The Holistic Value-Added Approach to Sustainable Development:

A strategy to reduce the friction between human-ecology and economics

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1. Abstract

Sustainable design and engineering is in great demand in cities all over the world. As a result, design and engineering consultancies have to continue finding ways to capitalize on sustainable developments responsibly. Implementing a strategy to reduce the friction between the human-ecology and economic imperatives is a major step. Amongst Ramboll’s Nordic sustainable perspectives, the Swedish perspective can be innovative enough to reduce this friction that can stand in the way of the comprehensive sustainable project mission, which is profitable and value-added. But can this comprehensive and holistic Nordic approach, intended to link stakeholders into a positive project dynamic be applied effectively enough under unique country-specific contexts? A strategy that incorporates a framework to understand and value the intangibilities of sustainability and fine-tuned for the different conditions and unique contexts of where projects are built can help by creating positive synergies between stakeholders. The friction between the human-ecology and economic imperatives exists and we draw upon previous research and sustainable development projects in Sweden and Istanbul, Turkey, to determine how this friction prevents projects from being comprehensively sustainable. Exploring beyond the Swedish sustainable perspective can help rationalize contextual barriers during the pre-construction stages of the project life cycle. And, with the right strategy, the project coalition can design and engineer with confidence knowing that the intangibilities of sustainability are valued and used by each stakeholder to optimize their profitability responsibly.
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CONTENTS
1. Abstract ........................................................................................................................ 1
2. Introduction .................................................................................................................. 6
   2.1 Background ............................................................................................................ 6
   2.2 Limitations ............................................................................................................. 7
   2.3 Abbreviations ......................................................................................................... 8
   2.3 Research question .................................................................................................. 9
   2.4 Structure of paper ................................................................................................... 9
3. Methods ...................................................................................................................... 10
   3.1 Research design .................................................................................................... 10
   3.2 Qualitative data .................................................................................................... 10
      3.2.1 Interviews ...................................................................................................... 10
   3.3 Quantitative data .................................................................................................. 11
      3.3.1 Ramböll questionnaire survey ....................................................................... 11
      3.3.2 Swedish and Turkish case studies ................................................................. 12
   3.4 Ethical and confidentiality considerations ........................................................... 12
4. Research purpose ....................................................................................................... 13
5. Literary Review .......................................................................................................... 14
   5.1 Swedish sustainable development perspective .................................................... 14
      5.1.2 Sustainable City Concept .............................................................................. 14
      5.1.3 The Symbiocity Concept ............................................................................... 15
      5.1.4 Sweden Green Building Council (SGBC) .................................................... 17
   5.2 Knowledge Management, Sustainability, and Project Success......................... 17
   5.3 Sustainability Economics ..................................................................................... 19
      5.3.1 Differentiating and addressing wants and needs ........................................... 21
      5.3.2 Sustainability economics and different contexts ........................................... 22
      5.3.3 Sustainability economics and development projects .................................. 23
      5.1.1 Swedish sustainability initiatives ................................................................. 24
   5.4 Real Estate Value and Measuring Sustainability ................................................... 24
      5.4.1 Sustainability and the project scope .............................................................. 26
      5.4.2 Value in sustainably built real estate ............................................................. 27
      5.4.3 Embodied energy, PLC, and LCA ................................................................. 28
5.4.4 Value and the project coalition ................................................................. 29
5.5 The Multi-Criteria Analysis (MCA) ............................................................ 32
5.6 Building Environmental Assessment (BEA) .............................................. 34
  5.6.1 The Growth of Green Economy and CBTs ........................................... 35
6. International Field Research Results ............................................................ 36
  6.1 Universal design and engineering areas of focus ...................................... 37
  6.2 Sustainability in the country-specific context ........................................... 37
  6.3 Turkish sustainable development perspective ......................................... 39
  6.3.1 Istanbul: Step to Global Competitiveness ......................................... 41
  6.3.3 Urban Transformation and Sustainable Development ....................... 43
7. Ramböll Survey Results .............................................................................. 47
  7.1 General ..................................................................................................... 47
  7.2 Project Management Department ............................................................. 52
  7.3 Engineering Department (HVAC, Mechanical, Electrical, Energy) ........ 53
  7.4 Planning Department (Landscape, Traffic) .............................................. 54
  7.5 Survey discussion .................................................................................... 55
8. Case Study Results ...................................................................................... 57
  8.1 Considerations to architectural design and engineering ......................... 58
    Architectural applications ......................................................................... 58
    Engineering: HVAC, Sanitation, and Energy ........................................... 59
  8.2 Universal design and engineering areas of focus ..................................... 61
  8.3 Swedish Case Studies ............................................................................. 62
    UURDA 5, Arenastaden, Solna ................................................................. 62
    Technical characteristics ......................................................................... 67
    Kv Jungmannen 3, Western Harbour, Malmö ......................................... 68
    Technical characteristics ......................................................................... 72
  8.4 International Case Study (BREEAM-In Use Certified) ............................ 73
    Kanyon Center, Istanbul, Turkey ............................................................... 73
    Technical characteristics ......................................................................... 77
9. Results ......................................................................................................... 80
  9.1 Human-ecology and economic friction .................................................. 81
  9.2 Making sense of intangibilities in sustainable development .................... 83
2. Introduction

2.1 Background

“A significant dimension of the rapidly emerging global economy is the “green” economy—that is, economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy use, recycling materials, and developing and adopting renewable sources of energy”.

Asteris and Neofotistos (2012, p.6)

Energy costs continue to rise, environmental issues threaten to plague future generations, and rising urban populations are reaching epic proportions. The success and profitability of sustainable design and engineering consultancies hinges on a number of sustainable applications and important contextual consideration unique to every project, domestic or abroad, to deal with a friction that exists between the human-ecology and economic imperatives (Appendix Q). These applications and different contextual differences permeate through the entire project life-cycle (PLC) (Figure 3) and affect both the sustainable development’s performance and its profitability for both the consultancy and their clients. However, there is a need for a workable framework for organizations working in a temporal one to consider—a strategy to help place value on the intangibles of sustainable development so that stakeholders can come to a consensus. This is a process of understanding and finding a comprehensive sustainable solution through triangulation that implement qualitative and quantitative analysis (Denzin, 2012). Without strong partnerships at the earliest phases, for example, problems and roadblocks can appear throughout the PLC. Often, however, these may be caused by misunderstanding, lack of understanding, and not knowing how to deal with constraints. This problem is only heightened when foreign consultancies operate under different international contexts.

The burden of working with challenging circumstances under different country-specific contexts is broad and complex. Consultants must not only understand what is happening in a different country and why, but must also build strong relationships with the hope of forming collaborative partnerships. Partnerships are also recognized as a necessary means to achieve international competitive advantage in construction projects (Ozorhon et al, 2007). The knowledge and experience shared between partners may not only be of great value, but result in the most efficient, value-added sustainable development, especially when the friction between the economic and human-ecology imperatives is reduced.

Unlike the past when urban development often involved less-than-comprehensive sustainable modeling, modern day planning involves new additions to life cycle assessment (LCA), including more specific social and economic considerations to balance out an otherwise unsustainable ecological approach (Gauthier, 2005). And, with over two decades of on-going development, green building rating systems like criteria based tools (CBTs) continue to evolve. These building environmental assessment (BEA) systems can be applied in conjunction with various stakeholder interests to build comprehensive
sustainability developments. When this is combined with the use of sustainability indexing (SI) and LCA, a systematic framework is provided for understanding and valuing intangible and tangible sustainability aspects. A strategy can then be devised together with proper knowledge management for profitability and value-addedness in sustainable developments. This strategy is consistent with collective bargaining between stakeholders that applies a holistic sustainability approach which considers the social, economic, environmental, and political interests together to insure each other’s sustainability (Regeringskansliet, 2010).

Since sustainable developments are custom made under cultural and environmental specifics that help solve that country’s sustainable problems, different contexts must be considered crucial for a holistic sustainability approach that provides appropriate country-specific sustainability solutions that brings profit. This is clearly valuable for the design and engineering consultancy because advanced designs and engineering prowess may not be enough to solve complex and ambiguous problems that requires proper communication, interpretation, and clarification (Vasconcelos and Ramirez, 2011, p236-237). Without such knowledge, for instance, legal requirements and unique circumstances will be hard to grasp along with adequate cooperation and commitments. Xu and Greenwood (2006, p438) explains that ‘governmental, market, and technical barriers to entry’ still plague foreign construction companies abroad. Moreover, blending and making sense of positive economics with normative sustainable analysis can be a difficult task, no matter how much designers and developers want to come to terms with legal environmental impact assessment requirements (Bartelmus, 2010; Gasparatos, 2010).

As important as the business imperatives may be, overall success and profitability may ultimately be attributable to a comprehensive, value-added, sustainable approach. In fact, evidence suggests that economics is vitally linked to the social and environmental aspects. This comes as no surprise because sustainability can now be measured by way of how the built environment affects the economy, the environment, and quality of life (Porta and Renne, 2005). In modern cities, the sustainable approach helps cope with urban sprawl, population booms, and environmental issues (Lehmann, 2011). It may even create robust economic activity to gain profit from, but only if the friction between economic and human-ecology can be reduced.

2.2 Limitations

1. Since a widely accepted sustainable framework has yet to be widely adopted, this paper will be limited by a set of theories and concepts that proposes a strategy to mitigate sustainability issues faced by the design and engineering consultancy.

2. The bulk of this research is about the friction between human-ecology and economic imperatives, the usefulness of measurements and values, aggregating individual criteria to build consensus and cooperation between multiple stakeholders, understanding context, and certain architectural and engineering solutions.
3. Mainly focusing on the early stages of the project life cycle (PLC) to build a strategy, but not implementation.

4. Some information acquired may be sensitive and confidential. This may limit the extent of empirical data we are able to reveal and analyze.

5. Context is explored in terms of condition and circumstance, not language discourse.

2.3 Abbreviations

BBR: Boverket Building Regulations (Swedish National Board of Housing, Building and Planning)
BIM: Building Information Modeling
BREEAM: Building Research Establishment Environmental Assessment Method
BEA: Building Environmental Assessment
CAD: Computer Aided Design
CBD: Central Business District
C2Gr: Cradle-to-Grave
C2Gt: Cradle-to-Gate
C2S: Cradle-to-Site
CBA: Cost-Benefit Analysis
CBTs: Criteria Based Tools
CHP: Combined Heating and Power Systems
CSR: Corporate Social Responsibility
EIA: Environmental Impact Assessment
EMS: Environmental Management Systems
GHG: Global Green House Gas Emissions
GBP: European GreenBuilding Programme
HVAC: Heating, Ventilation, and Air Conditioning
ICT: Information Communication Technology
ISO: International Organization for Standardization
IT: Interest Rate Targeting
LC: Life cycle
LCA: Life cycle Assessment
LCCA: Life cycle Cost Analysis
LEED: Leadership in Energy and Environmental Design
MAMCA: Multi-actor multi-criteria approach
MB: Miljöbyggnad
MCA: Multi-Criteria Analysis
PEC: Primary energy consumption
PLC: Project Life Cycle
PM: Project Manager
RES: Renewable Energy Sources
SD: Schematic Design
SETAC: Environmental Toxicology and Chemistry
SEA: Strategic Environmental Assessment
SHGC: Solar Heat Gain Coefficient
SIDA: Swedish International Development Cooperation Agency
2.3 Research question

Can the right sustainability consultation strategy reduce the friction between human-ecology and economic imperatives to create a successful, profitable, and value-added sustainable development? Sustainable development planning is virtually inseparable from the project mission in modern developments. Thus, we build on previous studies and a number of research methods to propose a profitable sustainable consultancy strategy for Ramböll that addresses the friction issue in a holistic and responsible way for the long-term success of sustainable projects. We problematize how this can be done by examining 1) innovative architectural and engineering applications around criteria based tools (CBTs) and project coalition cohesion within the early phases of the project lifecycle (PLC), 2) design and operational energy consumption of buildings to determine how it ultimately affects investment value, 3) the importance of a life-cycle analysis (LCA) and embodied energy in terms of waste, time, and costs, 4) statistical data showing the growth of the green buildings in Sweden 5) the importance of contexts in regards to the unique country-specific social, environmental, and economic conditions, and 6) most importantly, how all the results of these questions can be evaluated based on the differentiation of wants and needs, and then aggregated to form investment criteria that plays under the auspices of sustainability economics using multi-criteria analysis (MCA).

2.4 Structure of paper

This research paper will be organized as follows:

1. The introduction includes the research background, research limitations, term abbreviations, the research question and method of investigation, and the purpose of our research.

2. Two literary reviews are included in this research. The first narrows down the broad topic of sustainability to make it relevant for our research. This review also comprises our core strategy model based on pre-existing sustainability approaches and other researched theories and concepts. The second essentially supports the first by exploring the country-specific context, and the Turkish sustainable perspective in greater detail.

3. A survey with Ramböll Sweden AB has been conducted to better understand how much is known about comprehensive sustainable development in terms of the Swedish sustainable approach as it is widely taught, promoted, and applied today.

4. A comparative analysis between two green buildings has been conducted mainly in terms of energy consumption between initial design and post-construction operational consumption. A third case study in Istanbul, Turkey, is provided to show how sustainable developments there differs
from the Nordic, and eludes to how country-specific context plays a major role in the sustainability of design and engineering.

5. Several interviews were conducted in order to collect data from experts and professionals with experience working on sustainable developments.

6. The last three sections will be followed by the result, recommendation, and conclusion of this research.

3. Methods

3.1 Research design

The design of this research paper uses meta-analysis, case studies, and a field research study. However, we acknowledge that aggregation of both qualitative and quantitative data could weaken the validity of our results. For this reason we considered Denzin (2012) view that the use of different methods should be evaluated in the process of methodological triangulation, whereby the validity of the qualitative data is contrasted against quantitative data. And, since we are dealing with complex and abstract relationships, we considered it important that triangulation involves ‘epistemology, methodology, and specific inquiry techniques’ and ‘pragmatics, multiple interpretive practices, and bricolage’ (ibid, 2012; in Denzin & Lincoln, 2005, p. 4). In doing so, we were able to problematize the research question and to develop a strategy for the design and engineering consultancy intended to help pacify the friction between the human-ecology and economic imperatives, but kept well aware that any inconsistencies between data sources would allow for re-analysis of any strategy and framework for it.

Denzin (2012) also analyzed triangulation through Teddlie and Tashakkori (2003) “third methodological moment” and Flick (2002), whereby the former involves a mixed methods approach in social science traditions while the later states the difficulties in transforming qualitative data to quantitative data. Incidentally, they critically explore what justice for people means and uses mixed method analysis to responsibly understand paradigms and politics created by social constructs. Nonetheless, we believe that weaknesses in triangulation can be overcome by comparing reality with qualitative and quantitative data. We found this critical for understanding contexts. Compiled primary data collected from field studies and interviews to build the research foundation were also applied to add to the mixed methods approach and to see if particular barriers, sustainable methods, and business approaches by industry professionals effected projects. Quantitative data from primary and secondary sources also provided a basis to understand the cause-effect relationships in cases where results were affected by context or circumstances. Through it all, we expected to strengthen the resolve of our strategy.

