of Dubai and the success of Expo2020. It reflects the nature of stakeholders and the quality of leadership behind it. Expo2020 and DP World partnership will help in positioning the UAE and Dubai at the heart of the future global trade. During the sign-up of the official partnership in June 2016, Bin Sulaymen stated the following:

> Expo2020 will capture the world's attention and will leave a strong legacy and the same applies to DP World – we boost trade, build economies and create a positive future. We are a Dubai flagship company enabling trade in 40 countries and have a similar mind-set to Expo – thinking ahead, innovating for the future, which makes us a natural choice as Expo2020's global trade partner.

The sustainability considerations reflected from another important contributor to the transport case study for Expo2020 after the RTA. Both entities so far reflected the sustainability considerations and the plans to be world pioneering service providers. This vision is embedded in both entities through multiple achievements before Expo2020. However, both entities entered partnerships with Expo2020 in order to accelerate their progress, benefit the green economy of Dubai, build a sustainable future for the city, and brand Dubai as a hub for the entire region.

5.13.5 Dubai Airports

Dubai Airports is the agency responsible for operating and developing the two main airports of the city: Dubai International (DXB) and Dubai World Central (DWC) formally known as Al Maktoum international airport. The vision of Dubai Airports is to be one of the world's active airport company by creating infrastructure that adopts a continuous development strategy, amazes the customer by providing unique experiences, sets new standards of travelling experience, and leads the innovation process in this industry. Air transport contributes to the GDP of Dubai by 28% annually; this is leading to positive impacts on the social and economic development. Dubai Airport strives to follow ethical conduct in its business through honest, integrity, and respect for all the stakeholders.

Dubai Airport gives high attention to the social and environmental pillars of sustainability by first providing a healthy work environment through adopting advance safety and wellbeing practices with their employees along with an attractive and rewarding career system. This was observed by visiting both airports and chatting with some employees who confirmed this aspect of wellbeing and asserted that they are receiving continuous training for skills development which will help them to improve their career. Second, Dubai Airport's stakeholders are also encouraged to develop a sustainable approach in work. Third, in the environment pillar, Dubai Airport is working in reducing the impact of it is operations on the carbon footprint of the city. Dubai Airport recycles thousands of items of paper, cartons, plastic and aluminium cans across both airports, has implemented efficient lighting, and uses flow arrestors in order to control the water consumption. DXB targets to reach a carbon-neutral growth by 2020.

DXB opened in 1960 and has an annual average growth rate of more than 13% per cent every year. Currently the airport is serving 88.2 million customers per year, almost

eight times the entire population of the UAE. The airport connects flights for 240 destinations through 100 different airline companies. DWC airport opened in 2007 as part of the entire airport city. It initially opened for cargo operations until it started serving passengers in 2013. The DWC has a long-term development plan, once it is completed by 2025, to be the largest airport ever built. The DWC is located in Dubai South, the same area as Expo2020 and expects to handle a capacity of 120 million after the first expansion and 260 million in the second expansion phase.

Dubai has two main carriers jointly work together, Emirates Airline and Fly Dubai. Emirates Airline, one of the world's largest international airlines, is an independent entity that is serving 155 airports in 83 countries starting from Dubai. The operating revenue was delivering the group the thirtieth consecutive year of profits which increased from USD 22.4 billion in the financial year 2013-2014 to USD 25.08 billion in 2017-2018. While reducing cost, Emirates was able to carry 58.5 million passengers and invest USD 2.7 billion in new aircraft and equipment, acquisition of companies, modern facilities, and employees' initiatives in 2018. In addition, the company announced an agreement to purchase 40 new Boeings at a cost of USD 15.1 billon with a delivery date in 2022. Along with that, another agreement of USD 16 billion has been set with Airbus for 36 additional aircraft. Those new investments along with the already massive existing investments will form the gearing to carry the 25 million visitors for Expo2020.

A travel-planning platform Rome2Rio reviewed air fares for different carriers around the world and found that Emirates Airline is one of the most affordable airlines with a price of USD 0.11 per kilometre. Without compromising on the quality, Emirates Airline was selected many times among the best carriers in the world. This is taking place further after the introduction of a new hi-tech range in the first-class suites like

virtual windows and video calling. Emirates is working on reducing fuel consumption in a range of different ways. First it maintains the average fleet age at 5.7 years by replacing old aircraft with new efficient ones, which help to reduce emissions per ATKM. Second, the carrier is working with flight operations and traffic management to optimise the best flights routes which reduce time, fuel consumption, and emissions. Third, the carrier is adopting many ground initiatives to reduce emissions. Emirates SkyCargo is one of the world's largest international cargo airline carrying a record of 2.6 million tonne kilometres flown (FTKMs). The revenue of this company is USD 3.36 billion per year.

From this we can see that the air transport sector in Dubai is both sustainable and profitable and being managed with the same leadership mentality applied in different entities. It represents a reflection on the success of the Dubai leadership management in setting the right targets and initiatives, planning resources properly, and fostering a global destination that will amaze people in its sustainable approach. Dubai's transport sector case study reveals how this city is setting the framework for the sustainable hosting of a mega-event and continuous development with a massive investment in the infrastructure. It is doing this in an organised manner, using methods that do not impact on Dubai's residents despite the size of the mega-event taking place in 2020. The impact of design, plans, and leadership of Dubai infrastructure represents a significant contributor to this sustainability model. Expo2020-related infrastructure developments are ongoing within the overall development plan of Dubai to be a progressive sustainable city, and this project became part of multiple projects to serve the same purpose.

5.14 Cross-case Analysis

This section analyses the findings of the three case studies presented in this chapter. The study aims to answer the research question and develop an understanding of the sustainability practices and legacy planning considerations while preparing to host a mega-event for the first time. The four theoretical propositions have been presented and tested in the three case studies and the findings are discussed in this chapter. This cross-case study analyses the impact of sustainability and legacy in terms of the planning and preparation to host the mega-event, then assesses those cases by comparing the practices in each sector with the others under the main themes of legacy and sustainability.

5.14.1 Utilities and Mobility

Comparing both cases revealed a number of similarities and differences between the two sectors and uncovers the intention underpinning the sustainability considerations in each sector. The study compares case studies 2 and 3 as both cases have multiple similar stakeholders and common business models related to serve Expo2020 as part of Dubai. The construction sector is more focused on a specific project and has different business models that are considered later. Table 5.11 presents this below.

Table 5.11: Similarities and Differences of Sustainability considerations for cases 2 and 3

Sustainability pillars and success factors	Similarities	Differences	
	Cases 2 and 3	**Case Study 2** **Utilities**	**Case Study 3** **Transport**

Economic	- Having economic sustainability from their own operations and strong financial stability	- One entity with different agencies that work under DEWA's financial stability	- Different entities with different economic systems that each one has to create its profitability separately
	- Sustainable supply and progress is more important than the profitability of the entities	- Solo supplier - Affecting the cost of manufacturing and doing business	
	- Contribute to the green economy		- Solo and multiple suppliers
	- The sustainability considerations are embedded in the vision of the entity		- Affecting the manufacturers' proximity to international markets
	- Form a big part of Dubai's infrastructure attractiveness		
	- Have development and projects related to hosting Expo2020		
	- Going through development plan to increase capacity before		

	Expo2020 - Multiple sources of income - Improving services to become cost effective as it will affect the overall development of the economy - Apply public-private partnership - Applying advanced procurements practices and multiple supplier environment awareness and practices is applied.		
Social	- Having stakeholder engagement framework - Happiness is important - Woman empowerment - Stakeholder satisfaction is high - Set targets for Emiratisation	- Most of the stakeholders are living in the UAE - Disturbance in supply may affect the life in the UAE - Applied multiple pledge campaign to spread the culture of sustainability - Strict anti-corruption	- Having internal and external stakeholders - Running operation for infrastructure - Providing luxury client experience - Reflect the vision

	- Developing employees	strategy	of Dubai to the international visitors quickly
	- Large workforce		
	- Focusing on internal and external stakeholders		- Public transport and travel air fares are affordable once compared with the same service quality in different countries
	- Having plans to reduce demand side		
	- Encouraging people to come together and served as bulk		
	- Work in providing services online		
	- Promote employee diversification		
	- Setting strategies to manage stakeholders' behaviours to be more sustainable		
	- Applying multiple programmes for talent acquisition and talents retain programmes		
	- Adopting multiple social responsibility		

	initiatives		
Environment	- Having environmental planning targets - Working hard in reducing the sectors' carbon footprint - Having a high polluting industry, which both sectors are challenging by introducing green solutions - Adopting the SDGs - Adopting energy mix - Applying multiple energy efficient initiatives - Protecting the biodiversity of the city - High stakeholder awareness about annual sustainability reports	- Limiting the environmental impact decision is in the hands of the entity - UAE location and weather is a big challenge for sustainability	- Different types of stakeholder affecting the overall sustainability performance of the sector - The UAE's location is a contributor in the business model of transport and its sustainability - Having global education programmes

	- Both entities have ISO-14001 for environmental management system - Working in exceeding the environment sustainability considerations for a mega-event		
Leadership success factor	- Having inspirational leadership to achieve sustainability pillars - Setting long-term plans beyond Expo - Being a role model for similar entities in the region - Encouraging innovation solutions - Leadership vision is respected - Trying pioneer projects - Sustainability in the core business of the sector	- The sector is controlled by DEWA and the Supreme Council of Energy - Having several partnerships with the national grid system - -	- Transport sector is widely scattered through multiple sectors and agencies - Rail system between Dubai and Abu Dhabi has no direct connection - - -

	- Transparency is high - Assets sustainability and continuous development is a leadership direction - Sustainability embedded in the vision		
Design success factor	- Design that considers future generations, innovation, creativity, and sustainability - Continuous improvement - Planning for the outcome of each project before execution. - Both sectors directly influence the construction sector - Adopting multiple smart solutions	- Decision on design is a Dubai-made selection - Expo location has no direct impact on the service supply for the event - Limited tangible considerations for design identity. -	- Designs have to comply with international requirements of entities outside the UAE - Expo location was selected carefully to create new business hub outside the city centre - Design reflected the UAE's identity

	- Multiple sources and stations for each service		

The similarities between the core case studies reflect the multiple sustainability considerations that Dubai is adopting while preparing to host Expo2020. It reflects a vision and leadership standing behind the driving forces of sustainability. In case study 2 the intensive contribution of sustainably is being achieved through the supply side while case study 3 was contributing through managing the demand side and working in changing customer habits. For both case studies, sustainability was being implemented before and beyond Expo2020 as the size of investment in both sectors started way before winning the bid to host Expo2020, and both cases have plans to stand long after the event is over. There is no doubt that Expo2020 will affect those sectors, however, it is a project which fits within the set development plan and is not being driven by it.

The cross-case analysis for cases 2 and 3 showed the importance of equal prioritisation for the three pillars of sustainability and introduced two success factors represented by *Design* and *Leadership*. The study's findings are that without those two success factors, the impact of the three pillars will not be augmented in the same way that they are being managed currently. In addition, this empirical case research presents the role of the running development plan of Dubai in easing the impact of hosting the mega-event and how this massive project was managed as any other mega-project being executed

in the UAE. The size of business and development along with the sharp increase of the UAE population reflect the ability of the country to deal with multiple large size projects. The empirical data and case analysis provide evidence that the event owner should examine the Dubai case study intensely and change the awarding method from following the conventional way in considering bidders based on promises to initiate a development plan rather than awarding it to countries that have a running development plan. In this way, the event owners will reduce the negative impacts of hosting a mega-event as happened on many occasions, as discussed in the literature review.

Legacy

The legacy considerations in both entities are a result of the leadership vision of hosting Expo2020, while investing in sectors which will serve the future generations. District 2020 was a representation of how the legacy considerations plan of Dubai is developing in between the spending on the event and building a strong legacy for the future generations; the cases studies of utilities and transport reflect this fact strongly through the presentation of the method of development before Expo2020 and how both entities are executing projects that affect the mega-event yet with strong legacy considerations for the impact of the investment after the event. Table 5.12 represents the legacy considerations and similarities and differences between the two sectors.