3.2 Qualitative data

3.2.1 Interviews

Several interviews were conducted in order to 1) collect industry knowledge on sustainable development, including contextual understanding 2) discover points of
agreements and disagreements amongst stakeholders who would normally work together for a sustainable development, and 3) examine how much current research and innovations are actually being used in the design and engineering of sustainable projects, especially when it comes to green certified buildings. Thus, the interviewees include a number of design and engineering consultants, including construction contractors, architects, and real estate owners and investors, tenants, academics in the field of planning and sustainability, CBTs assessors, and urban and regional planners. The underlying theme of these structured and semi-structured interviews concentrated around each stakeholder’s role in sustainable development, the PLC, and other questions around other specific topics relevant to our objectives. In consideration to triangulation, it was our contention that every projects pose different contextual challenges in addition to economic pressures facing stakeholders that dominates human-ecology imperatives. Thus understanding how, why, and what influences each stakeholder to applies what they know in the sustainable development may help reduce sustainable development risks.

Interview answers were also analyzed to derive problems with contextual knowledge, architecture and engineering, and business approaches domestically and internationally, if any. This is also consistent with knowledge management in Section 5.2. And, because these interviews were both structured and semi-structured, we felt that there was enough flexibility to allow interviewees to elaborate without being pressured. Consequently, the semi-structured interview may have prevented bias and leading, and allow for a healthy debate. Aside from public interviews, those with industry professionals were based trust, professionalism, reliability and credibility. As researchers, however, we acknowledged facing bounded rationality so we viewed these points as essential in obtaining valuable knowledge from our specifically selected interviewees.

In order to keep the interviews focused on sustainable development and the intangible aspects of sustainability, the major categories covered as primary topics of discussion were:

1. Social and Environmental
2. Design and Engineering
3. Economics (real estate development and investments)
4. Governance and urban planning

A number of sustainability aspects were derived from these topics according to what would normally be covered in development projects and put into a matrix system (Appendix I & J). The table also indicates which aspects were covered and not covered amongst the different interviewees.

3.3 Quantitative data

3.3.1 Ramböll questionnaire survey

An analytic survey was conducted at Ramböll Sweden AB, Stockholm. As comprehensive and holistic the Swedish sustainable perspective may be it remains...
difficult to implement even today. This begged the question of how much do consultants in each department know about it and how do they deal with the complex intangibilities of sustainability when they are under pressure to keep costs at bay? The lack of knowledge or strategy may be endangering the comprehensive sustainable development mission. Based on the importance of knowledge management in organizations, our questionnaire contained various questions related to sustainability and the PLC. With regards to a semi-structured questionnaire where the questions are predetermined, but the respondents can use their own words (Churchill, 1999), our semi-structured, predetermined questions, which are mostly in multiple-choice form still provided room for respondents to elaborate further if needed. This was consistent with what Ghauri and Grønhaug, 2009 who says that there are no predetermined answers in unstructured questionnaires.

According to Simons (1987), analytic surveys we can test a theory by taking the logic into the field, in which the emphasis is put on specifying the independent, dependent and extraneous variables. This was a complex process involving weighing how the dependent variable, the sustainable development, was affected by both the actions and influences of the independent variables, the design and engineering consultants. We assumed the role of context and friction between the human-ecology and economic imperatives as the extraneous variables for analysis. The questionnaire surveys were disseminated into the following departments:

1. Project Management
2. Construction (HVAC, Mechanical, Electrical, Energy)
3. Planning (Landscape, Traffic)

3.3.2 Swedish and Turkish case studies

There are three case studies. The first two developments are between a green certified (MB) and a non-certified green building. One is the UARDA 5 office building in Arenastaden, Solna, Sweden. The other is the KV Jungmannen 3 in the Western Harbor, Malmö, Sweden. We were fortunate enough to be able to have collected both qualitative and quantitative from these operational developments. As such we were able to cover certain architectural and engineering nuances, including some social and environmental sustainability aspects. The data we received about energy efficiency and consumption rate helped us make assumptions about each development’s economic value. The third case study concerns a green certified sustainable development in Istanbul, Turkey. The same aspects covered in the first two case studies apply were applied here, except for the fact that we actually had to derive most of the quantitative figures from company sustainability reports. Figures are essentially estimated because exact numbers for this large project are hard to derive due to large and varied tenancies.

3.4 Ethical and confidentiality considerations

Some of the data collected were provided in confidence so that we can reflect on them without disclosing said data in this research in part or in its entirety. In fact, we did not include what we thought may be harmful to any party. Moreover, there has been no
attempt to make harmful statements without first discussing the issue with our sources. Any information we obtained were also discussed in a timely manner during our interviews or time of obtainment, if we felt that it was a sensitive issue. We have also kept careful records to prevent any misinterpretations and keep proprietary information to ourselves. Furthermore, it is not our intention to misconstrue any information we were provided or to take a position against or for any particular stakeholder, despite our cooperation and sponsorship by Ramböll Sweden AB. On the contrary, our goal was to remain as unbiased as possible with the purpose of deriving academically-based research results that not only benefits KTH and Ramböll, but all stakeholders who find an interest in sustainable development.

4. Research purpose

The purpose of this research is to propose a design and engineering consultancy strategy for Ramböll that pacifies the traditional friction between the human-ecology and economic imperatives. A number of researchers and experts believe that this friction exists. Based on the premise of our research question, we wanted to confirm that the appropriate strategy requires a systematic approach to understanding the intangible aspects of sustainability by valuing them, evaluating how they affect asset value to create investment criteria parameters, and then understanding how this is important while consulting under unique country-specific contexts. It should also be pointed out that we have taken geographical, climatic, political, economic and human-ecology into consideration in terms of contexts. Moreover, we touch upon theories and concepts to help distinguish between what society needs versus what they want to avoid long-term project risks. In order to see if our strategy would result in a successful, value-added, sustainable project, we also wanted to determine what is understood today by industry experts and researchers. Their view should be able to help critique the data we obtain while lending more relevance or contrasting points to our research question. And, by critiquing and problematizing the objectives we laid out against other country-specific contexts and perspectives, rationalizing profitability based on a myopic, sustainable, perspective may be avoided.

We focus on the early stages of the sustainable project life cycle (PLC) and use the Swedish sustainable perspective as the basis for our research’s sustainable perspective. This includes contrasting this current Nordic-specific perspective against the Turkish sustainable perspective to help determine how to make it more likely to succeed under unique country-specific contexts. This should ultimately help determine if our consultancy strategy is valid both domestically and internationally. In the process, we wanted to determine if Ramböll’s current sustainability approach that has catered mainly to the Scandinavian markets is effective enough to optimize profitability given these unique complexities faced in other international contexts.
5. Literary Review

This section systematically problematizes a number of theories, concepts, and models relating to sustainability and sustainable development. Coincidentally, this systematic approach also has a basis in triangulation, which uses qualitative and quantitative gathering and analysis (Denzin, 2012). Therefore, the multiple sections in this literary review are consistent with this approach. They will also explain the connection between human-ecology and economic imperatives, as well as why there is a friction between them. Starting with the Swedish sustainable perspective, a historical evolution of sustainability in terms of the Nordic perspective is outlined. Then, the value of knowledge management in terms of sustainability in the organizational setting is explained. A number of theories and concept will then be explored and framed into a systematic strategy to help project coalitions understand and work with the intangibilities of sustainability in different contexts. With a broad holistic approach to sustainability planning, organizations can better deal with the broad scope of sustainability development. Of particular focus in this section are the following:

1. Sustainability economics and unique contexts
2. R.E. value and measuring sustainability
3. Environmental Assessment
4. Building Environmental Assessment (BEA)
5. Stakeholder coalitions and the multi-criteria analysis (MCA)
6. Embodied energy, PLC phases, and Life cycle assessment (LCA)

These areas of focus are examined in consideration to what value-added would mean to the consultancy, the client, and the public/environment. The importance of value-added sustainable development cannot be underestimated as more and more clients are considering sustainability as an important part of their investment strategy. In this case, knowledge of how the sustainable design affects the short and long term value of projects is extremely important, especially when no widely accepted framework exists to help pacify the friction between the human-ecology and economic imperatives.

5.1 Swedish sustainable development perspective

Like other approaches, the Swedish sustainable development perspective covers what Hansmann, et al (2012, p.451) says are the integrative concepts designated by the social, environmental, and economic components.

5.1.2 Sustainable City Concept

The Sustainable City was a Swedish initiative which was intended to be holistic. Sustainable developments of cities under this concept were to consider economic, social, ecological, and spatial dimensions and was developed by Swedish Consultants (Sweco), a Swedish architecture and engineering consultancy, for the 2002 World Summit of Sustainable Development in Johannesburg on behalf of the Swedish Government through the Ministry for Foreign Affairs, the Ministry of Environmental, and the Swedish environmental technology industry by the way of the Swedish Trade Council (Eexportrådet). Based on this concept, the Swedish International Development
Cooperation Agency (SIDA) eventually developed a manual named “Support to Environmentally Sustainable Urban Development by 2007”. Ongoing sustainable urban development interventions and initiatives in Sweden underpinned what SIDA promoted. Projects such as Hammarby Sjöstad in Stockholm and the Western Harbour in Malmö won international recognition, in both developing and developed countries for their approaches to sustainable urban development, including water, waste, and renewable energy looping systems. Their new system solutions provided a wide scope for synergies between sewage, waste and energy production and enabled efficient land use coordination, landscape planning, and transport systems. All of this demonstrates an eco-cycle model, which is essential for a definitive shift from linear to circular resource flows.

According to Henrik Berg von Linde, who was a member of Sweco FFNS back in the 1980’s, said that the Swedish sustainable concept was developed to be applicable in planning of new cities where there are opportunities to reduce energy demand by up to 75%; and further achieving an energy supply based on renewables. In addition, the concept can be used to develop strategies for successive realignment of existing urban areas to address the future direction of a more sustainable Sweden.

5.1.3 The Symbiocity Concept

Background

In 2008, the Swedish Government launched Symbiocity – Sustainability by Sweden, based on the knowledge and experience gained from implementing the Sustainable City concept, and from SIDA’s development cooperation work. The objective was to create a unique market platform for sustainable urban development, based on Swedish environmental knowledge and technology. Going into 2010, the Sustainable City concept was integrated into the Symbiocity Initiative, as an overarching concept and communication platform for Swedish institutions and actors involved in sustainable urban development. This revised version of The Symbiocity Approach is considered a fundamental part of this initiative, and the change from manual to conceptual framework reflects a shift in the purpose and use of the approach.

The Framework

The procedural frameworks of Symbiocity are defined as follows (Sweden Regeringskansliet, 2010):

- Environmental factors
- Socio-cultural factors
- Economic factors

It consists of finding consensus through continuous dialogue towards a holistic approach where environmental assessments and evaluations are processed. Furthermore, the interaction of the technological systems enhances the citywide development strategies, and also contributes to the economic synergies through sustainable development. Another critical part is bonding of the involved stakeholders, which
includes private firms, public authorities, governmental and education/financial institutions. There are approximately seven hundred Swedish private firms who are promoting green technology to international locations willing to adopt the sustainable development, additionally few several hundreds of consultants, contractors, and system suppliers working actively around the global network (Sweden Regeringskansliet, 2008). Furthermore, the network encompasses the institutional participation for financial structuring designed to better promote sustainable practices. Spatial communicative gaps will exist due to negotiation information that may never reach the public (Fainstein, 2003). However, this may result in an unpredictable power struggles in and within democracy, causing uncertainty of risks as Bent Flyvbjerg (1998) refers to. Nonetheless, the significance derived from the planning efforts is for the culmination of conceived sustainability directives designed for beneficial and sustainable social and economic growth. The Ministry for Rural Affairs states on promoting a “dynamic and competitive business sector that is open and diverse, a vital eco-efficient and resource-efficient green sector, which is concerned, responsible, with high ethical standards while contributing to better global sustainability development” (Sweden Regeringskansliet, 2010).

Symbiocity and Stockholm Royal Seaport

The Stockholm Royal Seaport represents Sweden’s evolving commitment to sustainable development and piloting the Symbiocity concept. The implementation of ‘smart power-grid planning and systems’ enhances the reduction of energy demand and waste. Moreover, the innovative green approach promotes comprehensive recycling programs. In terms of social and environmental aspects, the planning and design of architecture emphasizes a more harmonious relationship with green public areas for better sustainability habits for the inhabitants. For some, however, the Symbiocity remains a form of marketing concept to better promote the Swedish sustainable practices, especially from the ‘environmental technology sector’ to the rest of the world (Sweden Regeringskansliet, 2012). Regardless, the implementation of Symbiocity at The Stockholm Royal Seaport has been a major milestone to help integrate, manage and build vital synergies between people, environmental awareness and participation, economic growth, social interests, political agendas, and innovative technologies.

Though it is touted as a marketing concept to represent ‘Swedish systems expertise’ and to promote the ‘environmental technology sector’ abroad (Sweden Regeringskansliet, 2012), Symbiocity drives the Swedish commitment to sustainable practices, which influences the dynamics between stakeholders towards a multidisciplinary holistic approach in urban regional planning and development. Companies like Sweco was one of the first to adopt this interdisciplinary approach and created their own model (Appendix C), which resembles the Hammarby Sjöstad’s Sustainable Model (Appendix B) as well as Swedish government’s Value Rose Approach (Appendix A). The mentioned models share the common interdisciplinary approach by trying to advance economic, environmental, social sustainability issues that are faced by multiple stakeholders. Since these aspects have traditionally contested each other, it makes sense that Symbiocity found a way to bring together many sustainable firms and consultancies in order to formulate a coherent contextual framework to achieve the goal of building a sustainable city.
5.1.4 Sweden Green Building Council (SGBC)

The previous section summarized the Symbiocity concept and how its holistic approach is used for urban regional planning. As such, it mentioned how Symbiocity emphasizes the integration of technological subsystems in a city-wide development perspective, which eventually creates the synergies for a sustainable development. The Stockholm Royal Seaport is no doubt an exclusive project aiming to become carbon neutral, but will individual buildings as part of the larger whole meet guidelines set forth for green certification requirements?

Just recently, the Swedish market had a total of thirty-seven green system programs to measure the building’s environmental performances (Sundkvist et al. 2006). Some critics argued that the existence of a myriad of systems drew confusion among the developers, clients, and tenants. Furthermore, questions arose about how comprehensive measurements were in terms of not only building performance, but in terms of social and environmental aspects. For instance, David Sundbom (2011) argues that indoor environment is one of the few attributes of system programs that helps determine whether builds are “green” or not. Yet, it’s hard to comprehend the whole picture of the environmental impact and how inhabitants are affect by it—how their interaction with it can become intrinsic value. These questions created confusion in the Swedish market, contributing to difficulties in communicating what green building means for sustainability and the emerging green economy (Bonde et al. 2009).

SGBC was founded in the spring of 2009, to assume a major role in managing Swedish green developments and helping to promote internationally recognized standards for green building. In particular, SGBC is to help the wider-scale voluntary-based initiatives set forth by the European Commission’s GreenBuilding Programme (GBP) to reduce the energy consumption of all new developments by its member countries. By 2011, SGBC narrowed the wide field of green systems by selecting four classification systems, which will later be described as criteria based tools. These include GreenBuilding LEED, BREEAM, Miljöbyggnad) that can be adapted to fit different kinds of Swedish buildings and property owners. A major goal of SGBC is to own as many environmentally classified buildings as possible to help contribute to a sustainable society (Sweden Green Building Council, 2013).