Table 5.12: Legacy considerations similarities and differences in cases 2 and 3

Legacy Consideration	Similarities	Differences	
	Case (2) & (3)	Case Study (2) Utilities	Case Study (3) Transport
	- Both sectors have investments in	- DEWA's direct investment for Expo is	- RTA has a massive investment

Tangible Legacy	billions before and after Expo	represented by the three solar stations to supply green electricity to the event	related to Expo2020 in roads, bridges, metro lines, public buses and hybrid cars. Those investments are going through a legacy plan created as part of hosting Expo2020
	- Will serve in boosting the international investment contribution in Dubai		
	- Present the city as an international destination to do business	- The massive water desalinisation plants is considered a necessity project for Dubai with or without Expo	
	- The legacy plan for this increase in capacity is well planned for the period after the event	- HH Sheikh Mohammed bin Rashid's Solar Park contribution for the future generation in clean energy	- Dubai investments in transport have multiple international success stories through acquisition and operation management
	- Provide a new business case for government entities		
	- Revenue diversification		- Further advertising for Dubai transport solutions
	- Expo2020 to leave		

	a long-lasting legacy in the sector		- Dubai to strengthen position as a trading hub
Show case	- Looking for this event as a chance to showcase the best practices being applied in the UAE - Decrease carbon density in both sectors	- Solar park, smart grid and many other initiatives present a chance for the region to learn from - Represent a real case that sustainable utilitiesare no longer expensive	- Raise the standard of transport - Change the concept of public transport in the region - Dubai as the first regional hub in transport - Existed infrastructure helped in taking further challenges like Al Wasl plaza's massive trellis

Economic Growth	- Will benefit from the increase of GDP in further development - Official partners of Expo2020 as part of the joined-hand strategy in delivering exceptional mega-event -	- Utilities have to be ahead of the development to facilitate the process	- Expo2020 and transport infrastructure represent a gateway for the region
Intangible Legacy	- Both sectors have international recognition in the efforts of SDGs - Image of Dubai as a green economy and modern affordable infrastructure will create value for generations to come		- Dubai as a tourist destination - Dubai as a business hub - Dubai as a transport solution - Dubai management style in acquiring international carriers and managing ports as a key success factor

	-Pioneer services change the image of the destination		- Responsible planning requires integration between transport planning and urban planning
	- Further marketing of Dubai as a tourist and business destination will enhance the country's image as a gateway for the entire region		- Integration between different transport means is the key for sustainable transport
	- Happiness is a big contributor to a sustainable economy		
Catalyst for change	- Expo reinforces Dubai's role in the international collaboration in facing sustainability challenges	- Life design of utilities is going beyond 25 years	-Smart traffic solution and control hub are key for traffic management system
	- Showcase for the importance of the	- Emergency plans and readiness for disasters are part of the sustainability	-Reduction in the service life for transport will have

	public private partnership - Health and safety consideration is in the top priority of doing business - Diversification is the key for success - Innovation requires strong social and technological consideration - Retention of women's empowerment and talents retain is vital for continuous improvement - Sustainability awareness is a strong contributor to SDGs	considerations for utilities - Innovation is a key factor for improving entities' performance	a positive impact on the sustainability considerations for the transport means - Innovation is the key factor in creating a competitive edge -Continuous development plan to transfer Dubai into a futuristic mobility network

	- Stakeholder engagement will amplify sustainability and introduce new practices - Stakeholder satisfaction requires continues revision - Technological investment will give the city a competitive edge - Responsible carbon offset plans and carbon neutral strategy have multiple benefits layers		

This table addresses multiple considerations in the thesis and presents the role of the mega-event in creating a legacy as well as being a catalyst for change. The analysis and interpretation of the case study is that those two considerations may become the

future rationale for hosting a mega-event. Without this, using the mega-event as a development trigger plan has shown that it is not the right plan or method of management to create a long-lasting legacy. The analysis compares those two cases in order to provide another comparison between the two cases combined and in the case of construction. In developing countries, the utilities and transport are usually the responsibility of the government as the sole supplier. Dubai is still adopting this methodology by retaining the investment in both sectors in the hands of governmental entities yet at the same time promoting partnerships between private and public in the innovation and technological parts. This is intended to achieve the best of both sectors for the current development stage. In the future, Dubai and the UAE are trying to transfer into developed countries where competition between private and public sectors is the key to enhancing services, and where the government is the facilitator of investment and not the investor. The findings support the idea that hosting such a mega-event may play a role as a catalyst for change in this manner even with limited evidence that this may happen soon. Anyhow, with such type of development and care by the government to ensure stakeholder satisfaction, this may not be a pressing subject. In the following section, the researcher presents a cross-case analysis between construction from one side and combined utilities/transport from the other side.

5.14.2 Cross-case Analysis of Construction with Utilities and Transport

The selection for undertaking this cross-case analysis between case 1 with cases 2 and 3 is enacted in order to facilitate the testing of the research propositions as this thesis has multiple propositions and three main research questions with multiple sub-questions. In the following table, the study presents the sustainability considerations during the preparation stage of hosting Expo2020.

Table 5.13 A comparison between the positive and negative considerations in hosting a mega-event along with the things that this research did not cover.

Sustainability considerations	Positive considerations	Negative Considerations	Things that were not covered
Construction and utilities	- The application of Green Building Regulations represents a massive step for sustainable construction that will save on utilities - District cooling is a major contributor to respond to the challenge of UAE weather - Design considerations for sustainable construction	- Completion certificate became a complicated process with multiple stakeholders to satisfy - Civil defence approval is a separated approval then Dubai Municipality one, researcher questioned why it cannot be combined under one certification	- Sustainability awareness or site workers was not tested by the researcher - The impact of using smart controls meters and irrigation on Dubai construction sectors was not tested - Dubai's construction costs under the Green Building Regulations were not tested compared to other GCC countries

	- Selection of materials represent another contributor for energy and water saving - Dubai Municipality set sustainability rules in coordination with DEWA to provide building permits and building completion certificates - Expo2020 requirements for energy and water represent a small figure of what Dubai will require with the continuous development plan		

Construction and Mobility	- Expo2020 is going to be the largest Expo in terms of international visitors during the 168-year history of World Expos	-The researcher observed massive amounts of high fuel-consumption cars on the roads more than any other places he visited	- The researcher was not able to study the impact of the UAE topography on the country's mobility
	- DWC and DXB represent an answer to Dubai's readiness for such massive amounts of international visitors	- Currently, UAE does not apply any taxes on high fuel consumption car	- The researcher will complete the research ahead of the event which will not give him the chance to report the mobility consideration of the event
	- Dubai invested USD 1.9 billion before Expo2020 award which reflect the city plans for constructing an international infrastructure	- The increased number of flights will leave a high impact on the mobility carbon footprint	
	- Expo2020 will be a new destination		- The researcher is looking to see the waste streams to create bio-fuel from Expo2020 site

	of Dubai for leisure, office spaces, learning centre, exhibitions, and conferences which will keep the District alive after the event		
Construction of the mega-event venue	- Compliance with minimum environmental considerations are mandatory - All the constructed buildings in the site have a LEED Gold certificate - Using BIM represents a great supportive tool to ensure the proper planning for the project	- Building Dubai South district with massive amount of apartments and villas will affect the overall real estate market - Local design firms did not get any major packages in Expo2020 which represents a shortfall of the event which promotes international firms on the account of the local architectural firms	- Land use plan for Expo and the Dubai south in general was discussed in limited manner without covering Dubai South overall development plan - The economy growth resulted from the construction sector for business related to Expo2020 - The researcher did not consider the reasons behind the price drop in real

	-District2020 is the answer to the previous criticisms for the mega-event legacy considerations - Construction waste management in the Expo2020 site reflects the environmental awareness of the mega-event team management and how much they have learned from previous mega-events - Expo2020 learned from the experience of previous mega-events which had to compromise multiple		estate - The researcher was not able to learn much about the 'city readiness' subcommittee set by Expo2020 for ensuring co-ordination between different local and federal entities ahead of the event -Role of Youth in Expo2020 success was not covered intensively - UAE-based main contractors like Al-Futtaim Construction, AL Naboodah Construction, Besix, Khansaheb, and Tristar Engineering provided limited information in this research due to the regulations that made it hard for the

	sustainability considerations due to deadline pressures Expo2020 is planning to be ready way ahead the event		researcher to access the site - Qatar diplomatic crisis made it impossible for the researcher to compare Expo2020 sustainability practices with Qatar World Cup2022 practices

The sustainability in Dubai is going through a set of governance processes and under the umbrella of UAE Vision 2021, Dubai Plan 2021 and the United Nation's 2030 agenda for sustainable development. The UAE, as one of the effective players in the 2017 Paris Agreement, committed to multiple important steps in persuading sustainability. A study by consultants EY commissioned by the Dubai government showed that the Expo2020 is projected to contribute USD33.4 billion to the UAE economy in the period between 2013 and 2031. The Department of Economic Development (DED), the agency responsible for Emirates' economic policies, forecasted that the UAE GDP is expected to grow to 3.8% in 2020 from the expected 2.1% in 2019 after the disappointing growth of 1.94% in 2018 due to the downturn in real estate market which lost almost a quarter of its value since 2014. The GDP is expected to fall to 2.8% by 2021 considering a low-case scenario for future growth. The study presents these figures to advise that the direct economic benefits of hosting

a mega-event are not worth any country making the investment if they do not have an ongoing and sustainable development plan.

Legacy impact on construction compared to transport and utilities

The study supports the idea that along with all the stakeholders benefiting from hosting Expo2020, those who will gain the most will be the residents of Dubai. This event is lifting the sustainability in utilities and transport systems, opening up further avenues for future international events, enhancing the sustainability awareness and benefiting from the economic upgrade. The District2020 represents the name of the city that will be named after the completion of Expo2020. In the literature review, the study presented a long list of criticisms for hosting a mega-event and how it is impossible to justify the massive investment for a short period of time. Dubai leadership has attended to this problem planning to maintain this legacy district long after the completion of the project. Furthermore, as the area is going to make an intensive investment in transport means and utilities, Dubai leadership decided to develop the full area around the Expo2020 site under a new development called Dubai South. Currently, a massive amount of construction that was observed is underway. Many buildings and villas and a logistic city are being developed around the Expo site. This area represents a gigantic construction site. Furthermore, many new practices in dealing with the site workers compared to other construction sites were witnessed. The Expo2020 team adopted high levels of workers' welfare for the work and living conditions of the construction workforce, the safety factors, the salaries assurance, and the working hours. This will generate a snowball effect in the construction field to change the conditions of the workers, a situation which was criticised by the West for many years. However, all of this remains a tangible legacy compared to the overall image of Dubai and the positive impact on national pride which Expo2020 is going to leave for years to come.

Comparing the three sectors' legacy considerations, the study confirms that these were calculated and planned before the start of the planning for the mega-event. This finding is going to be presented in the recommendation of the framework to host a sustainable mega-event as it should have a solid legacy plan that reflect the needs of the city. Dubai has been implementing a comprehensive development plan since 2005 and will continue to move forward with or without Expo. Expo2020 is used as an esteemed goal that joins the efforts of different entities in order to continue the path of excellence and development in a sustainable way. The leadership of Dubai represents a role model in how to initiate a development plan, seek ways to improve it, create joint values around it, have stakeholder involvement, and adopt the continuous development plan with the target to be among the best city in the world. The legacy and sustainability in the Expo2020 case study presented so far reflect two sides of the same coin in hosting a sustainable mega-event with a long-lasting impact. Expo2020 remains a chance to make Dubai the gateway for the region, and improve its position as a centre of excellence, sustainability, innovation, and leadership.

5.15 Role of the Research Interviews in the Study

The findings of this research rely on the data collected through interviews conducted with major stakeholders from sectors that make an influential contribution to the overall sustainability and legacy of the mega-event. Those interviews were recorded, scripted, compared and analysed in order to find evidence about the success factors for sustainability. Semi-structured questions were supported by secondary data prepared in advance, and the interviewees were asked to justify their answers where these contradicted or diverged in some respect from data published in the academic and industry literatures. A number of interviews therefore took longer than expected, as the interviewees were elucidating their answers or responding to comments made by the

interviewer. The interviewees' awareness of sustainability and legacy considerations was remarkable and embedded in their daily routines as well as in their entities' strategies. In addition, these interviews provided a method for corroborating actual practices of different stakeholders in order to assess and, to some degree, confirm the information collected through secondary data.

The sustainability success factors were initially generated from the interviews, as the literature review on the design and leadership factors did not reflect the role that these factors are playing in Expo2020. The majority of interviewees highlighted the role of leadership in directing different management teams towards sustainable concepts of the mega-event, while others reflected more on the role of planning and designing a mega-event wisely in order to create a sustainable legacy. The multiple sources of data from three different sectors provided a chain of informative evidence about the consistency of the information provided by different stakeholders. Design issues appeared strongly in OG 2012 in the structures of the venues, as in this case there was the additional dimension of the role the venues would have in creating the long-lasting legacy. In addition, all interviewees referred frequently to the role of the leaders of the UAE and Dubai in directing them through different management layers in order to achieve better sustainability and create a long-lasting legacy, thus providing some evidence of leadership's influence through the awareness and plans of stakeholders to achieve sustainability. The IOC shaped the bidding process of the OG 2026 by requiring consideration of infrastructure needs for the population in each candidate city (Preuss, 2019). The interviews conducted for this research represent a reflection on how Expo 2020 is developing the District 2020 plan, based on the development requirements of the city and how Dubai is building in this current development a legacy for future generations.

5.16 Chapter Summary

To summarise this chapter, the three case studies used in order to present the sustainability and legacy considerations adopted by Dubai in general and the management of Expo2020 by giving equal priority to the different pillars of sustainability. This case study offers proof that persuading sustainability requires a joint effort from different entities with strong leadership and proper design for each step. Furthermore, the cases show that Dubai is doing what it used to do before Expo2020 yet with a new purpose to combine the efforts around it. It is not the first time that Dubai is executing a mega-project, or developing a modern transport system, or investing in utilities to achieve world-class level. Dubai was doing so before Expo2020 and attended to several sustainability considerations even when this term was not as popular as it is today. Yet this event, with the seven years' preparation, has created goals that each entity or department wants to perform with excellence to contribute to the success of Dubai in this event.

This thesis presents the argument that executing a sustainable project is not as expensive as it used to be. Having a market that is ready for and aware about the importance of doing so represents the core of achieving a sustainable mega-event. Dubai market maintained a steady development in this direction before Expo and used the event to accelerate this infrastructure development once preparation for Expo2020 began. The social participation in the preparation of Expo2020 also represents a new development for the social pillar in the UAE along with all the other initiatives to improve the unbalanced figures of the gender in the UAE society presented earlier. The culture of volunteering is something completely new particularly in the numbers that are involved. The environmental considerations represent a part of the international effort to reduce emissions; however, Dubai and the UAE joined these international

efforts, and even though their contribution, with the small population compared to China or the USA or India, represents a minimal impact, it is helping in setting an example to many other countries. This inspiration process is part of the overall justification for hosting the Expo2020 mega-event.

The tangible and intangible legacy for Expo2020 will not be determined easily from now. We have to wait for many years after the event to present the actual outcomes. However, from the way that Dubai is planning, we can expect that the event is going to leave a legacy in research for a sustainable future, international joint efforts for solving humanity's common difficulties, and will continue to position the UAE as the gateway of the region. The framework of hosting a sustainable mega-event will include many points: First, a supportive leadership that believes in sustainability considerations and wants to contribute to the world in this direction. Second, the sustainability pillars have to be equally prioritised as ignoring one pillar will affect the overall system. Third, as much as a legacy plan is important, the way that legacy is reached is important and has to be planned in a flexible way to adopt future development and changes. Fourth, the mega-event should come as part of an ongoing development plan. The event owner should not accept any bid that will use the mega-event to initiate such plans as it will never be sustainable. Fifth, the mega-event management teams should be aware about the shortfalls of previous events and ensure that their plans for their new events will not repeat similar previous mistakes.

Chapter 6 Discussion of the Results and the Proposed Sustainability Framework

6.1 Introduction

In the previous chapter, the results of the three case studies based mainly on interviews with a selected number of key stakeholders and a review of secondary documents were reported. The analysis and interpretation of the field observations from the Expo2020 case study was presented. This chapter discusses the final research results and elaborates how the thesis was able to meet the thesis objectives and answer the research questions. The main research findings and the contribution to knowledge are also presented; these include the mega-event sustainability framework and comments on the preservation of the sustainability commitment over the ELC by testing those practices in the three main contributing sectors that will host the 2020 mega-event. The discussion also addresses the role of legacy in the sustainability plan and how the hosting destination can create a long-lasting impact. The research limitations, and suggestions for future research conclude the thesis.

6.2 Summary of the Sustainability and Legacy Considerations in the Mega-event

Researchers argue that different mega-event types share multiple similar features in terms of repetitiveness, exposure, bulky spectacles, limited time period and the cost of hosting. With the growing trend of developing countries playing host to mega-events, the challenges of doing so start being discussed. A mega-event boosts the hosting city's GDP, increases foreign investment, creates employment and enhances the economy. However, those benefits come with risks of increased inflation rates, mass relocations and changes in socio-economic groups, pollution, reduction in social aid, and increased congestion. Heavy investment in infrastructure, pressure on resources, intensive

development of specific areas, and challenges to the hosting destination's sustainability model are the main reasons for initiating the discussion about the sustainable mega-event. Sustainability is viewed as the end goal of the Expo2020, grounded within the three pillars of social, economy and environment. At a later stage, converting the value of sustainability to the stakeholders brought multiple challenges which drew further interest in the legacy concept. Hosting a mega-event requires massive investment in construction, transport infrastructure, and utilities, and the legacy it leaves reflects the rationale of hosting and investing in it. A literature review by Mair and Withford (2013) suggested that mega-event literature focused around three main topics: (i) event impact; (ii) link between hosting mega-event and tourism sector development, and (iii) event types and definitions. Subjects like socio-cultural and environmental impacts are under-researched comparing to economic benefits. This research was able to provide a new dimension of the mega-event hosting process include sustainability considerations for the entire city and not for projects related to the event only. Furthermore, the legacy outcome of hosting mega-event was discussed in terms of the overall legacy outcome and not the mega-event legacy only. By doing so, the mega-event impact was given a wider impact perspective on how the event impact the city, researching the mega-event influence beyond tourism and venues, and generates a new perspective of hosting mega-event as a catalyst of change.

This thesis evaluated the sustainability pillars of hosting a mega-event for the first time in the MENA. The three cases he presented were based on the sectors that contribute most to the mega-event – these are *construction, utilities*, and *mobility*. Expo2020 has two main themes –sustainability and mobility. This represents a unique chance to test those themes while the Expo management themes were considered of high importance. Previous researchers (Pelham 2011; Dodouras & James 2004) addressed the challenges

of hosting mega-events through points like resource utilisation and responsible sourcing, urban legacy project and vision, deploying the mega-event as a catalyst of behaviour change, stakeholder engagement, and achieving a carbon-neutral strategy. The study presents how Dubai is emerging as an innovator in inter-urban planning which Lauermann (2019) argues, communicates knowledge of sustainability that cities hosting mega-evetns can use as a model for visualising and designing sustainability.. The three case studies show how Dubai is going beyond those considerations by providing a new level of planning to host a sustainable mega-event in the three case-study sectors along with implementation of a strong legacy plan.

6.2.1 Economic Pillar

The construction of Expo2020 started in July 2016. What followed was the removal of four million cubic metres of earth in preparation for levelling ready for construction. During this phase, the site progress was periodically observed. Expo2020 in Dubai is 10% larger than the last Expo2015 in Milan. Prior to wining the hosting bid, the head of Dubai's Supreme Fiscal Committee expected that the Expo would cost Dubai USD8.1 billion investment in infrastructure. It is still too early to give the final approximate figures; however a recent study showed that the current cost to date is USD32.8 billion. This over-budget spending has become common to most of the mega-events where the hosting committee uses the legacy considerations to justify it. Baade and Matheson (2016) advised that from 1968 to 2012, every single Olympic Games (OG) spent well over budget. For example, the Beijing OG2008 costs shot up to around USD45 billion mainly through the spending on high environmental obligation. Years later, Russia exceeded this figures by spending USD51 billion on the Sochi OG2014. Currently, in year seven of the ELC of Expo2020, the event was not able to boost the UAE economy as expected, which led to a 25% drop in real estate prices compared to

2014.

The three case studies consider the economic component of hosting a mega-event and list the benefits of doing so. Expo2020 is contributing to the overall sustainability plan of the city by having joint goals that different entities are trying to serve with excellence. This is improving different entities' performances led by the Dubai Strategy 2021 along with the mega-event. Expo2020 will leave a massive construction site that will serve the UAE economy for years to come. This location, named District2020, will become a business hub for the region, boost the economy, boost the transport sector, host international companies, create new communities, attract foreign investment to the UAE, become a research centre, encourage responsible business, apply the latest technological considerations, and drive Dubai forwards into the new era. The infrastructure support in utilities and transport will offer a long-lasting legacy for the site and develop a business hub that will serve as a gateway for the region. In April 2019, Dubai became the first city in the MENA region to receive a Platinum Rating in the LEED for Cities certification awarded by the USGBC. This certification reflects the efforts of the city's leadership to become a global hub for sustainable development, where hosting Expo2020 represents one aspect of this. For the financial side, Dubai was able to finance the development in infrastructure through a strong business case for Expo2020; however, this requires continuous review in order to maintain this positive development plan. The USD 20 billion Abu Dhabi transferred to Dubai in 2009 rolled over for five years in 2014, and is due for repayment in 2019. A Reuters report on the 5th February 2019 advised that Abu Dhabi is expecting to roll over this loan for the second time as the Abu Dhabi government and the UAE Federal Central Bank agreed to refinance the debt for a further five years at a 1% annual interest rate (Carvalho & Barbuscia 2019).

Over the course of the six-month event, around 25 million visitors – with 70% percent international visitors – are expected to pass through Expo2020 gates. This figure represents the total number of Australia's citizens. EY Consultancy divided the Expo impact into three blocks: seven-year build-up to the Expo, the Expo being held for six months, and the ten-year legacy period. The gross value added (GVA) to the economy for the pre-Expo period is expected to be USD 10.2 billion, with a further USD 6.1 billion expected to be the GVA of the Expo2020 event generated through spending on hotels, hospitality and business services. The legacy period is expected to generate around USD 16.9 billion as the legacy infrastructures start to pay back the investment. Expo2020 is expected to generate direct results of USD 15.1 billion out of the overall impact of USD 33.2 billion. Matthew Benson, the EY's leader in the Middle East and North Africa advised that those figures are intended to be an incremental calculation that does not include development which may happen anyway without Expo. Those figures represent the actual contribution of Expo2020 to the economy. The tourism sector is a strong contributor to the Dubai economy; a sector that represents USD 8.3 trillion per year; 10.4% of global GDP. Hosting the mega-event will encourage more people to visit Dubai and to repeat this visit after the end of the event. From this it can be seen how Dubai Government has planned to generate the maximum economic outcome of Expo yet with high potential gains hinging more on the legacy period than on the Expo2020 fair itself. The Expanded Dubai Exhibition Centre (DEC) is a key player in the legacy period and is expected to attract around 1.6 million visitors per years to the site along with the expected 1.1 million overseas visitors who will come to see the Expo site post-event. Those figures represent a respite for the risk that Dubai is overbuilding for the Expo with Government-related entities (GREs) like RTA, DP world, DEWA and Dubai Airports spending billions on investment. The case studies

(2) and (3) were able to confirm the economic pillar of sustainability of those entities and their ability to overcome the long-standing debt problems by showing their ability to invest in the utilities and transport, pay back the investment cost, and still remain profitable.

6.2.2 Social Pillar

By May 2019, the construction on Expo2020 site reached more than 100 million working hours through 40,000 workers on site, who are completing their jobs in a high employee welfare environment in housing, payment and healthcare. Expo2020 health and safety considerations were able to respond to the continuous criticism of the safety considerations in the venue in developing countries (Preuss 2013). In addition, Dubai did not face any corruption scandals in securing this event, unlike the case faced by Qatar WC2022. The three case studies reflect a strong set of social considerations for sustainability that were adopted on the site as presented in the cases. However, the strongest contributor to the social pillar is going to be the transport system, particularly the Expo2020 metro line named Route2020. This 15 kilometre metro line will have a capacity of 522,000 passengers per day and will serve Expo2020 and the surrounding areas in the legacy period. This project will enhance the liveability of the Dubai South neighbourhood, will be a cost-effective transport solution, and will provide high quality service that is safe and trusted, similar to the case with the current metro line. This project will leave a long legacy of Expo2020 for the region being served and for the UAE, in general.

Expo2020 has succeeded in increasing the volunteering spirit in the UAE with more than 30,000 volunteers committed to contributing to the event's success. Those volunteers come from different nationalities, age and background. Expo live team

stated that they targetted 30,000 volunteers while the actual people applied for this exceeded 50,000 people from 200 nationalities. This social achievement represents a strong outcome for the Expo2020 before it happens. Furthermore, a study of the global AfrAsia bank on the migration trends for the high-net-worth individuals (HNWIs) showed that Dubai is in the fifth place internationally in attracting those people. HNWIs are people with at least USD one million net worth assets. The HNWIs are usually attracted to modern destinations with low crime rates, good schools, good business opportunities, and a modern society. Dubai was able to provide this and Expo2020 has further affirmed Dubai's status as an attractive destination for the HNWIs. A World Bank report for 2017-2018 ranked the quality of roads in the UAE as number one in the world. Transport is a crucial driver of economic and social development which helps connect people to jobs, education, and health services, and ensures an efficient supply of goods and services. Transport accounts for 65% of global oil consumption and 23% the world's energy-related CO_2 emissions. More than 1.25 million people are killed in road accidents every year, and air pollution of motorised road transport attributes to 185,000 deaths per year according to the World Bank 2018. Those figures are addressed in the Dubai transport system and present the sustainable level of the city once compared to those figures. Expo2020 represents one indicator that reflects the advances of the UAE in traffic mobility, which are yet to be improved by Expo2020.