5.2 Knowledge Management, Sustainability, and Project Success

Research shows that the importance of knowledge management greatly affects the how successful projects will be, especially when it comes achieving a comprehensive sustainable solution. This is because companies must organize for projects that involve the flow of information, resources, materials, and people (Winch, 2010). Many companies today say that they are stark supporters of sustainability, but the knowledge at their disposal when it comes to designing and engineering a comprehensive sustainability project may not always be reflected by the project mission outcome. In this case, employees may be segregated from crucial knowledge by internal knowledge gatekeepers (Dainty, et al 2006) that control perceived roles and tasks or knowledge management failures. What occurs is compartmentalization, which effectively causes knowledge gaps. The learning organization should blend the process of procuring
absolute measurements of sustainability with a hand-on approach of what they will achieve. This is to prevent designers and engineers from becoming distanced from the actual project when absolute figures are not leveled with understanding complex and normative nature of sustainability, which requires a firm grasp of how its aspects form interdependencies. As stated earlier with Hansmann, et al (2012) and Denzin (2012), this means using the integrative social, environmental, and economic approach which relies on both quantitative and qualitative analysis.

The combination of all disciplines involved with the design and engineering of sustainable projects should be fluid and continually learning, analyzing. Thus, the project should not be without in-depth knowledge, understanding of limitations and constraints, or addressing issues related to harmonizing ideas between stakeholders (Winch, 2010). This includes harmonizing the social, environmental, and economic imperatives because the investor is mostly concerned with branding, preserving image, providing a public benefit, and personifying power, which entails justifying investment costs through the qualities of specification, realization, and conception (ibid, 2010). A communication strategy at the earliest stages of the PLC is one solution, along with empowering investors with the long-term value-added benefits of sustainability. This strategy consistent with inclusive consensus building negotiations can minimize planning risks and tame subjectivity (Healey, 2003).

Stakeholders represent the accumulation of ideas, needs, and visions. The project mission should be a common goal amongst them, but keeping everyone in-line means establishing temporary organizations—organization, which, according to Sense (2011) are learning organization that breaks from the positivist epistemological frame of traditional organization by sharing and acquiring knowledge from different sources. The implications of understanding this is invaluable because projects in of themselves are information processing systems whereby stakeholders input parameters as solutions for the complex issues to achieve a successful project mission and to help anticipate how the project will perform (Winch, 2010). And, because sharing knowledge is a form of empowerment, it also incentivizes and encourages participation and cooperation (Dainty, et al., 2006). On the other hand, failure to grasp context can be costly as knowledge from consultants outside of the organization need increasing incentivisation to provide it (Frappaolo, 2006), especially if it is not already known in the earliest stages of the PLC. As such multiple project risks can arise in the design and engineering of sustainable projects created by the technical, managerial, commercial, and environmental fields of study (Fig. 1).
Each category posed in Figure 1 requires knowledge derived from education and experience. Stakeholders contribute architectural, economical, and technological solutions, but according to Frappaolo (2006) may not fully understand the context at hand. Culture, tradition, and socio-economic condition are examples. Space syntax, spatial configurations, people flows, and how build-outs may encourage unintended results largely understood through regulatory contexts, including local, state, and municipal laws and regulations, are other examples of unique contexts (Winch, 2010). In terms of building strong, trustworthy partnerships and cooperation, the temporal organization should also consider what Dainty, et al (2006) describes as unique organizational settings that creates formidable barriers to effective communication, like power and gender roles, physical surroundings that may lack efficient information communication technology (ICT), and language differences whereby meaning can be lost in translation. For an international company, this means that consultants need to be stewards of diplomacy by being considerate to different approaches, nondiscriminatory, maintaining broad-mindedness, and staying culturally aware (Fisher, 2010); and, if required, enlisting a native consultant. This can also help deal with what was earlier described by Flyvbjerg (1998) as power struggles in development projects—the by-product of which often defines rationality. Knowledge management can minimize bounded rationality created by these contexts, which is extremely important to find the appropriate, comprehensive, sustainable solution.

### 5.3 Sustainability Economics

The roots of sustainable development has attempted to bridge policy fragmentation that the United Nations mandated World Commission on Environment Development
believe is critical for conservation of the environment, social, and economic development objectives (Bartelmus, 2010). This makes sustainability economics broad in scope and very complex. Thus, in order for it to be useful for the design and engineering consultancy, one should also imagine how the individual development project as a real estate asset will benefit from incorporating sustainability. Warren-Myers (2012) argues that the relationship between real estate market value and sustainability is due to limitations in research today that can explain it well enough. This is why she emphasizes the importance of more tangible “evidence that would allow the incorporation of normative theories on the value of sustainability in valuation practice” (ibid, 2012, p.115).

Since rationalizing sustainable development with business enterprise is not an easy task costs associated with sustainable applications and practices are often perceived as unprofitable. Business enterprise with regards to the economic survivability of development projects have always been at the core of normative neoclassical economic paradigms. However, the design and engineering consultancy is helping the development industry come to grips with the merger of a comprehensive sustainable approach that also factors in scientific theories concerning the normative topics of the social, environmental, and economic realms. Martins (2011, 2) explains how the “nature of the entities posited in scientific theories” can be explained through ontology, which “is the study of the nature of reality”. If the development industry is driven by the basic tenants of the economic imperative, is also affected by such ontological entities. Moreover, this makes it more likely that sustainable development parameters will be defined by the bi-product of what Waring (2010) says is a theoretical and ethical debate between ecological economic and neoclassical economic theorists.

In a more rooted approach to understanding how the natures of ontological entities like the economic, social, and ecological dynamic affect sustainable projects profitability, Baumgärtner and Quaas (2010) believes that the future of social justice is inclusive of nature (Appendix P). Of importance here is that project profitability would thus be dependent on understanding how the human-ecology and economic dynamic affect the project. Harking back to Martins (2011) and the significance of ontology, the interrelationship between these aspects has been considered in legislation since the 1960’s after the Conference on the Rational Use of Biosphere Resources, a UNESCO initiative, which implanted “the concept of ecosystem in everyday language” and how “living organisms and human beings themselves are not independent from each other but on the contrary being part of ecological systems where any change to one element has an influence on the rest of the system” (Destatte, 2010, p.1580).

In concept, if political will is driven by public calls for environmental changes, sufficing society’s wants and needs with the proper design and engineering solutions must inevitably addresses influential social imperatives and consequential changes in environmental and regulatory standards that motivate sustainable innovations. Put simply, what comes from the human-ecology dynamic will affect economics. Such contexts explain what sustainability economics means for sustainable development. Then, there is also the question of bridging normative topics when formulating sustainable plans. In this case, Waring (2010) and Baumgärtner and Quaas (2010) both
Baumgärtner and Quaas (2010) rationalize sustainability economics as a tool to explore future uncertainties in which human wants and needs are met in the long-run with mutual justice considerations for people and nature. An important question for the sustainable business enterprise can thus be how profit can be found by balancing the economic imperative amongst other ontological entities like human-ecology. Certainly, a comprehensive sustainable approach should avoid what Sen (2009) says is a one-dimensional economic imperative to define our long-term well-being. This is where the inconsistencies of application and formulation of the theoretical and economized social and environmental factors lies (Camagni, et al, 1998), and a point of friction with economics. Thus, there can be two considerations for sustainability in the case of sustainable developments (1) the economic imperatives of how the project is able to continue operations, services, and expected payoffs during its life-time and (2) the inclusion of the relevant normative topics in sustainable research concerning human- ecology.

5.3.1 Differentiating and addressing wants and needs

How should societal wants and needs be weighed and rationalized for sustainable developments especially with respect to optimal profitability? This is increasingly important because of the greater need for nature conservation and the interaction that humans essentially need with it. This interaction is for health, well-being, productivity, and other forms of human activity that benefit the economy. Far too often, however, people are overwhelmed by the context created by urban designers that often fail to adequately provide this. For architects and engineers, investors often choose the economic imperative over the long-term benefits to human-ecology that may ultimately affect their investments.

Despite concerted efforts, the pressures of utilitarian neoclassical economics can be divisive when it comes to finding consensus concerning the differences between wanting and needing, and the formation of a more conscientious mindset towards sustainability (Martins, 2011). The point is not to separate basic tenants of profit, self-gain, or what is economically fair and just, but rather stipulating that there is a difference between what is desired and what is needed. For instance, ecological preservation should be a natural human right because humans have a natural dependency to it—transcending beyond unnecessary wants by virtue of being a crucial relationship required for the human species to survive.

Moral management that Martins (2011) refers to Smith (2002) and Sidgwick (1874) about would thus not be as critical when it comes to considering value and profit when it’s a matter of justice as defined by Baumgärtner and Quaas (2010). To break through corruptible morals, selfish natural human tendencies in the pursuit of achieving what they want, despite wanting to give back when it is convenient, for example, is part of the process by which Smith (2002) explains how the “invisible hand” works. In a sense, this also drives the tensions—the wants and needs that drive economies. Unfortunately, rationality can be shaped by power (Flyvbjerg, 1998). Driving on what
Baumgärtner and Quaas (2010) say, our basic human needs compared to what we desire should be an inalienable right, justice; and, thus, a natural component of the sustainable development. By naturally allowing the human and ecological cosms to their preexisting dependency with one another in an unpredictable future (Baumgärtner and Quaas (2010), irreversible damage to the environment would be tied to the fate of humans. Sustainability in this regard, must look beyond neoclassical economic utilitarianism that focuses on financial and economic growth, but not to dismiss those who Holdsworth (2011, 37) say ‘moral norms should never enter the explanatory apparatus of economics’ and those who like Baumgärtner and Quaas (2010) and Martins (2011) would agree that moral imperatives should be included.

The friction between morality and economics can be problematized and tempered by differentiating and addressing wants and needs. However, sustainable project development also requires bringing individual preferences together. From Froeman (1999), De Brucker, et al (2013) explains that project evaluation for stakeholders requires considering both the strategic and moral branch. Furthermore, De Brucker, et al (2013) rationalizes from Commons (1934), Klein (1984), and Mitchell (1969) that individual preferences can be consolidated through Democratic consensus building that helps arrange progressive rules that investors can value.

5.3.2 Sustainability economics and different contexts

Context is both tangible and intangible—creating the conditions surrounding sustainable projects. If Martins (2011) is correct about ontology and how ‘nature’ creates contexts, ensuring that humans and nature receive justice while investors continue to profit from sustainable development requires understanding how wants and needs are different internationally. For instance, the economic imperatives and human-ecology can be ontologically problematized through sustainability economics and the capability of affecting well-being (Baumgärtner and Quaas, 2010; Martins, 2011). Influential forces include country-specific status quo, the unique contextual situation, and its constraints. What is important to consider for sustainable developments then becomes not only profitability, but the project scope influenced by those forces and what Camagni, et al (1998) says is how the built, natural, and social environments occupies the same space.

More specifically for sustainable development are the interrelationships between humans, their cultures, and their ecosystems in the built environment. What society values and prefers thus forms evolving standards (Zimmerman, 2009), whereby form and function of design can be derived from unique processes of particular contexts and needs (Neuman, 2005). These reasons apply to development projects because the human-ecology influence permeates throughout the inner and outer realms of the project. In the end, the intrinsic values of projects are also the outcome of combined tangible, economic, and the intangible, human-ecology, and the interplay of wants and needs which can be construed as a unique context that varies depending on where sustainable projects are being built.

In light of society’s changing criteria and the contexts that arise from them (Zimmerman, 2009; Neuman, 2005), Ketelhöhn and Quintanilla (2012, p.1767)
provides insight on how country-specific conditions influence companies, whereby “industry is less important than internal differences among firms” due to the “effect of location on company performance”. That is, a noticeable difference in how individual companies perform when they operate in different countries, arguing that multiple companies will face the same environment outside of their countries which will affect how they operate. To reduce risks during the PLC, consultancies must therefore consider analyzing the scope of the project in many perspectives, especially with regards to how stakeholders may be operating under unique geographic and political settings (Porter and Derry, 2012).

5.3.3 Sustainability economics and development projects

Since the human-ecology connection with the built environment comes from societal constructs, proper architectural and engineering design must incorporate these demands along the lines of economic realities. However, Waring (2010) goes beyond Baumgärtner and Quaas (2010) and Martins (2011) view on ontological analysis and causal mechanisms of different entities with the idea that the ethical friction between neoclassical and ecological economics must be alleviated by the evolution of the cultural and human behaviors for the economic paradigm to mature in a sustainable way. And, as sustainability initiatives grow, the economic paradigm becomes more intertwined with what Markard, et al (2012, 955) calls a ‘sustainability transition’ whereby sustainability concerns are being met with innovative technological solutions. Likewise, existing governance and regulatory frameworks are driven by societal wants and needs. The differences between different interests often form perceived inequalities that widens into the political arena (Colantonio, et al, 2011). Moreover, McFarlane (2011) says that the human and ecological realms are linked to society’s material transformation and urban policies.

Thus, it can be said that different societal contexts exogenously influence architectural and engineering applications, if not directly, through legal and regulatory requirements. This is pointed out because the business enterprise often fails to adequately factor in sustainable applications for profitability. Nonetheless, changing societal constructs can change a project’s economic useful lifespan. For instance, Ngo and O’Cass (2009, p.498) say that the firm, which in this case is the owner and the customer are “closely interrelated in value creation” and that “the value offering created by the firm for the customer is defined in the marketplace by the customer”. Architectural and engineering innovations can be used to counter-act this risk by giving development projects elements of adaptability to avoid obsolescence and remain meaningful throughout its useful lifespan. If Waring (2010) is correct about the adaptability of culture and human behavior, it must also be reasonable to say that wants and needs shape the built environment. Does the project continue to meet the challenges and preferences posed by changing societal constructs? Continuing to analyze the unique contextual scope driven by human-ecology and economy of where projects are going to be built raises the likelihood of having a successful project, especially when human activities are placed both in the physical and natural environments.
5.1.1 Swedish sustainability initiatives

Although Sweden has had a relatively low population density and moderate economic growth in the past few decades, environmental issues have long been at the “forefront of Sweden’s agenda” (OECD, p. 228). With its strong international interdependencies, such as entry into the European Union and other Nordic cooperative initiatives, Sweden’s environmental issues also have a strong international focus. One clear demonstration of Sweden’s pioneering environmental commitment was the initiative taken to host the first UN Conference on the Environment, held in Stockholm 1972 (OECD, p. 228). Sweden has since continued to demonstrate its sustainable development commitment through national and international undertakings (IISD, 2004).

Sweden’s policies place a great deal of emphasis on sustainable development. Environmental concerns began in Sweden with nature protection in the first half of the twentieth century, and dealing with local effects of industrial emissions had already become an important issue in the 1960s. The longstanding national history of commitment to the environment and to sustainable development precedes the many initiatives undertaken in the country, which are now packaged in the Swedish Strategy for Sustainable Economic, Social and Environmental Development.

Furthermore, Sweden has a great deal to gain from being a leading country in terms of sustainable society. It can aim to a greater solidarity and a more equitable allocation in national resources, expanding to a larger international scale as well. A sustainable development policy can thus serve as a key catalyst of renewal, growth and employment in Sweden as well. Just as social reforms constantly spur economic progress, adaptation to environmental demands will require new solutions, new ways of supplying energy, and cutting-edge, environmentally sound technologies and innovations that will create jobs and stimulate development.

5.4 Real Estate Value and Measuring Sustainability

In consideration to Warren-Myers (2012) view that there are difficulties in drawing enough evidence to explain the correlation between real estate value and sustainability, and Martins (2011) and Baumgärtner and Quaas (2010) explanations on meeting societal wants and needs and human-ecology justice, respectively, Moldan, et al (2011, p.4) reminds us that because sustainable development is “pragmatic and anthropocentric”, there must be better ways to measure them. Moldan, et al (2011) still talks about how imperatives relating to the economic, social, and environmental as a basis from which sustainability policies are formed, but believe that indicators must be used to measure sustainability. Ding (2008, p.461; Fig. 2) was able to form a sustainability index (SI) that covers the “multiple-dimensional model that embraces economic, social and environmental values.” The following two equations denote the Ding (2008) SI model:

\[
SI_t = \sum_{j=1}^{J} e_{jt} W_j
\]  

(1)
Where, $SI = \text{the sustainability index for the project alternative } I; W_j = \text{the weight of criterion } j; \text{ and } e_{ji} = \text{the value of alternative } i = 1, \ldots, I \text{ for criterion } j$.