DEWA and RTA stakeholder engagement programmes aim to raise stakeholder satisfaction by reflecting the social sustainability that both entities are trying to achieve. They believe that this engagement should happen on multiple levels. Hosting Expo2020 even requires further collaboration, particularly between such large contributors. Expo2020 will also support 905,200 job-years between 2013 and 2031;

this figure represents more than 10% of the UAE population. The long-term investment is expected to be USD 33.4 billion as the impact on the UAE during those years will result in economic dividends that will benefit businesses, both large and small, across a range of sectors for years to come. The small and medium enterprises secured contracts of around USD 1.3 billion which support 12,600 jobs-years. This reflects the vision of Expo2020 in fostering innovation and supporting small business as per the EY consultancy report for the economic impact of Expo2020 Dubai.

The diverse nature of the workforce in the Expo team creates a special working environment full of energy and enthusiasm as seen during the visits to the Expo office. The Expo Academy and Emiratisation planning initiatives aim to learn from the talents of around 500 employees of 65 different nationalities who report directly to the Expo team, focussing on the transfer of knowledge to the UAE economy. These talented workers will have the ability to replicate the Expo experience in different events in the UAE and abroad. Furthermore, Dubai has a large number of exhibition centres and hotels, leaving the city well-prepared for future events. Expo 2020 will enrich this sector with experienced personnel, many of whom will join the sector after Expo has been completed. Expo 2020 offers opportunities for the local population of UAE to engage for the first time with an event on this scale, engaging young people through initiatives such as the internship and partnership programmes. In the first, the students are given the opportunity to work for Expo and to learn from this work experience for a few months, while the second is a nine-month programme aiming to attract potential employees and to hire them at the end of the programme. Expo 2020 is embedding Equal Opportunities for people with disabilities by integrating them into the workforce. Expo 2020 also plans to involve UAE citizens by offering tickets at affordable prices and, with hotels and hotel apartments that supply more than 100,000 rooms,

accommodation is plentiful. Expo 2020 is capitalising on the 200 nationalities living in the city to create a long-lasting legacy for this event.

In this chapter, the study has so far presented empirical findings and related ideas on how Expo2020 was able to provide a new social dimension to the sustainability outcome of hosting a mega-event. It arose as part of the overall city considerations to achieve social sustainability. Any mega-event that limits the social pillar solely to the mega-event itself, instead of considering the city social boundaries will never be able to provide a real standard of social sustainability that is capable of generating a long lasting legacy.

6.2.3 Environmental Pillar

The environmental considerations in Expo2020 were discussed in the three cases following multiple initiatives and processes. These included the mandatory green building compliance, design of the buildings, Expo2020 venue innovations in generating energy, adaptation of a passive energy strategy, selection of construction material, managing waste on site, using recycled materials, and much more. All those practices at the Expo2020 site presented in the construction case reflect the intention of Dubai to host a sustainable event that will leave a positive legacy in the construction sector. Case (2) also presented the efforts that DEWA is making to achieve a sustainable and clean supply of energy, starting from Sheikh Mohammed bin Rashid Al Maktoum solar park, the largest single-site solar park in the world, adaptation of RO water salinisation, use of energy mixes, a dependence on green coal and natural gas, and the notable achievement in being awarded the British Safety Council certification for the fifth consecutive year, and managing the demand side. Those steps reflect the efforts that this sector is contributing to ensuring a sustainable event. Case

(3) also showed multiple green initiatives like encouraging public transport by providing a competitive infrastructure, Smart Dubai, reliance on innovation in transport, ensuring a pioneering service, providing multiple transport means, reducing congestion, reducing stakeholders' travel distance, promoting electrical or hybrid vehicles, reducing transport emissions, investing in new vehicles and plans with better environmental performance, persuading advanced technology, and much more. Those points presented in case (3) reflect the sustainability considerations in Expo2020 and draw a clear path on how future destinations can host a sustainable mega-event and use the benefits of the advances in technology in creating a better model that will leave a long-lasting legacy.

The study did not ignore the upcoming impact of the international travel on the overall carbon emission percentage along with the emission of transportation means for goods to the Expo2020. However, those figures are not yet final, and those are an unavoidable emissions that will happen whether or not Expo2020 is awarded. The travel and tourism industry is one of the biggest contributors to the international economy and Expo2020 represent an advance representation of the benefits of getting the people together. But this is not to forget that Dubai is taking multiple radical steps in reducing carbon emissions by avoiding, offsetting or reducing it whenever possible.

6.2.4 Design Success Factor

The role of the design and planning for reaching actual sustainability and building a long-lasting legacy was discussed over the three cases. In case (1) presented the design of District2020 as a project that will inherit 80% from Expo2020's physical and digital infrastructure. This will represent around 200,000 square metres of LEED Gold structures built for Expo2020 that is going to be repurposed to create a new community.

It is designed to have a dynamic environment for businesses of all sizes with sustainable flexible buildings designed to reduce power and water consumption for the anticipated community of 90,000 people. In the same area, multiple social, cultural and educational facilities have been integrated within the design of the development including Al Wasl Plaza. Another 2,300,000 Gross Floor Area will be available for third parties to develop residential, commercial, hospitality, education and mixed-used spaces. The transition period is planned to start immediately after the closure of the event in April 2021 and future occupants will start receiving their units in October 2020. This project is going to be a unique experience to respond to the legacy criticism of mega-events. Dubai is going to benefit from the exposure of Expo2020; it is going to attract attention in the fields of transport, real estate investment, infrastructure capacity, manufacturing opportunity, being a safe place to live, international investment, and still use the construction built to achieve so in District 2020. This will establish an excellent example for future mega-event bidders and a lesson for event owners to seek answers for the legacy phase of each bidding dossier file.

The three case studies present multiple examples of and evidence for the power of the design in achieving a sustainable mega-event. The *construction case* presents the development of the Expo site, the Dubai Municipality design guidelines named green building regulations, the multiple ideas for recycling materials on the construction site, and design considerations to save energy and water. In the *transport case*, the study presents how the public transport design will contribute to the sustainability of the transport system in general, how planning for the future has given Dubai multiple competitive edges over similar cities, how the city has become a centre of air and sea transport, and how the plans set earlier always had the capability to expand. Those considerations reflect the real value of design capability in the city. In the *utilities case*

study, DEWA is designing an energy mix that will provide a sustainable supply for years to come. Furthermore, the urban and infrastructure development along with the economic and social legacy of Expo2020 are considered for the event and after it has finished. Dubai's flexible design and legacy considerations reflect the leadership quality behind the vision of Expo2020. The findings of this study provide evidence supporting the assertion that this mega-event project will meet the three pillars of sustainability, show the power of planning and design in the success of a mega-event and its legacy phase, enjoy the benefits of hosting a mega-event, and still use the investments made for the event for years to come. District 2020 represents an ambitious plan for a unique experience of legacy considerations that stands out from all previous hosted mega-event.

6.2.5 Leadership Success Factor

Expo2020 came as a result of the solid development plan that Dubai has implemented for many years along with stable economy, positive international contributor, and the UAE soft power strategy. Expo2020 is a reflection of the success of the leadership in building a country that has this international respect, is able and willing to contribute to the international efforts for sustainability, and which plays an inspirational role for the region. Furthermore, the leadership of Expo2020 has identified multiple challenges that those events face and planned ahead to avoid them. The challenges of a mega-event's misplaced allocation of resources and legacy criticism, the pressure of the deadlines and possible sustainability concessions, the infrastructure upgrades and the capacity challenges, the security concerns, and many others discussed earlier did not prove to be so problematic for Expo2020. This was established and related to others by comparing the Expo2020 preparation period with similar periods in different cases that were presented in the literature.

The success for hosting a mega-event is usually evaluated through the volume of participation, economic impacts and the gross value added (Thornton 2012). Expo2020's success will be evaluated after the completion of the event and during the legacy phase; however, the study reviewed multiple cases studies of different mega-events and found that the legacy and sustainability considerations in Expo2020 have multiple common points with one specific event – the London OG2012. This case was presented early on in this thesis to reflect the power of planning and leadership in achieving a sustainable mega-event, limiting the negative impact of hosting such an event, and planning for the legacy phase way before the event. With the multiple evidence presented in the three case studies, Expo2020 leadership is a key success factor for the event that, without the successful planning, would not be possible. Dubai leadership has proved that oil money's contribution to the success story of the city is limited once one compares what the city is doing with other oil-rich cities in the region.

In May 2019 Expo management advised that all the programmes for Expo2020 construction were being achieved, with 100% completion in infrastructure in the three-theme area. There are 86 buildings in the three theme areas, which will be used by the countries committed to be in Expo2020 for restaurants and entertainments. The three-theme area is joined by a basement that will connect the buildings and will be transferred to car parking in the legacy period as advised by Al Khatib, the executive director of real estate development for Expo2020 in an on-site press release. This fact reflects the leadership determination behind Expo2020 to prevent problems caused by the late completion of venues in earlier mega-events.

6.2.6 Dominance of Sustainability and Legacy Considerations

Expo 2020 is raising the bar of sustainability and legacy considerations for first-time hosts of a mega-event. In comparison with previous Expos, such as Milan 2015 – the first mega-event to obtain CES certification through the applied EMS and compliance with ISO20121 – Dubai Expo 2020 is bigger in size, maintaining its design commitment while Expo 2015 shrank by approximately 60 per cent of the committed size, resulting in an event one-fifth of the size of Shanghai Expo 2010. Despite its size, Expo 2020 is building the largest car park from recycled materials, setting new standards for green buildings, building the first self-sustaining building, obtaining a minimum LEED gold certificate in all buildings, and still developing a strong legacy. Furthermore, the energy supplied to the site comes from sustainable resources, the UAE population is engaged through multiple initiatives, the health and safety requirements are high, the workers' welfare is strongly monitored, the contractors and SMEs are connected through a transparent portal, and operate in a cost-effective way with strong economic performance. Expo 2015 faced substantial financial losses, had incomplete structures and an absence of transparency, destroyed the opportunity for Italy to re-launch its image from that of a struggling economy, and brought a phenomenal price tag. The major themes and structures of Expo 2020 have been completed almost a year ahead of the event, helping to emphasise the image of the city as a central business and transport hub for the region, and projecting confidence to existing and new financial partners.

Expo 2020's legacy plan answers the question of how to host a sustainable mega-event while building a strong legacy. The District 2020 area will become a new business and transport hub, developing the city as a gateway to Asia. The host experience of Shanghai Expo 2010 shows that hosting a mega-event as a catalyst for change for a particular area is based on market demand which deploys some fixed components

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within the legacy plan. Expo 2020 will repurpose the venue buildings: the Sustainability Pavilion will remain as a Children's Science Centre, aiming to inspire children about sustainability; the mobility pavilions will be repurposed into commercial buildings while the UAE pavilion will be managed by the UAE government. The exhibition centre will continue to offer approximately 180,000 square metres of events and exhibitions space; District 2020 will provide quality infrastructure for business, comprising approximately 86 buildings for office and residential use; and Al Wasl Plaza will remain open to host visitors post-Expo. Overall, 80 per cent of structures built for Expo2020 will be repurposed through the District 2020 plan, which employs the latest smart systems to reduce energy consumption, monitor and control building functions and collect data. Siemens, the strategic partner of Expo 2020, will provide those solutions and locate its regional company headquarters at the site.

Expo 2010 played a major role in developing the Huangpu River area, a 5.28-kilometre development with 2.5 million square metres of construction that formed part of the plan known as the Third Riverfront Development, triggered by hosting Expo 2010, with pavilions constructed using sustainable building methods, reducing pollution, adopting a zero waste approach, and achieving a competitive construction cost. Similarly, Expo 2020 is playing a major role in developing Dubai South city, which was an empty desert area before Expo 2020. Both events employed higher standards in improving the work conditions of the workforce when compared based on the preparation stage of the Expo 2020 event, and many projects have been undertaken at the same time, with the construction of metro lines, the airport expansion and the development of metro stations. Many buildings of Expo 2010 have been repurposed, for example to an exhibition centre, fine art palace and commercial area.

The legacy plan for Expo 2020 has much in common with that of Expo 2010, while the same cannot be said of Aichi Expo 2005 which aimed to return the site to its original condition, under the theme of 'Nature's Wisdom'. Expo 2005 represents a showcase for the construction of venues using recyclable and reusable material, fostering relations between nature and technology in architecture, and achieving zero emissions in transportation. Expo 2020 has a different vision of mega-event sustainability and a different legacy plan to Expo 2005; unsurprisingly given the differences in the site conditions of each location before the event.