If $e_{ji}$ and $W_j$ = higher value = better score. Project alternative $i$ will be judged better than alternative $i'$ if $SI_i$ score is that $SI_i'$ score.

$$e_{ji} = f \{BCR, EC, EB, EI\} \quad (2)$$

Where, $BCR = \text{benefit-cost ratio}; EC = \text{energy consumption}; EB = \text{external benefits}; \text{ and } EI = \text{environmental impact}$

Along with the economic objective, this sustainability index bridges the absolute measurements found with tools for MCA.

The general application of LCA addresses environmental impacts and built around each company’s internal ISO choice, but this analysis is not complete for sustainable development. Niederl-Schmidinger and Narodoslwsky (2006) point out that LCA do not offer a “fixed evaluation method”. Therefore, criteria based tools (CBTs) can be an important supplement at the very early stages of the PLC. With absolute measurements, the project can be given a more accurate sustainability capability whereby a progressive approach to it can be put in place early enough.
Along with each stakeholder’s integrated environmental management system (EMS), used to comply with global standards, mitigate trade barriers threats, and tackle issues related to difficult sustainable development issues (Khan, et al 2002; Lam, et al 2011), SI, LCA and CBTs have the potential to help weigh aspects of sustainable developments by providing actionable values. For instance, Khan, et al (2002) also says that LCA helps to assess environmental burdens. Thus it is reasonable to believe that the relationship of real estate value and sustainability that Warren-Myers (2012) is critical of, may be strengthened in consideration to the efforts taken by stakeholders about how sustainable measures can affect their investments. These tools may actually be a form of empowerment to help understand the project scope whereby stakeholders have something tangible to analyze and determine as individual stakeholders and how their investment criteria fits into the sustainable development. This knowledge, later in the PLC, may ease project risks from technical, managerial, commercial, and environmental fields as coalition professionals continually reevaluate and reanalyze during project management (Cagno, et al, 2007).

Assessment (EIA) and Strategic Environmental Assessment (SEA), which are now “legally required in several countries for projects/policies/etc.” (Gasparatos, 2010, p.1613). Gasparatos (2010) speaks of sustainable development in the broad sense of the term, but the value of real estate will undoubtedly be affected by how environmental assessments will affect project costs. For instance, various analytical techniques that Gasparatos (2010) talks about are akin to building environmental assessment (BEA) tools in which LCA and CBT’s are included, provide these techniques for measuring sustainable building performance. This relationship is critical for the purpose of this research because the better these tools are implemented to measure intangibilities in sustainable theories and concepts, the more prepared the consultancy will be for a sustainable project to help clients find value and profitability.

And, with the SI, the design teams, local council, and the public are given weight, which is something that CBT’s may fail to address (Ding, 2008, p.462). However, when it comes to the whether or not they are valuable for projects in the long-run, Gasparatos (2010) believes that implementing BEA tools like certifications are ways companies stay in-line with legitimate world industry standards of sustainable development. For instance, a LEED or BREEAM certified project can be industry recognized as legitimately sustainable to target the growing green economy with real estate owners who are increasingly sustainability conscious.

5.4.1 Sustainability and the project scope

An important aspect of assessing the value also has a lot to do with what is decided upon given the project scope. Unfortunately, this is not fully comprehensible to all stakeholders during the conceptual and design phases. The fact of the matter is that, in the end, economics can still trump the best solutions that ensure long-term value. As sustainable development becomes more mainstream, reducing the risk of functional and external obsolescence through human-ecology considerations, on-going measurements in tangible areas like energy savings are good for economic considerations. For instance, The GreenBuilding Programme (GPB) enacted in Europe with 167 partners who along with 286 building partners have reduced energy
consumption by 304GWh/year, and hope to increase this to 3.3TWh (Valentová and Bertoldi, 2011). Both renovations and new construction is included in this program. In Sweden, Fastighetsägarna, with over 20,000 property owners are members.

Knowledge to help narrow down the broad scope of sustainability is also on the rise as “scholarly literatures of management studies, sociology, policy studies, economic geography, and modeling” are being brought together in research (Markard, et al, 2012, p.955). These changes do not so much contest Warren-Myers (2012) as it does show that efforts are being made to show that sustainability in real estate can be more compelling to gain sustainable commitment when they are more tangible to place a value on against normative economics. In many ways however, individual stakeholders tender their participation with the notion that given pre-determined parameters under a certain sustainable framework will not change. Strategically speaking, measuring sustainability starts at the beginning of the PLC whereby the first step is perfecting partnering agreements, initiation of the project, then continuously analyzing, synthesizing, and evaluating it through the PLC to help minimize risks and improve future performance.

5.4.2 Value in sustainably built real estate

In this research we look at LCA and CBTs as a way to provide information before project initiation and to enlighten stakeholders of the long-term added-benefits of sustainable development. Though Fuerst and McAllister (2011) do not find compelling evidence showing a strong relationship between environmental/energy performance with rental and capital value, they acknowledge that their data is only based on appraised value, which is not the same as transaction prices. This is actually significant in real estate terms in that appraised value can be significantly less than fair market value (The Appraisal Institute, 2008). Moreover, Fuerst and McAllister (2011) grant that long-term profitability may still be found during tenant lease term negotiations that reflect higher energy savings. Also, pride of ownership, comfort, usability, and utility should also be factored as important intangible effects during sustainable development planning and to determine a real estate asset’s value in the marketplace (Appraisal Institute, 2008; Eichholtz, et al 2009).

In all fairness to Warren-Myers (2012) and Fuerst and McAllister (2011), is right when they say that there may be a lack of understanding where value is found in consideration to holistic sustainable development. However, this does not mean that more value does not exist in it. Turner and Frankel (2008) state that certified buildings have a lower management and operating cost, while Eichholtz, et al (2009) indicate that a “10 percent decrease in energy consumption leads to an increase in effective rent of about 20 basis points and an increase in value of about 2 percent, over and above the rent and value premium for a labeled building”. Considering that there are existing applications that can further reduce, benefits can be even greater. Using CBTs can help integrate value in green building in a number of ways, including identifying sustainability problem areas. For instance, Dall’O, et al (2012, p55) creates a partnership with the LEED framework to ‘audit green energy’ so that energy consumption profiles, possible measures, including cost-benefit analysis (CBA), and a way to report it can be possible. Again, in terms of understanding the intangible and
tangible effects proposed in sustainability economics, LCA and CBTs can be applied for measurements and to develop proper design parameters because they essentially provide sustainable frameworks. If applied in the very beginning of the PLC, a more comprehensive project mission can better consider future applicability of how design exhibit scalability and flexibility of systems and processes.

5.4.3 Embodied energy, PLC, and LCA

Carbon emissions or energy consumption in relation to a sustainable development can be examined from operating energy requirements and travel distance of employees, but also from the embodied energy of buildings. Estimating embodied energy is done through LCA and its sub-processes; Cradle-to-Grave (C2Gr), Cradle-to-Gate (C2Gt), or Cradle-to-Site (C2S), whereby figures are derived about the total energy consumed over a project’s life cycle (Hammond and Jones, 2008). The codes established in LCA originally came from the Society of Environmental Toxicology and Chemistry (SETAC) in the early 1990’s, which later helped establish the International Organization for Standardization (ISO) series 14040 to 14044, which encompass the ISO LCA framework (ibid, 2008). Today ISO LCA, along with ISO 14001 is part of many companies corporate social responsibility (CSR) in designing and applying an EMS that can be used to reduce environmental impacts.

The importance of embodied energy can be relevant in many regards after first being recognized as an important economic measure to offset potential global energy dilemmas (ibid, 2008). It facilitates the use of more responsible materials for sustainable projects in terms of “the quantity of energy required to process, and supply to the construction site” as figures are be calculated based on “material extraction, processing, and transportation” (Hammond and Jones, 2008, p.87). Interestingly, most CBTs still lack the full capability to calculate embodied energy. After calls from sustainability consultants in 2011 to be provided calculation tools, however, it is still viewed as a vital component for upgrading their measuring systems (UK Green Building Council, 2010). Moreover, it is possible to then continually lower consumption with better systems, processes, material replacement, and renovation during the PLC and serving as a value-added incentive for investors. By comprehending the comprehensive sustainable project scope in the earliest phases of Rambøll’s PM at the pre-construction phases of the PLC model as shown in Figure 3, below, better designs are possible, especially when there is more actionable knowledge early enough.
On the other hand, what is designed can be drastically different from what a development will consume in energy when it is fully operational, especially with tenants’ varying energy consumption over time. Nonetheless, with respect to Hammond and Jones (2008), a true carbon neutral project that sought by many design and engineering consultants would have given back the entire quantity of energy it consumed, while having the added quality of long-term social benefits. The long-term savings in energy alone is value-added.

There are also a lot of misunderstandings of what embodied energy is and how to best calculate it in an LCA to include how some operational variables like waste, time, and cost (Abanda, et al 2013). Moreover, connecting embodied energy accounting to building value, especially when building structures have a long life cycle (Jiao, et al 2012). Though some may dismiss its value, they may be underestimating the architectural and engineering possibilities that addresses the users labor energy expenditure and the exosomatic energy requirements laborers need (ibid, 2012, p.23). This seems valid for both design and operation of the subject property. And, if there was a more thorough understanding of embodied energy for PLC, better ways to reduce consumption during operation, along with better use of the right materials, and responsible procurement can be found. For instance, there is credible best practices knowledge dispelling misunderstanding of benefits of applying renewables, which can reduce the overall energy intensity of a project that Jiao, et al (2012) talks about. Once considered to have too much embodied energy from its production, RES is becoming more efficient with the potential to produce far more energy over its lifetime than its production cost. Nevertheless, it is also important to note that there is a missing consideration with embodied energy calculations dealing with scarce natural resource usage, acidification from emissions, deposition, and leaching, and the subsequent ecotoxicity from the long-term discharge of chemicals (Levin, 2010).

5.4.4 Value and the project coalition

Through a thorough LCA and CBTs, the complexities of sustainable development are put in a more actionable conceptual form with values that helps internal and external sustainable management systems. Each stakeholder in a sustainable project coalition
stands to benefit and provide for the greater good of the project mission. This is assuming that the unique country-specific sustainable solution is better understood, especially if Ketelhöhn and Quintanilla (2012, p.1767) are correct when they say that “industry is less important than internal differences among firms” due to the “effect of location on company performance”. That is, there is a noticeable difference in how individual companies perform when they operate in different countries even multiple companies will face the same environment outside of their countries.

Aside from the differences and power struggles that arise in most projects, which test the strongest coalition of capable, specialized, firms with the right combination of skillsets and expertise to create value, contexts and how these values affect the project are important. If they each have a greater understanding of the sustainable scope of the project, stronger commitment and cooperation can be realized. This is why it is essential to have efficient and productive avenues of communication where permanent working cultures come together in a temporal structure (Dainty, et al, 2006).

In consideration to the temporal structure and different motivations, multiple contractors may feel obliged to only complete their tasks without much room to be economically flexible, but a project mission must be made. Thus, it is important to understand the role of stakeholders and their different approaches to obtain better information and datasets on design alternatives early in the design process to accumulate more knowledge at the earliest stages of the PLC. Their roles are shown in Table 1, below.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Specifications</th>
<th>Actors</th>
<th>Planning Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Planning phase</td>
<td>City / Urban &amp; Regional Authority sets the framework for the development:</td>
<td>Municipality</td>
<td>Master plan</td>
</tr>
<tr>
<td></td>
<td>- Site location, orientation</td>
<td></td>
<td>Local plan</td>
</tr>
<tr>
<td></td>
<td>- Costs</td>
<td></td>
<td>Land contract</td>
</tr>
<tr>
<td></td>
<td>- Size (e.g. plans)</td>
<td></td>
<td>Local environmental</td>
</tr>
<tr>
<td></td>
<td>Targets for energy performance, environmental impact, and health requirements are stated.</td>
<td></td>
<td>targets</td>
</tr>
<tr>
<td>2. Investigation phase</td>
<td>Developer starts design process. The most crucial phase in the building process.</td>
<td>Developer</td>
<td>Environmental programme</td>
</tr>
<tr>
<td></td>
<td>All project phases of new buildings are based on specifications made in this phase, therefore, here is where the highest potential for sustainable building design can be found.</td>
<td></td>
<td>Early sketch</td>
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<tr>
<td></td>
<td>- Design / Construction (e.g. lightweight or solid construction)</td>
<td></td>
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<td></td>
<td>- Materials selection</td>
<td></td>
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<tr>
<td></td>
<td>- Benchmarks for HVAC, renewable energy sources.</td>
<td></td>
<td></td>
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<tr>
<td>3. Conceptual design</td>
<td>Revised preliminary design, including preliminary selection of superstructure, materials, and constructions. Mainly consist of design-related matters such as shape/volume ratio, building position/orientation. Generally too early to decide details on technical systems (HVAC) and building materials.</td>
<td>Developer, Architect</td>
<td>Environmental programme</td>
</tr>
<tr>
<td>4. Submission planning</td>
<td>Final design for submission to building authority for planning permission</td>
<td>Architect</td>
<td>Sketch</td>
</tr>
</tbody>
</table>
5. Detailed design phase

Final selection of superstructure, building materials, constructions, systems for building services as the base for tendering for the construction work. The exact definition of all components of the building and the HVAC systems are addressed.

Architect, consultants, developer

Tendering documents

Environmental plan

6. Construction phase

Construction work according to the implementation plan is carried out. Clear quality assurance measures for monitoring energy and ecological performance is included.

Contractor, developer

- 

Table 1: Building process and examples of options for taking LCA-based decisions in different phases

Source: Malmqvist et al. (2010)

It is clear from Table 1 above that multiple stakeholders each have a particular role. Cost in this case could be minimized by reducing knowledge gaps in the PLC through commitment, participation, and consistently keeping all parties legally accountable and aligned with the project mission. In theory, Figure 4 below shows how knowledge grows as project time decreases.

Figure 4: Knowledge LCA Precision and Design Alternatives

Source: Malmqvist et al. (2010)

Increasing knowledge early speeds up calculations of rough values to reduce unforeseeable risks. Additionally, utilization of software programs such as BIM in order to facilitate the extraction of design alternatives’ data could also be considered.

Again, making front-end decisions is extremely important. With the help of essentially frameworks like LCA and CBTs, each stakeholder is better equipped to assess the costs associated with sustainable developments and how their own criteria is met during the project. A capable design principal with strong guidance from the project manager (PM) can help mitigate obvious disagreements. Once every stakeholder has ascertained a better idea of costs, a multi-criteria analysis (MCA) can be put in place to aggregate every stakeholder’s criteria.
5.5 The Multi-Criteria Analysis (MCA)

Earlier in this section, we used sustainability economics to explain that there is a relationship between human-ecology and economics. Under MCA, however, De Brucker, et al (2013) do not elaborate on human-ecology and justice as Baumgärtner and Quaas (2010) does, but still refers to weaknesses of unbalanced economic imperatives that do not adequately consider social and environmental aspects that affect private economic goals. With Martins (2011) explanation that ontological entities together form a dynamic, these entities can be compared to De Brucker, et al (2013) view that the context that encompasses the broad scope of sustainable development can be broken down to sub-components referred to in sustainability economics and the development project, which both involves aggregating multiple stakeholders. De Brucker, et al (2013, p124) sees the importance of understanding context and also believes that MCA “conflict analysis is critical to sustainability management and planning”. Moreover, their view shows that they believe sustainable projects involves further re-evaluation of “narrow-scope economic goals” against “broader social objectives and environmental considerations” (ibid, p.122).

According to De Brucker, et al (2013) MCA is significant in that it helps evaluate the complexity of sustainable developments. Complexity can come from the ontological context, but it also places emphasis on formulating an optimal approach to what Frini, et al (2012, p452) says are “multiple and conflicting criteria” involving multiple-actors or interests that must be considered for decision-making (De Brucker, et al 2013). With sustainable development requiring the cooperation of many people, conflicts do not lend to an optimal approach for the investor when evaluating whether sustainable projects will be less risky or profitable. What is significant with MCA is that it helps build a mathematical model, given different entities’ interests that form a unique context, by making value assumptions for social and environmental effects like the context of “unique landscape and the value of biodiversity” not traded in the financial markets (De Brucker, et al 2013, p123). By compiling the seven (7) equations that De Brucker, et al (2013, p126), the “highest expected ‘value added’ can result from aggregated consensus, which can be decomposed as follows:

\[
\text{NPV}(a) = \sum_{t=1}^{T} \frac{B(a)_{t} - C(a)_{t}}{(1+i)^t} 
\]

(1)

Where, NPV = Net Present Value of project alternative; \(a) = the sum of all net cash flows, i.e., benefits; \(B) = minus costs; \(C) = B, C; t (t = 1, ..., T) = cash flow time periods; \(i = discount rate, which represents a return that can otherwise be earned on another investment in the financial markets with similar risk

Then, in consideration to the project alternative:

\[
V(a) = \sum_{j=1}^{J} W_j V_j [Z_j(a)] 
\]

(2)
Where, $V(a) =$ overall value score for project alternative; $j = 1,\ldots,J$ and $J =$ total number of criteria; $W_j$; $\sum_{j=1}^{J} W_j = 1$, and $z_j(a), v_j[Z_j(a)]$

*Criteria and weights are given by experts and policy makers utilizing, for instance criteria extracted from a combination of internal ISO, EMS, SI, LCA, and CBTs. In MCA this equation makes it possible to weigh the effects of human-ecology, for instance, in order to indemnify social and environmental interests*

Then, to achieve the multi-actor multi-criteria approach (MAMCA) in the subset of MCA, the geometric mean method (GMM) can be applied to compare separate stakeholders’ criteria and consolidate individual alternatives into a multi-actor perspective:

$$GMM = (\alpha_{ij}^1 \times \alpha_{ij}^2 \times \ldots \times \alpha_{ij}^N)^{1/N}$$

Where, $\alpha_{ij}^n = $ individual judgments; various stakeholders; $n = 1, \ldots, N =$ individual stakeholder representatives.

Values in the GMM are to be decided upon by each stakeholder when a consensus is reached. The following equation helps build a consensus based on the weighted average of every actor’s priorities:

$$P_g(a) = \sum_{j=1}^{K} W_k P_k(a)$$

Where, $P_g(a) =$ Global, multi-actor priority of project alternative; $a$; $P_k(a) =$ priority of alternative a derived from stakeholder group k’s objective $(k = 1,\ldots,K)$; $w_k =$ weight of group k; and K is the number of stakeholder groups.

In consideration to different design parameters (considered at the pre-conceptual/conceptual/pre-design phase):

$$Z_j(a) = Z_j^* if j is a benefit criterion;$$

Where, $j (j = 1,\ldots,J) =$ each stakeholder criterion; $z_j(a) =$ a criteria score not lower than predetermined minimum score (i.e. using performance certification and/or environmental standards);

Then,

$$Z_j(a) = Z_j^* if j is a cost criterion$$

Where, the score $z_j(a)$ of the project alternative $a$ must not exceed the predetermined minimum score when a cost criterion is in place [i.e. NVP, and/or hedonistic regression modeling (Fuerst and McAllister, 2011)].
Finally, in consideration to the particular minimum and maximum criteria in (5) and (6), which encompass societal and stakeholder needs, problematizing decision problems from wants are addressed using the AHP method De Brucker, et al (2013) borrows from Saaty (1977, 1986, 2005) as follows:

\[
AW = \lambda_{\text{max}} W \quad \text{and} \quad \sum_{j=1}^{J} W_j = 1 \quad (7)
\]

Where, \( A = J \times J \) matrix, or a pairwise comparison based on importance and contribution of various criteria \( j \) assigned values from 1 to 9, and from 1/9 to 1; \( W = (w_1, w_2, \ldots, w_J)^t \) = vector of weights; and \( \lambda_{\text{max}} \) = the highest \( W \) value.

If applied effectively, this approach can help narrow down “preferences (value, utility or priority)” from intangible effects faced under different contexts (De Brucker, et al, 2013, p.130).

The result of applying the MCA and its approaches are meant to create consensus building to find value addedness for all stakeholders. Of primary importance in the process is ensuring that every stakeholder’s wants and needs, including the social and environmental are addressed in a more level playing field whereby agreed upon aggregated procedures becomes the sustainable project mission (ibid, 2013). The framework provided by MCA and the subsequent equations provided by Brucker, et al (2013), allows both the consultancy and their clients to evaluate and plug in human- ecology and economic variables to help decide what the optimal value-added project may be. In large, expensive sustainable developments, this can translate to higher profitability in the long-run. As stated earlier, however, the project life cycle (PLC) comprises of different phases (Figure 3) that requires on-going analysis and evaluations.

**5.6 Building Environmental Assessment (BEA)**

In consideration to the traditional divisions between human-ecology and economics, and the subsequent failures to give equal representation to the former, environmental assessments may have been inherently flawed. However, the ‘sustainable transitions’ referred to by Markard, et al (2012) is also shaping industry practices and habits by providing compelling scientific research, which include various scientific bodies dedicated in sustainable matters. With references to Smith (2005), Say and Wood (2008), and WRI (2009), respectively, Sev (2011, p.231-232) says building represent 17% of fresh water consumption, 25% of wood harvest, and 40% of material and energy use, in which builds represent about 15.3% of global greenhouse gas (GHG) emissions. These statistics offer a sobering reminder that scarce natural resources are limited and will not last forever. Kajander, et al (2012) mentions that in 2010, Bloomberg New Energy Finance estimated that with US$140 billion annual investments, the climate mitigation industry is the fastest growing market in the world.

Like Environmental Management Systems (EMS) used to develop policies between the ecological and economic imperatives (Söderbaum, 2007), the BEA is a system aimed to
help “mitigate the environmental impact of buildings and construction activities”,
especially in consideration to different country contexts (Sev, 2011). However, tools
within BEA are also critical to help understand not only environmental impacts of
buildings and human activities, but to also help create sustainability awareness through
best practices, operations, and management. The two most widely used BEA tools are
1) score and criteria based such as CBTs and 2) quantitative based methodology like
LCA (ibid, 2011). The Swedish Green Building Council has narrowed down a once
wide field of abstract CBTs in favor of three most favored in Sweden—MB, BREEAM,
and LEED (Table 2).

<table>
<thead>
<tr>
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<th>Miljöbyggnad</th>
<th>BREEAM</th>
<th>LEED</th>
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<td>Energy</td>
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<td>Indoor Environment</td>
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<td>Construction Waste</td>
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<td>Infrastructure and Communication</td>
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<td>Ecology and Place</td>
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<td>Pollution</td>
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<td>Process and Innovation</td>
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Table 2: Most favored CBTs in Sweden
Source: Sweden Green Building Council (2013)

Another CBT called GreenBuilding has also be developed by the SGBC in conjunction
with the European GreenBuilding initiative to reduce the energy consumption of all
new buildings in Europe. It is considered not to be as prestigious and less
comprehensive as MB, BREEAM, or LEED with parameters mainly suited for the
Swedish BBR guidelines.

5.6.1 The Growth of Green Economy and CBTs

Statistics in Sweden about the use of CBTs and subsequent certification of building
were obtained from the Swedish Green Building Council (SGBP). Figure 5, below,
shows a positive correlation between green economy growth and the use of CBTs. It
should be noted that the growth of green certified buildings does not necessarily mean
that each building is a comprehensive sustainable build. Referring back to Table 2, for
instance, Miljöbyggnad only covers three of the ten categories BREEAM and LEED
covers.
Green certified buildings in Sweden have grown since 2005. In terms of sustainability, EU GreenBuilding is not nearly as comprehensive as MB, LEED, or BREEAM. The spin-off Swedish GreenBuilding certificate using BBR guidelines was initiated in conjunction with the EU GreenBuilding initiative to reduce energy consumption rates of all new buildings in Sweden by at least 25%. In many cases, Swedish buildings following the SGBC requirements exceed expectations. On the other hand, they are not prestigious like the other CBTs even though investors find it to be the least expensive. MB is the next least expensive with LEED and BREEAM having several options that can be very expensive. As CBTs grow, so does the green economy in which many investors see a different kind of value—a value-added kind of value because CBT certifications like MB offer prestige in Scandinavian investment markets, while LEED and BREEAM are more suitable and recognized by international investors. Both LEED and BREEAM are also relatively new and the slow growth reflection of cost to implement, time to develop, and the slow realization of their value to real estate. BREEAM Sweden, for instance, was just revealed to the Swedish market.

6. International Field Research Results

It’s our contention that problems that arise during the design and engineering phases of the PLC can also be attributable to contextual differences. Continuing on from the first literary review that covers, amongst other important considerations, to create measurable sustainability criteria, which are bridged with the economic imperatives, this section covers what is happening in the sustainable development industry domestically and internationally. As such, this section covers the following areas with reflections from current research in sustainable developments:
1. Sustainability in the country-specific context
2. Turkish sustainable development perspective

These areas were meant to expose the differences and similarities between the Swedish and Turkish sustainable development perspective theoretically, conceptually, and technically. In terms of the technical solutions, research and best practices indicate that green building designers and engineers are mostly focusing on particular systems and processes. Important universal technical aspects covered in both countries are further explained in Section 8.1. This section also focuses on how Turkey may be interpreting the holistic sustainable perspective and to determine if there are inherent problems with design and engineering developments in consideration to frictions between human-ecology and economics.

6.1 Universal design and engineering areas of focus

Both the Swedish and Turkish sustainable perspective attempts to balance the social, environmental, and economic aspects. For this research, truly sustainable developments strive to put the social, environmental, and economic imperatives on more equal footing. Green building investors tend to put most emphasis on economics and often miss the long-term value of a holistic sustainable approach, despite its perceived cost-inefficiency (Jones Lang LaSalle, Istanbul, 2013), but the green economy is on the rise. The fact that Jones Lang LaSalle also now have dedicated CBT certified environmental experts investigating global opportunities and measuring the sustainability of investments for clients shows how they intend on helping their clients rationalize how they are value-added.

In both Sweden and Turkey, the application of universal design and engineering components, as well as considerations for social and economic sustainability vary greatly due to the country-specific contexts that surround sustainable projects in each country. Through both technical knowledge and understanding of unique country-specific aspects, value can be built into sustainable developments.

6.2 Sustainability in the country-specific context

Many experienced architects and engineers always keep the social and environmental aspects in the back of their minds. Unfortunately, this is hardly enough to understand the complications associated with a successful sustainable project under country-specific contexts that inherently create cooperation problems, bounded rationality barriers, and knowledge gaps.

Martins (2011) explained the ontological view of how various natures in its own way affect the whole of society. With that, it is possible to see what Neuman (2005) means when he points to why urban development is more than just about physical form; sustainability is about interdependency between structures and processes that form the contexts of the compact city. For a sustainable development project, De Brucker, et al (2013) showed the extensive involvement of multiple stakeholders, which is handled through a democratic process. In this regard, the business model for handling such a project abroad requires “multiple levels of analysis” where stakeholders “operate on
multiple geographic and political scales” (Porter and Derry, 2012, p.35). What is important for the holistic sustainable approach is that the joined social and environmental interests of human-ecology and the business interests under economy are included as stakeholders. Together, they form the different sustainability contexts faced by design consultants.

Thus, if the architecturally built environment gives meaning to our everyday lives, designing and engineering sustainable projects means much more than building efficient structures and systems as the next generation of sustainable construction is mostly determined by ‘specific countries, their policies and attitudes’ (Upton, 2002; Kibert, 2007, p598). This sets the stage for different contexts found in different countries. The Swedish government in the 1990’s began developing a strategy to approach this complex context from the Swedish perspective (Appendix A). In comparison, Nevra Gürsoy at the Istanbul Metropolitan Municipality Urban Planning Directorate is using a similar model that attempts to balance the social, environmental and economic aspects for spatial planning (Appendix D). In addition, the multifaceted sustainable design process involves multiple participants to come up with innovative ways to link systems and processes into a resilient symbiosis. One such project is the highly debated sustainable development, Hammarby Sjöstad, in the south east of Stockholm, which relies on interconnected energy, waste, and recycling processes and systems (Appendix B). Along with the Western Harbour in Malmö, these projects represent the future and evolution of sustainable development in Sweden.

In terms of sustainability, there is nothing to stop construction development from happening where people need to utilize space. For instance, Turkey is now experiencing economic growth that the government and city municipalities must continue to plan for. As the city of Istanbul conducts what they believe is best for its future, outside consultancies may not be privy to planning schemes and negotiations behind closed doors that can endanger the process of understanding the full scope of a sustainable project. This is a risk that endangers both the project and the public. For instance, Istanbul Technical University researchers and Istanbul City urban and regional planners are all critical of Turkey’s top-down planning which usurps the city’s master plan. On one hand, there is a new Turkish Green Building Council, but there is little teeth to enforce laws which are supposed to restrict developments.

This is a social and environmental barriers to entry built upon what Kilbert (2007) described as policies and attitudes. This includes culture and socio-economic conditions that drives social imperatives that are not easily understood by outsiders. Moreover, leaders recognize in general terms that today’s generational needs should not endanger or ‘compromise’ future generations’ survivability (Council of the EU General Secretariat, 2006). Thus, preservation and wide interests are involved in international projects. Nevertheless, there is a large difference in the Swedish Nordic view on sustainable development compared to the Turkish one.

Aside from industry and legislative requirements, there are architectural and engineering applications that can be utilized for the sustainable development during the early PLC consultancy phases. As stated earlier, the human-ecology connection with the built environment comes from societal constructs so proper architectural and
engineering design must design around valued sustainability criteria, but must still design along the lines of economic realities. This forms economic constraints for the sustainable development.

Several interviews were also conducted in order to collect industry knowledge on sustainable development. The interviewees include a number of design and engineering consultants, real estate owners and investors, property tenants, construction contractors, and architects. The underlying theme of the interviews concentrated around how they as stakeholders consider aspects of sustainability in the PLC. With a semi-structured interview format, specific questions revolved around social considerations, designing, core and shell (engineering), and economic questions. Since every projects pose different contextual challenges, understanding how each stakeholder applies what they know in the sustainable development may help reduce sustainable development risks.

6.3 Turkish sustainable development perspective

Since the beginning of this century, the world has been covering Turkey’s significant economic and political transformation shown in literature, journals, media, and the business communities. To understand the Turkish sustainable perspective, its context developed over its history and the new, upcoming, modern version should be understood. The taming of hyperinflation by inflation targeting has strong foundations in authoritarian neo-liberalism and the machismo of big government (Genc and Balcilar, 2012; Lovering and Türkmen, 2011). Though they have been proactive in social and economic policy legislation to help foster high rates of growth of its gross domestic product (Figure 6), an export boom, and incoming foreign direct investments (Figure 7), there are clear indications that show a less than balanced sustainable perspective.