As stated earlier, the legacy plan for Expo 2020 was inspired by the OG 2012 legacy. While it is not central to the research objectives or research questions for this thesis, it is nevertheless interesting to assess the sustainable development evident in Expo 2020 according to the proposals and requirements stated in Olympic Agenda 21, which represents a baseline set of standards for air and water quality, and defines the green basic requirements for designing mega-event venues through the basis of SDTBL, used in the construction of Expo 2020. Expo 2020 has been designed to respect these standards of resource conservation, and has a LEED gold certificate for each building in the Expo 2020 site. It has strengthened the role of major groups represented by stakeholder management and volunteers, and established new methods of implementation for upgrading transport and construction systems, while respecting social and economic considerations through Route 2020, District 2020 and Dubai South Development. The Expo 2020 management team has demonstrated a progressive intent to manage resources, in particular through the legacy plan; to improve the socio-economic conditions of the host city and surrounding area; and to foster the international collaboration needed to achieve sustainable development. Expo 2020 will be the first event in the region to showcase how to incorporate sustainability in every

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aspect of daily life. The transport and energy sectors are two major contributors to environmental problems, as advised by Agenda 21. This research presents how Expo 2020 was able to respond to the challenges of hosting a sustainable mega-event through the three main sectors considered in this research.

6.2.7 Catalyst of Change

Expo2020 represents a catalyst of change for the UAE in terms of building on the previous development plan to start playing a bigger role on the world stage. Currently, Dubai is a fast moving developing city that has: a modern infrastructure with a sustainable supply of utilities, safe environment, convenient location, and high connection methods create an attractive destination for business and leisure. However, Dubai is using Expo2020 to be at the centre of the international efforts to address global warming and sustainable development challenges. The Expo2020 themes are selected as mobility, sustainability, and opportunity. The *mobility* theme is a response to the challenges of knowledge, ideas, and goods movement that the Expo2020 will help in exploring by finding new frontiers and using digital connectivity. Expo2020 presents an opportunity for the full region to shape the future through mutual efforts to face different pillars of sustainability problems. The third sub-theme that will contribute significantly to the legacy through the success of Expo2020 is *sustainability* which was discussed intensively in this research and remains the main attraction of hosting the event. Expo2020's main theme of connecting minds and creating the future reflects the vision of BIE and Dubai in joining the efforts to shape the future by transforming Dubai into an innovation and creativity hub of *opportunity*.

Currently, the world image of Dubai is of a rich city built on tourism and real estate. Expo2020 aims to foster this image by adding the research centre and the transport hub to the city's portfolio. It represents a chance to reflect the actual will of the city in doing so. Dubai's capability in executing mega-projects was presented earlier in the literature review and reflects the nature of its project management style. The Dubai transport system also demonstrates a big achievement for the city through the acquisition of several ports and airlines around the world. Expo2020 will promote those successes further and build on them to take forward the sustainability plan of the city. However, as many of those sustainability practices initiated ahead of Expo2020, the study shows that hosting this event is a demonstration of sustainability practices and represents one method to encourage it. The study presented earlier how Expo2020 is acting as a social catalyst for change for the UAE residents through the promotion of a volunteering culture, increased awareness about carbon emissions, and steps that the stakeholder has to take. Expo2020 is a catalyst for development for a new area in Dubai, named Dubai South that only a few years ago was an empty desert.

6.3 Answers to the Research Questions

The research questions selected for this thesis came as part of the two main challenges in hosting a mega-event – *how to be sustainable* and *how to create a long-lasting legacy*. The study those two considerations in 2014 where many answers to those questions were still vague and challenging. With the progress of the research and the thesis over the years, the Expo2020 management team was developing and giving answers for many questions.

The study observed the development of the management team and their reliance in previous mega-events lessons in spotting the expected problems ahead, designing

solution for them, planning the resources, and reflecting on it before it happened. The research questions were answered through the three case studies, the cross-case analysis, and the discussion chapter. The study summarises these results by answering the research questions (RQ) as follow:

R.Q.1. How can a developing country be sustainable across the event lifecycle when hosting a mega-event for the first time?

The leadership's determination backed by a sustainable design that considered key success factors for the three sustainability pillars and a strategy with embedded sustainability considerations are the solution. Dubai's sustainable development plan ahead of the Expo2020 led the city to win this event and motivated the BIE to trust that this event will foster sustainability further in the city. Starting from the construction considerations, Expo2020 was planned and designed to reduce the usual shortfalls previous mega-events faced. Repeated issues related to the high spending cost for an investment that will only serve a short-period event. District2020 was the answer. As a developing country, Dubai's answer was in learning from the best practices of the developed countries and applying them. Those practices include transport system development and utilities. To address the challenge of the required increase in utilities capacity to serve 25 million visitors, Dubai's solution was to build facilities that will reduce the impact on the environment for years to come including the solar parks, the adaptation of the RO water salinisation process, constructing of buildings with green design, managing the demand side of utilities and transport, adopting new technology, and application of green building regulations, among other initiatives. Dubai's leadership has contributed to the sustainability over the ELC by setting a vision for each entity presented in the three case studies and how those visions are being closely monitored realised. So, to answer this question, a developing country can be

sustainable over the ELC by having a leadership vision that embeds sustainability in each step, creates a governance process to follow the application of those plans, and designs any new buildings or facilities with equal importance ascribed to the three pillars of sustainability. A successful leadership vision also applies intensive follow-up during the construction, and ensures the excellence and happiness of the stakeholders by preforming beyond expectations. It has a collaborative, inter-related strategy where each entity complements what, rather than competes with, the others do

R.Q.2 How can a mega-event legacy be part of the sustainability plan?

At the start of the research, the answer to this question was vague. The legacy plan for Expo2020 was not clear and no one at that time was able to answer what Dubai will do for the legacy phase after committing such huge investments in Expo2020. The answer came with the announcement of the District 2020 plan which reviewed closely and found it to be a solution that will not only solve this dilemma in this one mega-event, but will also encourage future mega-events to adopt the same strategy. London OG2012 was one of the first mega-events to address the legacy considerations closely and provide a solution beyond the future usage of the venue that was already common as presented in the literature. Expo2020 learned from this experience to select the location in place that requires intensive development. Expo2020 location was an empty desert between Dubai and Abu Dhabi; the Expo team used this location in the account of the success of the event by developing it, which will represent the future of Dubai as it is close in proximity to the planned airport – which will be the biggest ever built. In addition, the site proximity to the flagship Jebel Ali port represents a strategic location. Building this site in accordance with the best green practices in development; with a set plan to serve Expo2020 events; and the plan to transfer it a few months later into a development where people can live, invest, work, and study remains a brilliant

plan that future hosting cities should learn from.

R.Q.3 How can a mega-event's long-lasting tangible and intangible legacy be created?

Adopting a sustainable approach towards hosting a mega-event is the first answer to this question. By doing so, the hosting destination is fostering the development in a phased way beyond the event, by creating a new business hub, and developing this hub based on strategic competitive edge. In the case of Dubai, the competitive edge it has is in the location, transport facilities, and leadership stability. Expo2020 came to illustrate those benefits and foster development within it in addition to attracting international investors to join those efforts for mutual benefits. Sustainability represents both tangible and intangible legacies; it reflects the leadership's determination to ensure continuous development, innovation, progress and reliance to face any possible crisis. Having a vision that is embedded in sustainability considerations will help with building a mega-event legacy that will stand for years to come.

6.4 Research Implications

The research findings in hosting a sustainable mega-event are a contemporary subject that the study was investigating while the preparation for the event was taking place, and continues to the present day. The main advantage of doing so was for the observation and the interviews with the key stakeholders to occur while they are performing their roles. This research contributes to this growing literature of mega-events by directly engaging with the people on the scene, discussing their sustainability vision, and watching the impact of their decisions while the mega-event is yet to come.

6.4.1 Theoretical Implications

The most significant theoretical implication for this thesis is in providing an example about how a city hosting a mega-event can learn from previous failures to host a sustainable event. Dubai is presenting that leadership vision in working towards sustainability at each stage of development, which is the key to achieving a sustainable event. It is not enough to polish the image of the hosting city by publishing that the destination is applying best practices of sustainability in the event venues. Dubai's sustainability considerations were found in each and every step that any of the government entities were taking. It was embedded in the vision of those entities and being audited consistently to find ways to improve it. Once those considerations are taken ahead of awarding a mega-event to any destination, the future mega-event will become more sustainable and generate a long-lasting legacy. Furthermore, a mega-event should be hosted under a vision that serves the hosting destination and region before the event owner. Dubai addressed the challenges of sustainability and mobility as they represent the key elements that shape the future of the city. By starting from this, the city is building what it will need for the future generations through the continuous development plan. In addition to this, the results of this event, and how minimal the complications of the preparation phases were, reflect the importance of awarding a mega-event to countries with active development plans. The strategy of using a mega-event as a catalyst for change and not a catalyst for development is well respected in Dubai's hosting experience through the persuasion of what the city requires for the future generations and not developing exclusively to keep the economy rolling.

At the beginning of this investigation, the researcher was under the impression that he would be able to find how much Dubai is spending on sustainability considerations

compared to what is spent on the legacy considerations; however, as the research progressed, it reached a point where he started to believe that those two elements are two sides of the same coin. The research showed that once the hosting destination sets its sustainability considerations in the vision of the city along with a proper development plan, the long-lasting legacy impact will be generated as an outcome of this planning process.

6.4.2 Managerial Implications

The evidence in this empirical study reveal the importance of having a leadership vision as a key success factor to achieve sustainability. However, along with this vision, a managerial team has to believe in the leader's vision and address and persuade the three pillars of sustainability equally. Accordingly, the hosting destination should accept the fact that any management division that is not complying with the leadership vision which includes sustainability embedded in it should be changed before the preparation phase of the mega-event commences. The sustainability considerations viewed in this Expo2020 case study reflect the importance of embedding sustainability ahead of the beginning of the project, watching its growth and development during the mega-event, ensuring that plans are going to be completed way before the deadlines, and addressing any possible obstacles before they start affecting the overall sustainability plan.

6.5 Replies to Research Objectives

The proactive framework was looking to build out of this study was reflected in the three cases presented in this research. The construction, utilities, and transport sectors are the three main sectors that future hosting destinations should seek to make sustainable ahead of bidding for the event. By doing so, the market of any destination

will be ready to accept green building regulations and will have enough knowledge to go beyond those practices. In the utilities, the cities aiming to bid for sustainable mega-events should be able to present plans for sustainable supply and dependence on the latest technology to reduce emissions. It is not acceptable for any world city today to stop investing in increasing the production of green utilities with or without events. Today's technology is able to provide green utilities at lower costs and with lower emissions. The transport system is the third framework that the hosting bidder form developing countries should have in place ahead of the bid. The destination should set out the basics of the public transport system that aims to provide a reliable service, that is both economic and green. Starting from this, the development of any transport system should respect the pillars of sustainability and upgrade the capacity of public transport within those boundaries.

The study presents multiple practices in previous mega-events along with the challenges that face the hosting destination and discovers how Dubai was learning from those practices and planning Expo2020 to avoid failing in the same areas. The most important elements in this were reflected in the vision of the UAE leaders to host a sustainable event supported with a strong legacy plan to reply to the major criticisms that previous mega-events have faced. Expo2020 built on the latest developments in the construction sector to adopt the green building standards in the venue and the related construction. In addition, the leadership of Dubai worked in improving all the infrastructure and utilities through adopting the sustainable approach of any steps. By doing so, Dubai exemplifies that the hosting destination can learn from previous experience and adopt what fits within its development plan.

The study was not able to create a model for monitoring how the management team of Expo2020 is preserving the sustainability commitment versus the pressure of the

deadline, as the Expo2020 was planned to be completed one year ahead of the event. This leaves adequate time for testing and commissioning, and eliminating any chance to cut back on sustainability practices in order to meet the event's requirements. This is another impact of the leadership of the event and how they have reviewed previous mega-event experiences and learned from them.

The pillars of sustainability were respected equally and the leadership direction was clear on this priority. Each step or plan or design was going through different testing for the expected outcome of sustainability on it and how it will be reflected in the legacy outcome. By doing so, the Expo2020 management team and Dubai leadership closed the door to any concessions made on any environment considerations on the account of the economic or social pillars. This was reflected clearly in the development plan for RTA and DEWA and how they are setting out their future plans based on renewable or sustainable energy which will reduce emissions, provide a sustainable supply, be economically feasible, and serve the future generations.

The literature found that the sectors under most pressure when a country is hosting a mega-event are construction and transport. The supply of utilities was selected due to the fact that the UAE's natural resources are limited and water and energy supply for such event may challenge the sustainability model of the city. Throughout, the study found that Dubai used those challenges to empower the existing system and make it more sustainable through multiple initiatives discussed earlier in terms of green energy, sustainable supply, green building, public transport, and sustainable transport.

6.6 Research Limitations

Every research project is completed within a specific set of assumptions that fit within the context of the study. In addition, every research project is conducted within a

specific time frame and with limited resources that shape its boundaries. The study reflects multiple limitations that he may face once he started the research and he may still face more. The limitations are as following:

- **Research boundaries**: The study selected the subject of sustainability and legacy considerations in hosting a mega-event with a time constraint to complete the research before the event itself. The study showed that as much as this constraint is challenging, it will create an incentive to conduct another research investigation to complement this one during and post-event and in the legacy phase.

- **Interviews:** The total number of interviews was 29 that were conducted in the Expo2020 site, DEWA, RTA, Dubai Ports and the main contractors in different construction sites in Dubai, such as Masdar, and Shams Company. The study found it difficult to interview people from the Expo2020 site other than those who had been assigned to assist the researcher, or deal with the media. The researcher thought that he would have the chance to access the construction site and speak with construction engineers or construction managers in different levels to see how the sustainability considerations through multiple pillars are being applied. This was not possible; the site access was prohibited and the interviews were completed with only the people assigned to do so. Dubai Municipality interviews were also not possible; many interviewees advised that they would help in arranging further interviews, but without success. This research was going to be richer if it had gained more contributors from those two entities.

- **The case study approach: The approach** adopted in this research has a limitation in generalisation of the results due to the small number of cases

investigated. The study only tested three sectors through a limited number of interviews that were analysed for answering the research questions. Therefore, the research provides general answers to the sustainability considerations for those specific sectors without going in-depth into any specific sector. Using water salinisation as an example, this is a process where found a strong sustainability impact for the RO process; yet neither the resources nor the size of the research allow for a detailed research and comparison with other GCC or international practices. Another example is in the topography of the UAE and its impact on the sustainability of construction; this is another key area where hoped he would get the opportunity for extensive research once compared with different topographies of different mega-event hosting destinations.

- **Expo2020 subcommittee.** Expo2020 formed the 'city readiness' subcommittee that learned about at a very late stage as it was formed in the second quarter of 2019. The study expects that future research on sustainability and legacy for the Expo2020 should be started from this point to cover the event, city readiness, and sustainability practices before, during and after the event

- **Interview protocol.** Some interviewees did not give permission to have their interviews recorded. The study adopted a protocol to write notes during the interview and immediately after completion. However, some important information was lost because of that as the repetitive listening to other recorded interviews was an important data resource to discover further sustainability and legacy practices once the data were compared with different entities.

6.7 Chapter Summary

This chapter presented the results of the research on the Epxo2020 case study in light of the literature of different mega-events and the sustainability practices adopted in Dubai. It also sets out how the thesis has answered the research questions and achieved the objectives set ahead of the research. The study was able to identify multiple sustainability practices through different angles and entities and described how the leadership's vision conferred as a key success factor for achieving sustainability over the three pillars. The importance of having a sustainable design was presented in place well ahead of the event. This design should be inspired by the leadership of the event and planned in an environment of strong governance and over multiple layers and through multiple entities to ensure its application. The Expo2020 case study will be a guideline case that future hosting destination should learn from before bidding to host any mega-event. This chapter reported on how Dubai was able to ensure the economic, social, environmental pillars of sustainability were upheld, and how the leadership and design contributed to this system in delivering an exceptional sustainable mega-event.

Chapter 7 Conclusion and Recommendations

7.1 Introduction

This thesis represents a research endeavour to uncover the sustainability practices of Expo 2020 and the legacy that it is planning to create, in order to fill the gap in the literature of hosting sustainable mega-events in the MENA region. The study presented the argument that the final legacy outcome should be tested some years after the hosting of the six-month event, and proposed a framework for future host destinations by setting out good practice for the planning and design of a sustainable mega-event. This thesis shows that such practice requires a leadership that embeds sustainability practices in its vision for the city. This chapter is divided into two main sections: the first presents a summary of the research contributions of the thesis while the second contains multiple recommendations for the research stakeholders and other related aspects.

This study recommends that mega-events should give attention to the generation of post-event communities to ensure that the events cause minimal harm to host countries after they have ended. In this regard, Gaffney (2013) argues that the IOC, FIFA and World Expo should incorporate committees for urban planning as a standard part of the bid evaluation phase. The host city should not allow itself to be influenced by over-optimism and the propitious circumstances of hosting mega-events, but should remember that its successful bid must initiate long-term plans for venues to be constructed in ways that improve the local population's quality of life long after the event has ended. As Marcuse (1998, p.109) stated,

> Matters of social justice, of economic development, of international relations, of democracy, of democratic control overall technological change and globalization, also have both short and long term implication. For a given policy to be desirable it

must meet the constraints of sustainability in each of these dimensions, failure in any one is, in theory, sufficient cause for rejection.

Urban planning related to mega-events must consider issues including housing, education, sanitation, and health care. The transportation concerns in many bidding dossiers are limited to the event's requirements and do not take into sufficient consideration the future demands of the city. This research proposes a set of steps that should be included when planning to host a mega-event, from which decision-makers can benefit in implementing their mega-projects for global events, and which provide a framework for best practice when hosting sustainable mega-events.

7.2 Research Results

The main research objectives were to test the sustainability practices applied by Dubai while preparing to host a mega-event for the first time. The rationale behind such research was to build a sustainability framework and discover how effective this framework is for the seven-year preparation period leading up to the mega-event. Best practice may follow different paths in developing countries to those followed in many developed countries. The study presents a number of mega-event sustainability considerations drawn from countries including South Africa, China, Brazil and Russia, and compared these with practices from countries such as Japan, Germany and the UK. The importance of sustainability, as shown in the literature review, provided the motivation to present the mega-event as one that has the potential to bring as many consequences as it creates opportunities, and to test those considerations within the framework of Expo 2020's preparation, through the three sectors under most pressure, as presented in the three case studies.

The analysis of the collected data was based on the existing literature on previous

hosting process practices and the growing importance of hosting a sustainable mega-event with a long-lasting legacy. Dubai's experience in the preparation period will form a framework for hosting a sustainable mega-event; however, it is yet to consider the legacy impact after the closure of the event. So far, the planning of the legacy shows high potential to create a long-lasting legacy. The following points summarise the results obtained from the investigation in the three case studies:

- **Construction**: Many host cities faced multiple challenges in the construction process which led to irreversible results, including Montreal OG 1976, Vancouver Expo 1986, Athens OG 2004, South Africa WC 2010, Milan Expo 2015, and Brazil OG 2014 and WC 2016. These host cities present actual examples of what the consequences of hosting a mega-event may be. The study is not be able to comment on the financial impacts of Expo 2020 during the legacy phase, but has demonstrated that Dubai planned ahead for a strong legacy through a sustainable development plan that considers sustainability against the three main contributing sectors. For construction, the Expo 2020 team adopted the best green building practices through the leadership guidelines which include: LEED Gold certification for all buildings, sustainable design, competitive location, proximity to Jebel Ali port, district cooling, large development around site to reduce infrastructure cost, consideration of ecology and passive energy, indoor environment quality, low levels of construction air pollution, construction waste management plan, selection of green construction materials, construction management competencies, energy and water saving plans, stakeholder engagement, sustainability awareness, health and safety procedures, workers' welfare, site handover well in advance of event, and allocated contract percentage for

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SMEs.

- **Utilities:** This sector has a strong influence on the overall sustainability plan for any country. Electricity generation is a major international polluter with an augmented impact in the UAE due to air-cooling requirements, lack of natural water resources, and reliance on water desalination. The study was able to present the efforts of DEWA in providing sustainable utilities through initiatives including setting a strategic plan with multiple phases for the city's dependence on clean energy sources; initiating green building codes to control the demand on district central cooling; controlling water irrigation, introducing shame initiatives, together with stakeholder engagement, stakeholder happiness goals, Emiratisation, anti-corruption initiatives and investment in R&D. Sustainability was a major theme in building the Expo2020 site, the supporting infrastructure for which includes a smart grid, slab tariff system, the world's largest single-site solar park, a large RO plant, Dubai Carbon consultancy, three dedicated solar substations, a gas-based power station, IPP green coal, and investment in Blockchain technology.

- **Mobility:** The third major contributor to the overall sustainability of the mega-event is transportation of goods and people. Dubai had one of the most advanced road transport systems in the world before the event. However, the leadership aimed to further improve this system, and put in place multiple initiatives in green transport to ensure sustainability, including diversification of income sources, public transport strategy, investment in the metro Route 2020, innovations in smart solutions for ground transport, intelligent traffic solutions for demand management, stakeholder engagement and wellbeing, integration between urban and transport planning, diversified transport means,

digital transformation, cycle tracks, continuous sustainability performance for different means of public transportation and international investment in ports and airlines. They also implemented an effective strategy to reduce transport emissions, introduced electric and hybrid taxis, improved non-face-to-face channels, promoted the metro system and trams to increase number of users, introduced SRRDP management for RTA environmental performance, and imposed high health and safety standards. Other initiatives include a significant reduction of the EFR, ensured financial stability through revenue diversification, R&D in futuristic mobility means, adoption of the SDT, SCG sector to sustain organisation excellence initiatives, DP world investment in smarter trade using data-driven logistics, DP world acquisition strategy, green initiatives at Dubai airports and low average fleet age.

Based on the results listed above, the study was able to demonstrate that sustainability in a mega-event cannot be achieved simply through the event venue construction process. It is a holistic strategy that must cover all aspects through a leadership vision for a sustainable economy. The study suggests a number of recommendations for different stakeholders in the following section.

7.3 Research Recommendations

The study provides multiple recommendations for different stakeholders in order to achieve a sustainability for Expo 2020 and future mega-events.

7.3.1 Recommendation to Dubai Stakeholders

Expo 2020 is an exceptional event in the overall development of the UAE. The findings of this study provide evidence to recommend that Dubai's stakeholders learn from the overall sustainability practices of this event in order to accelerate the sustainable

development of the country. Another lesson to be learned is that collaboration in such a project is based on the leadership's vision and effective and thorough planning for the future. The study has been able to present the possible consequences of hosting a mega-event and how Dubai was able to overcome the challenges and maximise the potential advantages of this event, at least in the preparation phase. Concerns about quality of life and the environment for future generations have led to key benefits in sustainability. Dubai's major stakeholders present a strong leadership team and share the same vision, as shown in the three case studies undertaken. This mega-event will demonstrate to future host cities the importance of such collaboration between different entities that share the same vision.

The stakeholder engagement plans and consideration given to stakeholder wellbeing helped to improve this culture of collaboration. By having a plan to enhance stakeholder wellbeing on different levels, Dubai was able to present the advantages of hosting a mega-event. The financial impact of hosting is still to be discussed on the legacy plan, yet so far it seems that Dubai did not overspend on this event, as it included it within the overall development plan for the city. The existing commitment to the District 2020 plan justified the hosting and the cost incurred, and influenced how this event will create a long-lasting legacy for the UAE.

The Expo 2020 case study, underpinned by three cases from different sectors, demonstrates the importance of having an equal prioritisation process for the three main pillars of sustainability. In addition, the study showed the importance of proactively supporting those pillars with leadership and design considerations as success factors. The study's case narrative of the progress of Expo 2020 reflects on the role of these success factors in creating a plan for a long-lasting legacy. Through its planning, Dubai was able to ensure a long-lasting tangible and intangible legacy.

District 2020 and the infrastructure supporting this event, along with the continuous development plan for different areas in Dubai, represent the *tangible* legacy. The *intangible* legacy is reflected through stakeholder happiness, the sense of pride, and the development of the UAE's role in the world as a significant player in humanity's efforts towards increased sustainability.

The study has been able to identify and present the key sustainability drivers in the UAE that made the achievement of the event possible: a well-developed vision, commitment to the cause, leadership awareness of the role of sustainability, stakeholder engagement, a detailed plan to achieve sustainability targets, a design to meet those targets, and stakeholder commitment.

7.3.2 Recommendations to Event Owners

The event owners should look at the Expo 2020 hosting plan and how Dubai was able to prepare and execute the requirements for hosting such an event for the first time within the parameters set regarding sustainability and time frame. The study recommends that the event owners consider a range of criteria in the bidding process, including the leadership's vision for sustainability, the city's development plan, the legacy considerations of this development plan and the need for such development. Other criteria to consider are the sustainability plan, the design, the commitment of different levels of stakeholder, the power of the leadership, the sustainability considerations of all three pillars, and whether the event will benefit the region, and not just the host city.