![Figure 6: GDP Growth rate (annual %)](image1)

![Figure 7: Foreign direct investment (current USD)](image2)

Given that every country is affected by global economy, what these graphs show is the relatively high GDP growth of Turkey compared to the EU, U.S., and East Asia & Pacific countries before the onset of global financial crisis in 2007. The crisis stemmed from the subprime mortgage and mortgage-related securities meltdown. The graph also shows how foreign investors via a direct investment strategy have viewed investment opportunities in Turkey. Assuming that Turkey has been absorbing a lot of foreign direct investments, the drop in GDP growth in 2007 can intuitively be attributable to
financial capital drying up globally due to the crisis. Before 2007, it can also be said that investors did not have perfect knowledge of what would occur in the market and began slowing their investments finances became unavailable.

In terms of GDP growth, it should naturally be assumed that the global economy affects all participating countries. This entails that there is a correlation between the growth of other countries and Turkey in the global economy. In fact, we can see every country’s GDP drop in 2007, which all began to show signs of GDP growth simultaneously in 2009. Among them, Turkey had the most dramatic rebound. Even compared to Sweden, Turkey’s foreign direct investments are clearly higher, despite Turkey being considered as an emerging market amongst the comparables in the graph. Yet, with an emerging market, Turkey’s growth is unlike that of other countries because they have not yet established a firm consumer-based society. Coincidentally, the other comparables may be closely tied with the decline of China as a major exporter of goods. Instead, Turkey still has strong growth in the construction and manufacturing sectors. This is reflected by confidence, if not apprehension by most of our interviewees in Istanbul.

Despite Turkey’s growth, for example, some assert that the emergence of an allegedly democratic, if somewhat conceded, political Islamism, marks a new chapter for Turkey (Tugal, 2009), but Lovering and Türkmen (2011) also mention how government may be counter-balancing opposition power to maintain their modernization policies, which is a clear threat to the public. They go on to say that one of the most outspoken against government in terms of development projects in Istanbul is the Chamber of Architects. Our interview at the Chamber of Architects in Istanbul with architect Burak Kaan Yilmazsoy, a Ph.D Student in Environmental & Cultural Heritage, and an Istanbul Architecture Foundation Charity Fund Board Member, indicated that the government has been trying to minimize the influence of the Chamber of Architects and may even close it down. Part of the reason is that they have been outspoken against some major project proposals by the government, including the Haydarpaşa Project along the Bosphorus where they would like to build not just one or two, but several skyscrapers that would rival other global developments such as those in Dubai. Moreover, new laws concerning quality-of-build in terms of safety and environmental quality seems to also be in question, especially since an earthquake in Istanbul caused widespread devastation in 1999.

By the way Istanbul is growing their government may not be immediately scared of an economic slowdown compared to, say, how many economists feel about China and the other comparables. What can also be noted is that Turkey compared to China has not been at the center of attention for artificially devaluing their currency to make exports cheaper. Turkey is implementing an effective monetary policy using inflation rate targeting (IT), whereby forecasted inflation is compared with current inflation rates to determine the best course of action against dramatic fluctuations (Genc and Balcilar, 2012). However, Genc and Balcilar (2012) still conclude that IT may have failed despite a tremendous drop in inflation because the Turkish government failed to be fully transparent with regards to actual interest rate figures made public. Incidentally, it is this transparency problem with the government that many sustainable planners fear when it comes to the sustainable future of Turkey. Urban and regional planners in
Istanbul like Nevra Gürsoy at the Istanbul City Planning Directorate said that it can be hard to determine what the government’s intention are when they are economically driven, which makes it hard to plan for a comprehensive sustainable master plan for Istanbul (City Planning Office of Istanbul, 9 April). In any regard, the recaptured real estate values are on the rise in Istanbul. The question in this case is whether or not revitalization and modernization of Istanbul is comprehensively sustainable as evidence suggests that there is not only a growth in segregated communities, but deficient consideration of the human-ecology imperatives.

6.3.1 Istanbul: Step to Global Competitiveness

Even as an emerging market, the City of Istanbul is as cosmopolitan as their EU counterparts. With one foot in Europe and one in Asia, it has established itself as a hub of commerce and finance, making it important for global competitiveness. Their social makeup is complex and its culture a diverse agglomeration of many from the region. These characteristics have also enriched Istanbul’s history and make it identifiable and unique. According to Erem and Gür Şener (2008), the current capacity to engage with the global capital reflects the competitiveness of cities; however, the function of deep-rooted culture and heritage plays a vital role in creating spatially differentiated pattern of uniqueness. If we are to assume a linkage between sustainable development and the quality of life in a city, we can also assume that socio-economically, Istanbul remains polarized. If Istanbul is to raise their competitiveness, they need have a plan of sustainable development that also combats this issue by raising human capital, which Professor Dr. Türkoğlu, head of the Urban Planning Department at ITU says is critical for the City’s sustainable future. Even though the government says they aspire for a sustainable future with their Environment and Sustainability Development Program, 2011 (Appendix K), according to United Nations Development Program in Turkey (2011), many doubt the government’s motives.

As the largest urban cluster group in both Europe and the center of the Turkic-speaking region of approximately 200 million people from Aegean Sea to beyond the Caspian, Istanbul has long been an attraction to migrants. Migration fuelled its remarkable growth from its post-Ottoman Empire low of 700,000 to over 12 million by the year 2000. Gürsoy even mentioned that because people continue to move into Istanbul, planners are aiming to stabilize the metropolitan area’s population to approximately 16 million. This is despite acknowledging that hundreds of thousands may actually still be moving into Istanbul annually. Past issues with government census gathering apparently makes it difficult to obtain accurate population numbers. In fact, there may be many unregistered peoples in Istanbul in any one of its squatter neighborhoods, which has become common place. Academics at the ITU Urban and Regional Planning Department like Dr. Türkoğlu and Assoc. Prof. Dr. Tezer, Azime say that for more than a decade, Istanbul has been undergoing an ambitious urban regeneration, urban transformation, and redevelopment. Caught in the middle are, in general, the citizens themselves, but many are those who are socio-economically challenged and underrepresented.

With their plans to upgrade and modernize, and with so sustainability questions left unanswered, the government may be risking long-term prosperity, especially when
Lovering and Türkmen (2011) says that the whole intention of a planning strategy can be seen as a means to trigger a wide-ranging process of urban destruction and reconstruction. The responsible approach can thus be in consideration to the three pillars of sustainability and culturally. Unfortunately, questions of transparency and lack of cooperation by the government plagues a fledgling Turkish sustainable approach. As proponents for responsible sustainable development, there seems to be a general consensus amongst sustainability planners that the government may be rushing to push forward projects that research shows to be detrimental to the human-ecological imperatives in Istanbul. This can be seen by inadequate consideration for human-ecology and the questionable quality-of-build of marginalized neighborhoods and housing, while world-class districts are on the rise.

6.3.2 The direction of Turkish sustainable development

In Turkish cities where urban regeneration and transformation are occurring, sustainability is perceived as a remedy to achieve economic vitality, ecological integrity, and social equity in cities. However, we’ve seen a reality that illustrates another view mentioned by Martins (2011) about the ontological aspects and the friction between economic imperatives and the human-ecology. In Turkey, there has been an increasing awareness on the importance of sustainability along with conservation and regeneration issues since ‘Habitat II’ – the Second United Nations Conference on Human Settlements, held in Istanbul 1996. Except for some of the undertaken actions, however, conceptual and detailed ideas have not yet been introduced into legislation, nor have they been in common practice (Ercan, 2011); which brings an importance on what McFarlane (2011) mentions on how human and ecological realms are linked to society’s material transformation and urban policies.

When looking into the Turkish context, it is crucial to remember what was mentioned earlier by Kibert (2007) who says that sustainable developments involves more than building efficient systems, but by understanding sustainable construction through what is happening in ‘specific countries, their policies, and attitudes.’ Lovering and Türkmen (2011) claim that the key ingredients of the urban development in Istanbul’s ‘strategical-context’ seems to be the promotion of increasing property and land values, with that of explicit goals of key authorities, which are keys to attracting and engaging with private investors, and to gain the main resource that the authority uses to win local consent. In this case, it was hard to reflect back on the friction between human-ecology and economics—the economics driven by the traditional neoclassical utilitarianism mentioned earlier by Smith (2002) and Sidgwick (1874). What may have worked in the 1980’s with Reaganism and Thatcherism that used neo-liberal policies, for example, may be a repeat formula for disaster in a new globalized Turkey. As unlikely as this may be, it was hard not to question if the Turkish government is repeating history through some form of liberalized economics as the key tool for growth.

Today’s Turkish perspective and its direction toward sustainable development differentiate from the Swedish model, which is consensus-based and holistic. Lovering (2007) and Anderson (2010) argue that the ‘liberalization’ of Istanbul’s economy and culture is globally familiar; however, the institutional and ideological framework through which neo-liberalization is accompanied by authoritarianism is uniquely
Turkish. Figure 8, below right, illustrate how the Turkish perspective of sustainable developments is a top-down process through an authority-centric, ‘Control Paradigm’ model approach. As touched upon earlier by ITU researchers expressing their concerns about the direction of sustainable development in Istanbul, it can also be proposed that the traditional model should blend with Figure 8, below left, which demonstrates the ‘People’s Process’ model that emphasizes people at the center of the development to foster significant social justice. Interestingly, referring back to Appendix A, the Swedish sustainable perspective seems to have combined them already.

![Figure 8 Current Turkish ‘Control Paradigm’ (right) versus the ‘People’s Process’ model (left)
Source: Lankatilleke, L. and Y. Todoroki (2009)](image)

However, today’s authority-centric Turkish model may also be limiting social checks and balances and leaving state institutions unaccountable to the extent of their actions that puts the public at risk. In this case, government is developing the context they want. Painting a brighter future for Istanbul, using public relations media to promote unsustainable developments, entertaining glamorous proposals drawn up by affluent foreign architects to entice global investors, and the remedies of ‘modernizing cultural politics’ to disadvantage inconvenient groups resisting removal and creating a city appealing to elite groups, all have Ottoman echoes, which demonstrates the ingredients that form contemporary Turkish context (Lovering and Türkmen, 2011).

6.3.3 Urban Transformation and Sustainable Development

By the early 1990s, urban regeneration was introduced in the Turkish policy agenda under the concept of ‘urban transformation’. This was a simultaneous approach which Ercan (2011) says was widely accepted as a way of focusing on several urban problems in rapidly growing Turkish cities by the governments in power. The authorized legislations over the last 30 years of urban transformation have not only contributed to strengthening developments that disintegrates the inner city with the peripheral areas, producing social segregation and exclusion but they also have led to displace the poor and vulnerable communities of their localities, without having their problems addressed.
(Dinçer, 2010). Examples of this happening are the Gulsuyu and Ayazama neighborhoods as shown in Photograph 1 and 2, below. Furthermore, neo-liberal policies have shifted the dominant actors in the building sectors from small and medium-sized building contractors of the 1950s and 1980s to mostly national and international developers and institutional investors as the key stakeholders today (Gündoğdu and Gough, 2009). At the same time, Burak Kaan Yılmazsoy has been investigating the build quality of newer developments that have been allowed to propagate, especially in the disenfranchised and socio-economically challenged areas. This again, highlights what Lovering and Türkmen (2011) said earlier about the shaping of Turkey’s modern-day context. Even the last green urban park at Taksim Square is scheduled to be demolished in order for a new shopping center to be built.

According to Gürsoy, commercial and industrial developments with economical values are prevailing over the ecological values in today’s Istanbul (Appendix G). A building of a third airport in a green corridor area and reported to be the second largest in the world second only to Dubai, luxurious housing villas and other larger detached homes that raises the square meter consumption per capita, and a new third bridge that connects Istanbul’s European and Asian sides through the same northern green corridors (Appendix N), are perfect examples that demonstrate the current friction between economical imperatives with human-ecology. Development advocates may say that areas are being recaptured and revitalized are former industrial sites, but research shows that they are also natural rehabilitation sites (Appendix O). As development ensues, a top-down, authority-centralized, approach has been questioned for its sustainability. According to ITU professor Dr. Azime Tezer, most new projects continue to rise in the most ecologically sensitive areas without implementing rigorous environmental impact assessments and long-term consideration towards cultural, heritage, and environmental conservation (Istanbul Technical University, 11 April). Gürsoy emphasizes the importance of the northern axis of Istanbul as shown in Appendix G, since it contains the unique ecological values that could ultimately play a vital role as a contested area to drive human-ecology imperatives further into the political arena, forming new legislation.

One of Istanbul’s major on-going urban transformation project called the Kartal District faces the European side, but is located on the Asian side along the Bosphorus waterway. Figure 9 below shows architect Zaha Hadid’s masterplan consisting of
entirely new neighborhoods, high-rise office and residential buildings, civic complexes, hotels, and marinas. Designed with a totally different context in mind, this approved project seems tourism-centered with a high economic impetus. However, Hadid claims that the master plan’s strategy will create a balance as an antidote to the current monocentric bias of the European side, and will bring transportation and logistical efficiency by building expanding Istanbul’s economic center. In this regard, Burak Kaan Yılmazsoy states that one must critically question whether this 555-hectare site stretching from the Sea of Marmara up to the stone quarries of the E5 highway, is the kind of ‘urban transformation’ project is truly sustainable enough to respect and preserve the true values in Istanbul’s long, rich, historical context (Istanbul Chambers of Architects, 16 April).

Figure 9: Kartal Coastal Urban Transformation Project
Source: AMRES eLearning (2013)

From a new undisclosed eco-city being planned south of a new airport both outlined in red in Appendix H, a third bridge, and Hadid’s new urban district, a new contemporary trend has clearly taken flight in Istanbul. However, it also highlights some dangers of planning for a more sustainable future with mostly economics in mind. It has been said that the city is trying to preserve the most significant cultural heritage sites, but Hadid’s new city actually creates a wedge within the Asian landscape that may threaten to encourage more redevelopment in segregated areas. Moreover, projects at this scale may be overlooking serious long-term repercussions such as deteriorating human capital and loss of vital natural habitats. Incidentally, sustainability has not rooted itself in Turkish culture as it has in Sweden, but Gündoğdu and Gough (2009) says Istanbul
is restructuring with the aim of becoming one of the ‘capitals’ of the world. If this is the case, Lovering and Türkmen (2011, p.73) seem correct when they say that Istanbul is facing a ‘highly authoritarian form of neo-liberalism’. Thus, ongoing development creates a paradox in which redefining of context and the advent of new technological solutions to reduce consumption becomes counter-productive to harness value-added synergies between sustainability aspects in the long-term. For instance, Lovering and Türkmen (2011, p.77) say that university expansions began educating the ‘sons and daughters’ of rural migrant families to allow them ascend in society, but large-scale redevelopments forcing evictions and displacements say otherwise as poverty still plagues many neighborhoods. From this standpoint, it can be argued that there is not only a failure in human capital mobility and accessibility, but a clear friction between human-ecology and economic imperatives.

Then again, the redefinition of context may just redefine a new sustainability paradigm if Istanbul is modernizing its resiliency and carrying capacities. For the last three decades, with the increasing global investment capital moving into Istanbul, new exclusive, luxurious, and distinctive residential housings are slowly replacing urban ‘ghettos’ in the core and periphery of the city (Kurtulus, 2010), and today’s skylines are bursting with cranes and high-rise construction sites (Appendix L), but much can be said in perhaps another study to expand the theory that economic growth without responsible sustainable development actually results in higher pollution and emissions.

Turkey possesses its own unique cultural heritage and natural environment values. Ercoşkun (2005) states how these values create the urban identity and make its settlements unique. From an economic perspective, a development that links to its cultural heritage values is a way to improve the city’s international reputation and make it a more attractive both locally and internationally (Teper, 2002). Moreover, there are suggestions that people should be able to safely, easily, and comfortably interact and enjoy the environments they live in. However, it has been clearly shown that the current development and plans of Turkish cities are not succeeding in implementing sustainable solutions within its own unique context. As we’ve seen modernization may mean intersecting an entirely new context within an older conservative authoritarian form of neo-liberalism.

Photograph 3: Old City view from the Taksim Area, Istanbul, Turkey
Photograph by De Robles (2013)
Of course another research can elaborate on this, but there is strong evidence to suggest that Istanbul is on a less than sustainable path in consideration to the comprehensive and holistic approach. But even at the very best scenario, there are similarities between what is happening in Istanbul, China, and even the United States. Unfortunately, they are now trying to reverse some of the damage caused by less than sustainable economic choices of the past. It is critical to revise the legal framework in Istanbul, re-organize appropriately controlled policies, and establish mechanisms to enforce them. Montgomery (2003) states that they can contribute to the regeneration of run-down urban areas through renovations of historical buildings, and the re-usage of abandoned industrial sites with new functions (Heilbrun and Charles, 2001). With its cultural diversity and urban vitality, Istanbul has significant potential upon which new sustainable development opportunities could flourish without having to lose its identity. For the design and engineering consultancy, however, the context of how government shapes sustainability development must be better understood, especially when the society itself is becoming more aware of their surroundings. Nonetheless, it may seem much more likely that sustainability consultancy can flourish within the context of Istanbul’s urban transformation with human-ecology in mind to gain the support and respect of the people who are caught at the crossroads of tradition and modernity.

7. Ramböll Survey Results

7.1 General

The survey was conducted from 25th of February to 6th of March 2013 at Ramböll Sweden AB, Stockholm office. The questionnaire was distributed by hand to each department, since email and postal surveys generally face the problem with high rates of ‘non-response’ even though it is less expensive and time consuming (Scott, 1961; Boyd and Westfall, 1970). They were distributed to 7 different departments of Ramböll: Project Management, Construction, Electrical Engineering, Mechanical Engineering, Landscape Planning, Traffic Planning, and Energy. The results here reflect a further consolidated of smaller departments into three main departments, which are 1) Project Management, 2) Engineering (HVAC, mechanical, electrical, and energy), and Planning (landscape and traffic).

The main purpose of the Ramböll survey was to collect data about 1) the general employees’ knowledge and insights on sustainability; 2) different departments’ role on sustainable development and; 3) main barriers faced when dealing with projects from the design and engineering consultants’ perspective. In consideration to literary review, Section 5.2, some assumptions were made, including 1) knowledge can be scattered within organizations causing bounded rationality problems, 2) consultants have conflicting interpretations of what sustainable development is due to their unique specializations 3) designers and engineers often fail to cooperate early enough in the pre-construction PLC to efficiently address the sustainable project scope, 4) economic constraints limit sustainable solutions, and 5) the comprehensive sustainable solution requires equitable compromises between the human-ecology and economic imperatives. It should be noted that sustainability in this survey was put in terms of how the social, environmental, economic, and political aspects affect projects.
The survey showed many interesting results; the main one being that there are multiple reasons why sustainable solutions are often not as comprehensive as we’d like to believe. That is, our assumption proved true and that it is extremely difficult to reach a perfect balance between the human-ecology and economic imperatives because a robust framework to systematically address them is most often not within the project mission strategy. Moreover, consultancy companies can face knowledge obsolescence without good knowledge management.

The general results shown in Figure 10 in terms of age, academic background in sustainability, and professional practices in sustainability showed that 55% of the respondents were in the age groups between 25 to 35, and 17% between 36 to 45 years old. However, only 45% of the respondents had formal academic backgrounds or company training related to sustainability, which indicates that their exposure toward the subject may be relatively low compared to the extensive knowledge their specific role requires as a sustainability consultant. Furthermore, only 5% are currently a member of professional body or organization associated with sustainability. This may also indicate a higher dependency on outside assessors when it comes to auditing sustainability in terms of CBT use.

Figure 10
Figure 11 shows that at 55%, the youngest age group makes up the majority of respondents. Coincidentally, 80% of the respondents have shown their interest toward sustainability issues, making it likely that the newer generation of consultants may be inclined to upgrade their knowledge in sustainability. 57% of the respondents, however, feel that they either understand or partially understand what sustainable development means. With most respondents lacking formal or company training in sustainability, 43% did not feel that they knew the definition of sustainable development. With no real surprise, 92% of the respondents did not know what Symbiocity is, despite it being one of the most significant Swedish pilot sustainability concept exports and having its roots in Sweden’s sustainability evolution as shown in Section 5.1. Yet, 23% of the respondents rate Swedish sustainable development as excellent and 65% good.
Respondents gave their input on what they feel are the most important aspects of sustainability as shown in Figure 12. The significance of this part of the survey is that all respondents acknowledge the connection between sustainability aspects by choosing what they feel is the most important one amongst them all. With respects to their profession to design and engineer the most efficient and green developments, it does not come as a surprise that approximately 70% of the respondents ranks the environmental aspect the highest as the most important, followed by the social aspect with about 15%. Nonetheless, the economic aspect ranks at approximately 42% as the second most important, with the social aspect after that with approximately 35%. What we can deduce from this result is that the friction we say exists between the human-ecology and economics does exists as consultants try to develop the most sustainable development with the pressures to keep costs as low as possible. Another important point here is that at over 50%, the technological aspect is ranked as the least important. The fact that the competent engineers at Ramböll choose to apply time-tested, reliable, systems and processes, achieving good results may not be the problem; the problem may be from economic pressures and lack of commitment and consensus within the project coalition. This also highlights how innovation through technology is a social process of the organization and industry.
53% of the respondents feel that their contributions to sustainable developments are highly relevant, with the next majority of just relevant being at 34% (Figure 13). This given result suggests that consultants value their contribution for sustainable developments, regardless of formal knowledge or training. With 51% of respondents saying that their departments do not monitor or report the performance of sustainable developments and 27% being unsure if there is even a way to do so, it can be assumed that projects use trust and experience to rationalize how and why sustainable projects will be achieved. This makes sense since 58% of respondents openly discuss sustainability issues either formally or informally, which incidentally shows that sustainability is embedded in company culture. This probably varies by department, and the level of which can stand further analysis in another report, especially when it is very critical to understand the sustainable project scope at the earliest stages of the PLC. Given that there are absolute numbers calculated by departments, the amount of coalition critique and input at the earliest stages of PLC is hard to determine without monitoring and reporting as a means for constant re-analysis at the design and engineering stages. And, highlighting the influence of economics is how 35% of the respondents consider economics as the biggest project constraint.
7.2 Project Management Department

The above survey respondent’s view seems inconsistent with when Figure 14 shows only 50% of the respondents in the Project Management department have interest in sustainability, and 50% say that they are not aware of the sustainable development definition. Nevertheless, the responses indicate that the sustainable development means providing economical solutions that have the minimal negative impact (e.g. usage of natural resources) on the surrounding environment where the end product meets the client’s goal. This shows an unmeasured understanding of the interrelationship between sustainability aspects. As a go-between for the investment clients and contracted consultant, it makes reasonable sense that approximately 50% of the PM respondents view the financial constraint as the biggest project barrier in the very important category. As such, the next most important at 50% is time in the fairly important category, followed by approximately 50% saying efficiency is of average importance in the average category. Interestingly, approximately 80% within the not important category views time and communication almost equally as not important, while approximately 70% in the no importance at all category believe that political issues have no importance at all. The results with time, communication, and political may be caused by the PM department working on pre-construction and post-construction consulting. In this case, post-construction may not have the same

Figure 14

“As Project Managers, we tend to get involved in projects from the very early stages, so we should be able to convince our clients to go sustainable.” Survey respondent, 2013
economic or regulatory pressures. Whatever the case may be, 91% believe that the contribution of sustainability in developments is highly relevant.

7.3 Engineering Department (HVAC, Mechanical, Electrical, Energy)

The Engineering departments, including HVAC, mechanical and energy, are directly engaged in using absolute numbers to derive optimized calculations in terms of the project mission. Since comprehensive sustainable development not only involves energy efficiency drawn from absolute figures, the valuation of the normative, intangibles of the sustainable aspects is critical. In this regard, Figure 15 shows that 88% of respondents in the Engineering departments are interested in sustainability either because they understand this or because they would like to better rationalize how to accomplish it. On the other hand, 47% believe that they are aware of the sustainable development definition even though we have our doubts about how comprehensive a project will be without prior parameters given by the client, inhabitants, or other stakeholders. And, even though 50% believe that their work is highly relevant versus 34% who say it is just relevant, the dichotomy is statistically inconclusive in determining if they understand how crucial their role in sustainability truly is. Either they understand that a balance must be struck between sustainable aspects or they feel that their work is detached from direct responsibility, which according Section 5.2 on, should not be the case. What we are talking about here is not just energy efficiency, but responsibility to human-ecology that enjoys equal representation as a justice, together. Environmental impact assessments are valid, but may miss other important social intangibilities. In terms of project barriers, close to 60% rate financial...
constraints as the most crucial in the very important category, followed by approximately 30% time and 30% efficiency in the fairly important category. Like in the PM results, the fact that the Engineering departments work on pre-construction and post-construction consulting, project barriers stand to be influenced differently. On the other hand, structural engineers, for example, say that there is little they can do when they have minimal authority to make changes to given parameters.

7.4 Planning Department (Landscape, Traffic)

![Sustainability Interest](image1)

![Awareness of SD Definition](image2)

![Contribution to SD at Ramboll](image3)

![Project Barriers: Causing Deficiencies at Ramboll](image4)

Figure 16

The Planning Department, including landscape architecture and traffic are involved in improvements on the urban and regional scale. Figure 16 shows that 87% of the Planning Department respondents are interested in sustainability. This may be part of the fact that they are working on many aspects involving sustainability, including exposure to planning involving both public and private spaces and how they may affect the individual project. Yet, only 44% feel that they are aware of what sustainable development means, while 44% say they have no awareness of it at all. Whether or not they feel that they understand what sustainable development means, 62% of the respondents feel that their departmental work is highly relevant to it. In this case, we can assume that there are intangibilities that can stand to be clarified when it comes to doing their jobs. This includes the interplay of politics and economics within infrastructure and other public works projects, which is why financial constraints and political issues are almost equal in the very important category at approximately 40% each with about 20% believing that communication is very important. Interestingly,
approximately 50% in the no importance at all categories believe that efficiency is not important in what they do.

In a strong sense, it seems that answers provided by this department shows that they look at sustainability broadly. One respondent says that sustainability is “to provide a well-planned society which is affordable for everyone and helping to foster consumption of the world’s resources in a non-destructive way;... socially speaking, this is a society which is sustainable ecologically, economically.” Other answers indicate that there is understanding of the human-ecology connection. For instance, an employee at Landscape Planning mentioned the importance of rainwater re-usage by the utilization of the water-collector as a sustainable solution that does not require the impacting the environment with artificial systems. However, another employee had a more pragmatic response by stating, “when involved in landscape planning of housing area, there are large ambitions to provide sustainable and ecological solutions, but unfortunately is very often superficial.” Planning Departments deal with projects (e.g. public transport, infrastructure) where public sectors and municipalities are involved as major stakeholders. To this reason, it seems clear that they generally “process” political matters as shown in the results, and economic friction is inevitable with consensus-building communication between the stakeholders becoming vital to mitigate those frictions.

7.5 Survey discussion

Searcy (2011) states how environmental performance measurement provides insight into measurement system development processes, indicator selection criteria, usage of data in measurement systems, and the role of measurement systems in corporate governance. As Tangen (2005) explains, “a successful performance measurement system is a set of performance measures that provides a company with useful information that provides a company with useful information that helps manage, control, plan, and perform activities undertaken by the company.”

In referring back to our research question about if the right sustainability consultation strategy can reduce the friction between human-ecology and economic imperatives to create a successful, profitable, and value-added sustainable development, this survey pointed to a number of interesting points consistent to Section 5.2 about knowledge management, sustainability, and project success. First of all, we have confirmed that many consultants do know about sustainability to a certain degree. Most of the knowledge that they possess, however, seems to come from experience rather than formal education in it. This is just the reality. With the exception of just a few who have worked extensively on pilot projects and concepts relating to sustainability, most seem inclined to work or develop only an aspect of it. It is clear that the broad, normative, topic of sustainability remains a buzz word that has slowly trickled into the mind-sets of design and engineering consultants because of the industry’s direction into the green economy. In all fairness, the design and engineering industry has only begun to take sustainability to heart in the last 5-10 years; while the field of sustainable research still struggles to define a widely accepted sustainability framework.
Earlier, we brought up Symbiocity because it was derived from the industry and found its way into sustainable developments such as The Stockholm Royal Seaport. These kinds of projects are by no means minor and show how the Swedish sustainability perspective has embedded itself within the Swedish society—the degree of which can be studied further. Our survey was intended to draw out not only how employees view sustainability, but how they have gone about understanding it. Was it through education, experience, or company culture? One critical factor to have in mind here is that most of the employees at Ramböll weigh the advancement of sustainable development mostly in environmental aspects, showing that most people perceives sustainability as Scholz and Binder (2011) a process by which human activities should not endanger global dynamics, resource availability, and the resilience of the ecosystems in a way that can cause problems to the self-sustainability of the current population or the future generations. However, this is a complex endeavor that cannot be oversimplified and takes thorough analysis. That is a general, broad, interpretation of something complicated. Our literary review shows a more complex rational approach to understanding the human-ecology and economics and why the friction between them exists. On the other hand, many consultants feel that parameters are often non-negotiable forcing them to follow a political process that misses sustainable aspects and possibly reducing the need to communicate about sustainability even though consultants are feel that their work contributes to sustainable developments. For instance, some in the PM department do not consider politics and communication as very important even though many in the Planning Department feel differently. Furthermore, only around 30% of engineers feel that time and efficiency is important even though this would be important for reducing costs in the PLC. With such results, there are clear indications that barriers can be arise in consensus building.

But it is clear now that regardless of the friction between the human-ecology and economic imperatives, their degree of interaction also matters to balance out sustainable developments equitably and efficiently. In other words, we can go back to the literary review to reconfirm the importance of understanding how the natures of ontological entities such as economic, social, and ecological dynamic affect sustainable projects profitability. However, our survey indicated that there is an inter-departmental process or culture causing knowledge to be scattered. The relatively low score of technology may in fact be emphasizing that knowledge management and finding values for the intangibilities of sustainability can help balance sustainable programs conducive in reducing the friction between the human-ecology and economic imperatives, especially when consultants keep in the back of their minds that human-ecology preservation is a form of justice. Furthermore, there seems to be active participation in sustainable measures and applications by consultants. In short, our thought is that if knowledge management and finding values for the intangibilities are allowed to reduce friction, the industry can eventually modernize and innovate responsibly.