The research presents the importance of putting in place an infrastructure that is ready to operate, and disseminating knowledge about sustainability practices before hosting mega-events. The host city may make commitments for buildings or developments

they will not need in the future, which represents an unsustainable act that will impact on future generations' ability to be sustainable. The event owner should validate the sustainability practices for any bid dossier and the ability of the host city to comply with the requirements without changing its overall development plan. Furthermore, those bidders should have support from a government that leads through its vision of sustainability. The study presented the key elements to be embedded in the development plan through the three cases presented in this research.

7.3.3 Recommendations for Future Bidders

The findings presented the sustainability considerations for hosting Expo 2020 through three pillars, in order to show the factors that a potential mega-event host should consider prior to submitting its bid. The Expo 2020 mega-event, in common with the majority of cases presented in the literature, will not generate direct profit for the host city. The mega-event owner should consider bids from cities seeking to use the mega-event as a catalyst for behavioural change. China OG 2008 and Expo 2010 represent massive steps taken by China to reduce its emissions and improve air quality: this is a strong behavioural change. Expo 2020 will change Dubai's position, making it a research and transport hub, supported by a sustainable city infrastructure in terms of utilities, construction and mobility. The theme of Expo 2020 reflects what the city is trying to build, a city that will be the gateway for the region through joint efforts and collaboration.

The second important recommendation is to construct the bid based on the existing strengths of the city and develop it from this point. The major investment and potential over-spend will expose the hosting process to risk. The impacts of the total amount spent by the Dubai government after completion of the legacy phase are yet to be

assessed in terms of risk. The OG 2008 cost China approximately US$40 billion (with an initial budget based on US$2.2 billion), and despite this additional spend, the impact on the country's GDP was 2.02 % (Lie, 2013) which represents a weak ROI and could be considered a failure if the other benefits of this event are not taken into account. In contrast, a study of 15 countries that hosted the OG found no long-term positive impact (Tien et al., 2011) of those events on the hosting city. This reflects the importance of hosting such events with a clear and specific purpose, with an embedded plan for sustainability that includes legacy considerations, and with the support of the leadership's vision.

The third recommendation is to ensure transparency in the process before bidding for such an event. An anti-corruption strategy should be adopted in the bidding city long before the bid is submitted. Once this is implemented and supported by a strong leadership direction and a robust security system to fight corruption, the dossier file should be accepted. Pukas (2016) indicated that Rio OG 2016 cost US$4.6 billion with over 85,000 security guards needed to protect the 500,000 visitors, corruption scandals, double-digit inflation rates, recession and increased unemployment levels. In addition to such high costs, those points reflect the failure of the city's systems and management even without hosting a mega-event. Why complicate the situation further with such a complex investment? This is a question that event owners and bidder should answer jointly. A city bidding to a host mega-event should understand that, much as such events look tempting, they are not suitable for every bidder unless there is effective leadership, implementing a sustainable development plan to create a long-lasting legacy.

7.3.4 Recommendations for Academic Researchers

Research in the field of sustainable mega-events is sparse considering the importance of the subject. A small number of studies examine mega-event sustainability practices in the GCC (e.g., Kennett, 2010; Weber & Ali-Knight, 2012; Sofotasiou et al., 2014; Jauncey & Nadkarni, 2014; Wittkunh & Reiche, 2015); however, to the best of the researcher's knowledge, no study has investigated different aspects of sustainability during the hosting process and legacy considerations. Perhaps two imminent mega-events in the region within two years will boost this research. The beliefs generated through this study reflect that the two events are comparable and future work should seek to examine the impact of the leadership in both countries in boosting sustainability considerations on the overall outcome for the two countries through the tangible and intangible legacies for each event. Furthermore, Levermore and Becom (2009) found that the majority of research on mega-events covers sports mega-events and particularly OG, while Expo, which can arguably have a stronger impact on humanity, is not researched sufficiently.

Dubai's current sustainability framework, covering utilities, transport and construction support, with a leadership vision to create a sustainable country that aims to be among the best in the world represents an ambitious framework that developing countries should try to adopt when bidding for mega-events in the future. This framework of including the mega-event within an ongoing development plan with minimum distribution and limited negative impact demonstrates that hosting a mega-event should not be a chaotic process that leaves a negative legacy as presented in many cases discussed earlier. The last recommendation draws on the current sustainability practices of Expo 2020 in the legacy outcome of the event. The researcher believes that this area of research may generate a much better understanding of how to host a

successful and sustainable mega-event, of what type of planning is required, and of the different elements that the host city should have in place in order to achieve this outcome.

7.4 Contribution to knowledge

This case study of the planning and preparation stages for Expo 2020 shows that a new host city can learn from the experiences of previous events in order to improve the sustainability and legacy of hosting a mega-event. Expo 2020 learned from different previous mega-events, especially OG 2012 and Expo 2010, notably in how to plan a sustainable event while still setting a strong legacy plan. District 2020 could represent a benchmark for future bidders in how to use mega-event venues to improve overall city development. The key sustainability factor in Expo 2020 is represented in the construction design and implementation, management of the demand and supply of utilities, and the diversification of the transport matrix. This case study research on Dubai demonstrates that focussing on these three sectors will contribute to the overall sustainability outcome, reduce the criticisms of hosting mega-events, and create a positive and long-lasting legacy.

Hosting a mega-event with a legacy plan embedded in the design stage is key to achieving a tangible and long-lasting legacy. The site for Expo 2020was selected based on the city's development plan which wished to create a new business hub south of the city. This hub is closely located to a new international airport and port, and is well connected by metro, and by roads to major highways which will serve the city's vision to become the gateway to Asia. This location did not destroy any heritage sites, change the city centre, or create problems for citizens; it has targeted improving the side of the city that the people of Dubai have tended to avoid. By doing so, the development of

the site did not disturb people's lives or negatively affect the sustainability model of the city. This research can be interpreted as implying that selection of a site in a less-used area could be the answer to creating a tangible, long-lasting legacy. Mega-event legacy can be comprehensively achieved by creating a new destination rather than developing an existing one as shown in this Expo 2020 case study. The intangible legacy is represented in the sustainability practices adopted by the city in hosting this event: raising citizens' pride through their experience of the capability to host and build facilities for the mega-event and the development of a volunteering spirit are significant contributions to mega-events on which any future host city should focus. Expo 2020 has not had a single corruption scandal arising in the public domain over the last eight years, which reflects the importance of transparency, and future mega-event hosting cities should consider this.

Acquiring international talent with experience of previous mega-events is another important contribution to knowledge. The Expo 2020 team includes more than 50 different nationalities, and this diversification of the workforce represents an added value for the city. Future hosting cities should consider this and appoint teams from previous mega-events rather than only employing people locally. Furthermore, for Dubai, Expo 2020 is just one of five major projects under development currently, with the remainder having no direct physical relation to Expo 2020. This represents a reflection on the overall efficacy of hosting a mega-event within a running development programme rather than using these events specifically to attract development. The leadership of Dubai played a major role in setting these ideas in Vision 2015 and Vision 2021, which both consider the development of the city and use the mega-event as one of the tools rather than relying completely on such events to trigger development. The adoption of this approach by leaders who want to host mega-

events will definitely augment the benefits of hosting mega-events, locally, regionally and globally.

This research has been able to present the importance of leadership and design in achieving sustainability and developing a plan to build a strong legacy, even in a city with no previous experience of hosting a mega-event. This reflects the importance of continuous learning from previous hosts of the upcoming event, and this thesis presents examples of this. Sustainability and legacy considerations will be significant contributors to the success of future mega-events by creating a proactive system to plan for legacy ahead of the actual running of the event. The best presentation of this system is through the role of the hosting committee in setting high sustainability requirements for the site, which will represent a learning hub for the entire city in the future. Expo 2020 and Dubai represent a live example of how hosting a mega-event should have a positive impact on the entire city's progress in economic, social and environmental terms. The best reflection of this is in the elevation process of advancing construction operations, developing the sector through multiple sustainability actions, social engagement, transport development, and the creation of a long-lasting legacy. The main elements in planning to host a sustainable mega-event are: site selection; planning for the legacy stage already during the preparation stage; constructing the venues and transport systems considering their sustainability; considering the future requirements of the new development, deploying advanced technology to ensure the site will be up-to-date once completed; considering new ideas in trial projects for new technology; adopting the LEED rating system in construction; adopting transparency and free access to information policy; establishing modern public and private transport systems; and raising the performance of utility supplies to more sustainable levels.

This thesis reflects the power of design in setting the legacy plan which will inspire

future generations by adopting innovative designs, use of new construction materials and methods, and considering the legacy of the venues after the event. The characteristics of leadership needed to host sustainable mega-events are: an ability to inspire sustainability practices at different management levels; setting a clear vision about how and what the future looks like; establishing the business framework and increasing a teamworking spirit between different entities in order to work together collaboratively rather than competing. Dubai's leaders had a clear vision of the sustainable future of the city and how to invest in hosting mega-events through continuous development, and saw the importance of communicating and implementing this leadership vision before the event. The Expo 2020 team learned from the OG 2012 legacy plan and created a new learning hub from which future host cities can benefit, compensating for a lack of experience in hosting such events by learning from previous events run elsewhere. It was fascinating to interview the various stakeholders and see their awareness of sustainability and legacy, how much they learnt from previous events, the importance of diversification of the workforce with more than 65 nationalities working together, and how the Emirati people are developing their knowledge in this field. As well as constituting a platform for the importance of learning from previous events in overcoming the possible negative consequences of hosting mega-events, Expo 2020 demonstrates the efficacy of project execution based on actionable sustainability goals and a clear legacy plan.

The Expo 2020 hosting committee focusses on engaging future generations through facilitating schools' visits, inviting students to site tours, and organising engagement activities reflecting the benefits of hosting this event for future generations. This represents another element present in this research, through reflecting on the role of mega-event in shaping the future rather than just impacting on economic performance

and development. Expo 2020 is bringing to the UAE the spirit of volunteering, which was demonstrably weaker before this initiative. This mega-project has also introduced new construction methods, higher standards in dealing with sustainability and workers' welfare, new transport and telecommunications and much more. Expo 2020 represents a new level of development for Dubai, which will shape the future of the city.

Expo 2020 represents a case study that can benefit future hosts of mega-events, who may adopt practices applied in Expo 2020 in the construction, utility and transport sectors. The construction sector represents the first learning hub where future bidders can see the planning for both construction and legacy; use of BIM; creation and enhancement of an iconic destination; employment of new construction materials; and the development of adequate parking facilities, isolation systems, and communication systems. The sustainability pavilion will represent a live example of how design innovation can provide solutions to deal with different challenges. The combination of conventional sustainable methods of supplying utilities presents numerous elements central to hosting a sustainable mega-event where the host city creates and maintains a system of development. In relation to the transport system, Expo 2020 provides an example of how to select a site that will represent a future destination in the city, next to a new international airport, large ports, and different access points through public and private means of transport. These practices are related to legacy planning and design; disseminating the sustainability considerations through leadership, over different management layers; having a legacy plan that will serve the city's vision; sustainable utility infrastructure and supplies that depend on different technologies and renewable resources; an up-to-date transport system with networks efficiently serving different stakeholders; and an active construction sector.

Implementing improved mega-event preparation and practice requires leadership that

treats sustainability and legacy as priorities while planning to host the mega-event, that integrates those events within ongoing development plans, adopts new construction and development methods to advance local practices, learns from previous experiences, and employs an international workforce that is motivated and willing to transfer knowledge to other team members and local people. In executing effective mega-events, the leadership should be transparent on what and how to bid, prevent corruption scandals, include the mega-event within an ongoing and successful development plan, and ensure full engagement of the various stakeholders. Furthermore, the host city must consider the requirements of the event owner, not only to satisfy them but as a means of transferring new and existing practices into a coherent daily routine, especially when it comes to sustainability. This research answers how to host sustainable mega-events for the first time in a region, based on three distinct sectors that contribute the most to the overall sustainability of the event. It presents the importance of considering legacy outcomes when planning for the event, so that venues and the related utilities will be aligned and focussed to serve the event sustainably and still create a long-lasting legacy to benefit future generations.

7.5 **Pattern for Generalisation**

This research was not conducted with the intention to generalise results. It examined a specific case study for a contemporary event and identified the strategies put in place by the host city to achieve a sustainable mega-event with a long-lasting legacy. However, it was argued earlier that comparing one country to another, even if they do not have many similarities, can lead to the same outcome if the same practices are applied. It will always be a tailored plan that can be inspired through successful events; for example, Expo 2020 drew inspiration from London OG 2012, particularly with reference to sustainability considerations and legacy planning.

7.6 Naturalistic Generation

The research presents the impact of the leadership's vision in developing the country through a sustainable plan. Having the vision to create a sustainable country that gives the same priority to the social and environmental pillars as it does to economic factors represents an inspiring example for all countries and cities, even if they do not have a mega-event on their agenda. At the same time as hosting the mega-event, different housing programmes are in progress in the seven Emirates of UAE; the development of transport systems is taking place all over the UAE, the Etihad Rail project is still under construction and many different projects are still continuing as usual. This demonstrates that Expo 2020 is not hosted on account of other Emirates and that development is not only taking place in the area around the venue. This reflects the UAE leadership's vision of creating sustainable communities. When thinking about future generations, the legacy that the current generation should leave, including the development plan, the vision, and the eagerness for excellence and happiness, are elements that can be generalised to any city planning to adopt sustainable development.

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Appendix A

RTA semi-structured interview questions

1. How you define sustainable development in transportation?
2. What mobility means for RTA?
3. To what extent you believe current transportation system in Dubai is sustainable?
4. Why Dubai wants to be sustainable?
5. What are the main changes in RTA strategy since Dubai won Expo2020?
6. What are the major preparations for Expo2020?
7. Do you believe those preparation was going to be the same if Dubai didn't secure Expo2020, why?
8. Do you believe that Dubai can host Expo2020 without having disturbance for the citizens' life style?
9. How RTA will deal with the extra capacity and investment cost of infrastructure after the event?
10. Do you believe that it is an advantage for Dubai to have a young public transportation system compared to London subway system?
11. How you get benefits from the advance technology in transportation?
12. How do you integrate the transportation planning with the urban planning?
13. How you relate happiness for sustainability?
14. What are the current and future projects RTA executing as part of the strategy for encouraging sustainable mobility?
15. How RTA achieves financial sustainability?
16. Who stand behind the culture of excellence, quality and innovation in RTA?
17. Whom are RTA main stakeholders and how you manage strategic partnership with them?
18. Do you believe that Dubai citizen have sustainable development habits in transportation, what you are doing to improve this? (any awareness program)
19. Do you compromise the environment sustainability goals in order to increase the economical benefits in RTA projects?
20. How you plan the projects related to EXPO2020? Is those projects are common with other urban planning development projects?
21. Considering project life cycle of 7 years for preparation of Expo2020, how Dubai is dealing with the time pressure? Do you feel the pressure of project deadline?
22. How Dubai is going to benefits from the projects related to EXPO2020 in order to serve the future generation?
23. How Dubai is learning from previous mega-events for providing better sustainable event?
24. How serious you consider the output report of Dubai carbon center of excellence?
25. Do you feel that Dubai is doing extra efforts in sustainability in order to polish the environmental image of an Oil producer?
26. Do you think that any of your current projects wasn't going to be considered now if Dubai didn't win Expo2020?
27. What is the role of legacy?
28. How RTA want to communicate the image of sustainability of Dubai during expo?
29. Do you believe that RTA still can enhance the sustainability performance?
30. What are the main plans to increase RTA assets sustainability?
31. To what extent the RTA strategic plan 2014-2018 is completed?

Appendix B

Shams semi-structured interview questions

1. How you define sustainability, is it environmental sustainability of sustainable development with 3 pillars of social, economy and environment?
2. What is the relation between doing this project and hosting Expo2020?
3. Whom you consider as project sponsor and the initiative of this project?
4. Dewa announce that 15% renewable generation capacity will be achieved by 2030, how much the contribution of this project out in this plan?
5. What is the contribution of the project in overall percentage of UAE energy consumption?
6. When the project was decided, designed and awarded?
7. When it was the project initiation, how long the execution phase was and when was the handover?
8. Dewa announce to produce 9656 MG, how much out or that come from green resources
9. How much the overall power generation capability of the full plant, is this based on the highest efficiency or a yearly average of production?
10. Are you considering this project as Legacy of mega-event?
11. What is the expected return on investment for this project?
12. Are you executing the job to make UAE more sustainable or as a profit center regardless of any environmental commitment?
13. What is the expected project life cycle and the ROI of the project?
14. How much you are losing efficiency from the panels every year
15. Do you believe that the hot weather in UAE is an advantage for the solar energy system or a shortfall?
16. How much emissions were produced in order to manufacture the current PV panels.
17. Do the plants deliver the electricity to DEWA on DC or AC?
18. Do you feel that there is certain type of high expectation from the solar energy where the manufactures weren't able to deliver yet?
19. What were the main challenges you faced it during the construction of the solar plants?
20. Do you believe that this project improves the learning curve of doing a solar plant?
21. Dewa expend 3611 million aed in 2014, how much the stake of this project out or this expenditure
22. Do you believe that solar energy is a cost-effective technology to produce energy?
23. What is the maintenance cost of the plant?
24. If EXPO2020 wasn't awarded to UAE, Do you think that an oil producing countries still will go for such project?
25. Do you believe that such project is a necessity for UAE at this point of time or mainly its been used to reflect the country prioritization of environment preservation strategy?

Appendix C

Dewa Semi-structured interview questions

1. How you define sustainable development in energy generation?
2. Considering energy consumption of water salinization part of energy consumption, to what extent you believe Dubai is sustainable?
3. Why Dubai want to be sustainable?
4. What are the main changes in DEWA strategy since Dubai won Expo2020?
5. What are the major preparations for EXPO2020?
6. Do you believe those preparation was going to be the same if Dubai didn't secure EXPO2020, why?
7. How DEWA will deal with the extra capacity of water and energy generation after EXPO2020?
8. Why DEWA adopting carbon reduction strategy?
9. What are the current and future projects DEWA executing as part of the strategy for encouraging renewable energy generation?
10. To what extent DEWA strategy is effective in creating energy efficient consumption?
11. Do you believe that Dubai citizen have sustainable development habits in water and energy consumption?
12. Do you believe that the concept of sustainable development overcome the sustainability terminology?
13. Do you compromise the environment sustainability goals in order to increase the economical benefits in DEWA projects?
14. How you plan the projects related to EXPO2020? Is those projects are common with other urban planning development projects?
15. Considering project life cycle of 7 years for preparation of Expo2020, how Dubai is dealing with the time pressure? Do you feel the pressure of project deadline?
16. How Dubai is going to benefits from the projects related to EXPO2020 in order to serve the future generation?
17. How Dubai is learning from previous mega-events for providing better sustainable event?
18. How to create a sustainable stakeholder management framework to reduce complexities and increase sustainable society practices?
19. How to set a proper plan for stakeholder management to maintain the same commitment to sustainability during the project life cycle

Appendix D

Dubai Supreme council of energy Semi-structured interview questions

1. How you define sustainable development in energy generation?
2. Considering energy consumption of water salinization part of energy consumption, to what extent you believe Dubai is sustainable?
3. How you spot the difference in strategy toward energy before 2013 and after 2013?
4. Why Dubai wants to be sustainable?
5. What you relate the sustainability practices of Dubai in general before and after Expo?
6. Do you believe those preparation was going to be the same if Dubai didn't secure EXPO2020, why?
7. How Dubai is planning to cover the extra carbon foot print generated by mega-event usually?
8. How you communicate your green goals with Dubai Stakeholders?
9. To what extent Dubai supreme council strategy is effective in creating energy efficient consumption?
10. Do you believe that Dubai citizen have sustainable development habits in water and energy consumption?
11. How you plan the projects related to EXPO2020? Re those projects are common with other urban planning development projects?
12. Considering project life cycle of 7 years for preparation of Expo2020, how Dubai is dealing with the time pressure? Do you feel the pressure of project deadline?
13. How Dubai is going to benefits from the projects related to EXPO2020 in order to serve the future generation?
14. Do you feel that Dubai is doing extra efforts in sustainability in order to present an image of developed country?
15. Do you think that any of your current projects in sustainably wasn't going to be considered now if Dubai didn't win Expo2020?
16. How Dubai supreme council is planning to communicate the image of sustainability of Dubai during expo?
17. Which field is the highest polluter in Dubai, construction, transportation or utilities?
18. Do you believe that Dubai supreme council still can enhance the sustainability performance?
19. Do you think that Dubai create the right framework in order to enhance the investment in green technology?
20. Do you believe that Dubai was going to be any different if it didn't secure Expo2020?
21. What is the carbon abatement strategy?
22. How Dubai is learning how to be sustainable?
23. Do you think that Dubai strategy is returning to the roots of sustainability practices?
24. Do you believe that Dubai was going to be any different if it didn't secure Expo now?
25. Do you think that the current practice will be a legacy for the future generation?

Appendix E

Dubai Carbon Semi-Structured interview questions.

1- How you Define sustainability… how you differ it from sustainable development?
2- How you relate excellence into sustainability?
3- What was the role of Dubai Carbon during the dossier preparation for the bid of Expo2020?
4- Having Dewa and ENOC as main stakeholders, how this make your work more efficient?
5- What was the major contribution of Dubai Carbon in the transition process of Dubai economy toward Green economy?
6- What is the strategy Dubai is following as carbon abatement to cover any unplanned emission caused by the event?
7- Transportation, power generation and water salinization…. Are Dubai carbon is involved in more industries as part of the carbon abatement strategy?
8- Hosting 3 times the number of the current population will put a pressure on the country resources, Having extra preparation with extra capacity will leave the country with excess capacity that they don't need. How Dubai will deal with that and remain sustainable?
9- Dubai Carbon job as consultancy for Expo2020, what you can tell me about your works with Expo2020 team
10- What are the main points you are looking to cover when you are managing a green project?
11- You start have clients from private sector for the manufacturing of Carbon credits?
12- For the government entities… are you trading the carbon credits or you are keeping it for future use?
13- To which extent the ERP (enterprise resource planning) for DEWA and Emirates Global aluminum was successful…. To which extent they improve?
14- Do you have a baseline for the number of good days in terms of emission reduction?
15- How you can assess the trend of the green house gases emissions in UAE since 2011?
16- What is the direct benefit of the sustainability reporting?
17- Do you believe that hosting mega-event in Dubai will pollute more than hosting mega-event in place with established infrastructure like UK?
18- Looking for what Dubai is doing now, do you believe that hosting mega-event is a non sustainable act?
19- Why you believe that Dubai want to be sustainable? You don't look to the hosting of Expo as an unsustainable act?
20- In your opinion, to which extent you think that sustainability is still expensive?
21- Do you believe that the mix culture of Dubai affects your practices in improving the sustainability of the city?
22- Who's the biggest un-sustainable industry in UAE?
23- Do you see the current plan of legacy is replacing sustainability considerations?
24- Do you think that this legacy is long lasting?
25- If the mega-event will help in improve the sustainability practices now, do you think this will last?
26- Do you believe that Dubai would be the same in 2020 if it didn't secure Expo?
27- What are the main event life cycle where you think it's the least sustainable?
28- Do you think that mega-event can help in changing the consumption attitudes of UAE residence?
29- What are the main benefits of Dubai citizen from hosting Expo2020?
30- In your opinions what is the actual number who will visit UAE for the Expo it self and not a time switchers or casuals.
31- Which city you use as a benchmark?

Appendix F

Chair of the ISO 20121 Committee semi-structure interview questions

1- How you Define sustainability in mega-events… how you differ it from sustainable development? ……. How to develop
2- What are the main pillars of sustainability in mega-event?
3- How you relate business excellence into sustainability?
4- Do you still believe that mega-event planner will pay more to be sustainable?
5- Why you believe the mega-event has to be sustainable?
6- Looking for the trend of Olympic 2012, you will see a major shift from focusing in "the most sustainable game" into consideration of legacy, how you justify this?
7- Regarding FIFA Rio 2014 and Olympic Rio 2016, Do you believe Brazil was able to be sustainable?
8- How you relate sustainability into legacy?
9- How a hosting committee can prepare for ISO20121 certification?
10- Do you believe that government can impose the sustainability practices by proper legislation if the society doesn't have a sustainability practices?
11- How you justify a non –sustainable act like mega-event will be sustainable?
12- Do you believe that using mega-event as a catalyst for development is a proper act?
13- How you start engaging sociality into sustainability?
14- I am trying to build a theory that in order to be sustainable in mega-event, you have to have a proper infrastructure and legislation ahead of bidding for such event rather than using this event as polishing for existing image
15- Do you believe that any hosting committee can compromise the success of any mega-event with sustainability goals?
16- To what extent the environmental sustainability is compromised during the mega-events for the benefit of achieving social and economical sustainable development?
17- What is the optimal level of "hosting spending cost" compare to the event-related spending on the legacy and sustainability?
18- What about the intangible legacy, is it part of the sustainability plan?
19- the hosting committee of mega-event will always have some requirement to build an event related venues which will be bigger than its own requirement, how to avoid this?
20- Do you believe that we can reach one day virtual events?
21- Do you believe that sustainability practices is universal?
22- Along with transportation, energy generation and construction, do you believe there is any other sector who can challenge sustainability commitment?