In terms of technology, BIM and smart systems can help with communication, change consumption rates, and behavior; there has to be a moral imperative to understand that justice to both human-ecology is crucial in terms of what Smith (2002) and Sidgwick (1874) say. And, because there seems to be active participation in sustainable measures and applications by consultants, Waring (2010), Baumgärtner and Quaas (2010) and Martins (2011), amongst others in our literary review make compelling arguments for
them to consider and are more up-to-date and relevant to today’s world. Wheeler and Beatley (2004), for instance, states how in the early 1970s that an economy based on endless growth in physical production was impossible, and called instead for steady-state-economy based on qualitative but not quantitative growth. Achieving this steady-state economy was through ongoing process to deplete resources through quotas by which the government essentially auctioned off the right to consume basic resources. In short, if knowledge management and finding values for the intangibilities are allowed to reduce friction, the industry can eventually modernize Wheeler and Beatley’s (2011) point that consumption should be decreasing over time because technology would, perhaps, be elevated in importance to help reduce consumption of resources. Right now, economics still dominates.

At sometimes, however, “sustainability requirements have affected which materials are to be used, and generally they have been specified by the architects.” An engineer at Ramböll involved in BREEAM certified projects have acknowledged that because of the parameters given, “there’s not a lot we can do as structural engineers.” For the most part, this explains how their contribution to sustainable development may already be decided by clients and other involved stakeholders.

8. Case Study Results

Three case studies were examined for this research. First, two subject properties were identified in Sweden for a comparative analysis based on energy consumption and operational costs. One of the finished projects is green certified, while the other is not. The main purpose of this comparison is to critically determine if green certification increases value. However, each property was examined based on their individual design and engineering merits, including its resulting sustainable attributes and characteristics because they cannot be compared with traditional real estate evaluation methods. The two similar properties are physically dissimilar and are located in two different cities that have different real estate fair-market values. Moreover, geographic location posed different environmental conditions for their designs.

The third case study involves a built mixed-use development in Istanbul, Turkey. This particular property is still one of the most unique in all of Turkey and represents what designers and engineers like Murat Cengiz, senior architect, at Tabanlioglu Architects in Istanbul envision projects in Turkey. It is also BREEAM In-built certified and personifies a particular type of lifestyle and occupancy. Of particular importance in understanding why this project is different from those in Sweden is that it was built under a different country-specific context. Furthermore, we wanted to scrutinize the difference between what is designed and what is ultimately consumed during the operational phase. Thus, we examined how well systems were integrated and the level of commitment and understanding each project coalition had at the earliest stages of their PLC.

In order to conduct a fair assessment based on tangible figures we were able to obtain, our assessment of each case study considered each project’s energy consumption. These figures can be plugged into an MCA as explained in Section 5 as major criteria
for investors and tenants. Thus, we examined available data on the total energy consumption of all three building in Mwh for the largest, Kanyon Center in Istanbul, Turkey, and in Kwh for the smaller Swedish properties over a period of at least one year. In consideration to our interpretation of the sustainable development that balances the human-ecology and economic aspects in a value-added way, we tried to determine the use and role of CBTs, if any. Was it valuable for auditing the sustainability of projects or are they useful tools for stakeholders to build long-term value for sustainably build projects? In terms of an LCA, none of the properties used a type of CBT that could have provided in-depth measurements of embodied energy even though we kept its use in mind for cost analysis and to scrutinize why it may have been used or not. In the process, we also expected to confirm the existence of the friction between human-ecology and economic imperatives. Of course, the success of each project is subjective, but our objective included determining if a comprehensive sustainable development was accomplished as a measure of long-term success and value-addedness, especially with on-going debate about the value of CBTs.

In all three cases, it should also be noted that because green certifications have mechanisms to help offset inefficiencies in some design and build categories, what was considered most important is operational consumption when initial investment capital for design and construction is foregone. This is because in the long-run, operational costs can cost more than initial development costs, depending on building type and location. With regards to the various particular impact categories listed in many certifications in which Wallhagen and Glaumann (2011) believe are often reworded despite them measuring the same thing, we needed something immediately measurable, which is energy consumption. In the process, we were able to problematize design and engineering criteria that shaped the build and character of all three case studies. In this case, architectural and engineering areas of focus outlined in the following section were considered.

It should also be pointed out that we did not attempt to compare green certifications, which goes beyond the scope of this research, especially when it requires analyzing complex weighting systems that can blur a fair auditing of true efficiency. For instance, inefficiencies with HVAC and CHP systems can be offset by a credit system that gives credit for raising another sustainable category. Not to be unfair, weighting credits still raises other sustainable aspects of projects and ultimately offer a good examples for the future of the industry. Green certifications also offer widely accepted industry credentials that investors value, especially when they are following internal ISO auditing for corporate social responsibility (CSR) (Vasakronan Stockholm HQ, 14 March). Moreover, CBTs like MB can certify that buildings meet the Swedish Boverket Building Regulations (BBR) minimum requirements when Bronze level is attained (White Architects AB).

8.1 Considerations to architectural design and engineering

Architectural applications

According to Upton (2002), architecture is the tangible fabric that creates the landscape of everyday lives. If this is the case, people interact with the built environment and give
it value. Sustainable developments then need to factor in a number of sustainable considerations mentioned earlier in Literary Review 1 under sustainable economics and tangible and intangible criteria taken from SI, LCA, and BEA tools. In practice, well-respected architectural firms in Sweden like White Architects whose projects include the highly researched Hammarby Sjöstad sustainable neighborhood in Stockholm, the largest research hospital ever built in Scandinavia called the New Karolinska Solna University Hospital, Stockholm, and the New Kiruna City Center as the result of the Kiruna City relocation plan in Northern Sweden. In cooperation with Ramböll and other Swedish firms, these are but just a few projects that are at the forefront of exhibiting the Swedish sustainable perspective.

Arfvidsson, Anders, Partner White Architects, has worked on both MB and BREEAM projects in Arenastaden like UARDA 1, and says that architecture, its aesthetics and the context it can create is very convincing, especially when preliminary sketches can often determine engineering parameters (White Architects AB Office, 21 March). Nevertheless, Arfvidsson continues to say that collaboration with engineers in this respect is crucial, despite project barriers that may arise, especially when it involves systems designing and learning about the tradeoffs between design and engineering to build flexible buildings. It is clear to Arfvidsson that architecture can be convincing in sketches and renderings, but designing must eventually come to terms with functionality that works. When it comes to CBTs and how sustainability, the difficulty with using them is their specificity. For example, MB requires high marks for daylight which is often hard to capture or simulate with computer aided designs (CAD) simulations. Interestingly, operational consumption and efficiency of projects are often very different from the initial design. In the end, however, it is the client that decides whether or not to go sustainable though he sees the industry moving more in that direction.

But it is not always about new sustainable development with new sustainability programs. Eriksson, Erik is a Project Manager and Environmental Specialist specializing in CBT calculations at White Architects says that architecture must coincide with certifications (White Architects AB Office, 24 March 2013). This still holds true for upgrades and renovations, and in many ways can be more difficult because of the modern requirements for sustainability today. Even with more simply CBTs like MB, it would be virtually impossible for older buildings to become certified just from the direction of the windows relative to the sun because of its lighting prerequisites. Architecture can also make it possible to create more passive and more climate neutral designs that are very efficient and naturally comfortable environmentally. This point makes it clear that architecture must always be combined and understood thoroughly for its role in unique sustainability programs.

**Engineering: HVAC, Sanitation, and Energy**

The single largest influence to energy consumption in a sustainable building is its heating, ventilation, and air-conditioning (HVAC) and its combined heating and power systems (CHP). Ramböll HVAC and sanitary engineering managers seem to agree that based on the client’s environmental climate criteria the economic limits are set forth (Ramböll Sweden AB Office, 11 March). Along with the parameters set by clients,
they must make sure that their designs are within code and regulation guidelines, but also believe that system flexibility is critical, especially with space HVAC shaft provisions and pumping solutions. This flexibility can be achieved from good design and planning ahead to accommodate future upgrades, such as false flooring at the New Karolinska Solna University Hospital that provides adequate room to separately conduct major upgrades efficiently and unobtrusively on each floor (White Architects AB Office, 21 March).

Norberg, Gunnar, Senior Advisor of Energy Strategies, Energy Division, at Ramböll Sweden AB, agrees with many existing HVAC and sanitary solutions, but was clear saying that achieving sustainable designs has nothing to do with not knowing how to do it (Ramböll Sweden AB Office, 08 March). The expertise is there; the problems are really from cooperation issues that go beyond shell and core design. What Norberg alluded to was a common problem far too often faced in sustainable projects whereby innovative design cannot meet its full potential because of lack of commitment and participation issues. As innovative the design and engineering consultancy may be, legislations may not be fast enough to keep up. This problem seems to contradict the very framework instilled in the comprehensive Nordic sustainable perspective such as Symbiocity, in which Norberg was part of developing when he was working with Sweco in the early 1990’s.

From our own analysis in Literary Section 1, the problem with holistic sustainable approaches like Symbiocity in sustainable projects often comes from bringing stakeholders together that fail to ultimately comprehend the entire scope of the sustainable project. Without everyone knowing how their criteria and role is in the project, the project at its operational phase can be very different from what its design was intended. Ramböll consultant Johan Bursell also believes that built designs often differs from what was initially designed. This affects life cycle costs, which he considers an important aspect to always consider. As a former project director for the Sweco Plantagen pilot project, Bursell has also gained a lot of knowledge about systems and processes affecting energy efficiency. Nevertheless, he is very adamant about the need for commitment and participation to have sustainability success. On the other hand, society itself must take a hard look at their level of consumption since their needs shape how sustainable buildings are designed.

This concern seems more appropriate seems consistent with other consultants who agree that better solutions can often be at a cost too great for clients to afford, making it quite difficult to implement better systems and processes. In fact, Environmental Officer and multiple certified CBT assessor, Maria Perzon, at Bengt Dahlgren AB, says that documentation and calculations for premium CBTs are not only more expensive, but complex. Cost depends on a sliding scale with different certification levels. The higher the level the more sustainable, but the possibility must be weighed against longer-term savings and future marketing value of the asset. Another caveat, however, is also talking thoroughly about what certifications mean and what to expect because many clients do not fully comprehend how complicated engineering can be to accomplish certain certification levels, especially with complicated LEED calculations and BREEM documentation process.
For many engineers, certain sustainability aspects are simply beyond what they can influence. Both Mathias Haag and Tomas Igergård in Ramböll HVAC and sanitary engineering department say that they can only give their input about other sustainability measures, but usually work with pre-determined energy parameters. As it turns out, parameters can be overly optimistic on reducing energy consumption when setting initial goals, but idealistic efficiency numbers that requires utilizing better systems and processes is often not consistent with economic realities. As a result, they add that the day does come during the designing phase when investors and owners sit and realize that it’s not only about energy-efficiency, but the cost itself. However, they agree that architects and engineers should blend their designs knowing that the right solution may be complimentary to each other, not necessarily the most expensive, and coincides as the most appropriate under different sustainable contexts.

With regards to these topics, Dall’O, et al (2012) goal of reducing energy consumption, managing costs, and reducing environmental impacts is also considered in terms of the unique context of each project location. This is because long-term profitability of these projects does not exclusively depend on technology and technical know-how as stated by Ramböll senior energy advisor and engineer, Gunnar Norberg. Research shows that with technology and know-how already available, the design and engineering phases are more likely to be affected by unique country-specific contexts and inherent bounded rationality problems. Along with misunderstandings about the benefits of sustainable developments when pitted against the economic imperatives, these issues makes knowledge gaps worse and often hinders full cooperation and commitment from stakeholders.

In today’s fast-paced, globalized, world, counties are simply becoming more competent as they endeavor to compete in the global economy. This does not make in-depth experience in sustainable design and engineering useless, but simply makes preconceived contextual constructs weak against what may be needed in another country with a different context. Reasonably speaking, core competence can be severely limited without understanding different contexts outside of what is already known. The sustainability scope is surely a product of unique country-specific contexts. This is the primary reason why the Nordic perspective is contrasted against that of the Turkish perspective. Thus, a profitable sustainable business strategy in one country may certainly not be in another. Ultimately, risks from functional and external obsolescence should be address in terms of both sustainable architecture and engineering, and how motivated all stakeholders cooperate.

8.2 Universal design and engineering areas of focus

After speaking to a number of qualified and experienced engineers in Sweden and Turkey, the following technical components are widely considered to be the most critical for energy efficiency:

- Heating systems: Heating pumps, boilers
- HVAC: Heating, ventilation, air-conditioning
- Building Envelope: Building shell and materials (envelope)
- RES: Photovoltaic (PV) solar, wind, geothermal
Control Systems: Control systems
Interface Systems: User controls (smart/automatic/manual)

These components are also combined in heating and power systems (CHP). Evidence suggests that the energy efficiency of these technical systems and processes are not reliant on the consideration of social and environmental imperatives. In other words, efficiency can be accomplished no matter what inhabitants experience or the environmental impact it may have as long as it meets building codes and regulations. However, it is clear that those inhabiting buildings can spend as much as half of their lives inside of them. This teaches us something about the importance of human interaction with the built environment—which according to Cengiz, is value-addedness for investors to consider for sustainable developments in the long-run.

To elucidate on the relationship between the social and technical aspects, with respect to Section 5.2, which examines societal wants, needs, and constructs; Section 5.3, which examines the interplay of real estate value and sustainability, the following considerations were examined and problematized for long-term project success:

- Inner/Outer Environments
- Use/Usability/Utility/Safety
- Form/Function
- Flexibility/Scalability/Upgradability

8.3 Swedish Case Studies

UURDA 5, Arenastaden, Solna

UUARDA 5 in Arenastaden, Solna, is located approximately 6km NW from the central business district (CBD) of Stockholm, Sweden (Figure 16). It is also part of Fabege AB’s 166,000m² stake in Arendastaden (Photograph 5) and currently occupied by Vattenfall with approximately 2,300 employees on site.
The area in which UARDA 5 sits is still under development (Photograph 5). It only takes about 10 minutes by foot to arrive at the building, which is very conspicuous with its matrix-like green façade (Photograph 4). There is construction going on all around, even though larger projects like Friends Stadium is already hosting events and concerts. Nevertheless, an air of change and transition lingers there. With a more direct route to Solna rail station, via overpass currently under construction, activity and foot traffic should increase. This will provide better accessibility by employees and visiting pedestrians as the area becomes increasingly occupied. Today, the immediate area around UARDA 5 remains relatively quiet and muted. In fact, we ate lunch at on site at the only other restaurant tenant in UARDA 5. It was clear that most of the patrons were Vattenfall employees as they all arrived at roughly the same time to eat.
UUARDA 5 is a highly visible project with a rather unique façade that sets it apart from the other buildings in Arenastaden. The head architect at Archus Architects involved in designing UARDA 5, Mattias Fredberg, says that they were able to create a special context with the special glass façade, which has never been used in Sweden before (Archus office, Stockholm, 25 April). It posed a number of design and engineering questions. Questions such as how color and tinting applied on the backside of the glass would affect the building’s SHGC and the indoor comfort of the inhabitants were of primary concern, but these issues were overcome. For example, a small percentage of window surfaces on the southern building faces helps reduce SHGC gain during the summer. Fredberg continued by saying that the building can be enjoyed in many ways as inhabitants are made to feel a sense of freedom and lightness. Four main buildings were laid out on site in a way that encourages employees to interact at intersecting junctures (Figure 17). That is, employees are bound to meet others on the way to the elevator or commonly used spaces. In fact, a large glazed inner common atrium shown in Photograph 6 and 7 between the four buildings serves as a multi-use area where employees can eat, gather for events, and hold meetings. The atrium can be used year-round.
For security reasons not detailed to us, we were not allowed to take a tour of the inner spaces of UARDA 5. We had to rely on provided renderings and photographs.

The construction of the four main buildings at UARDA 5 can be seen in Photograph 8 below. The work crane is also seen standing between them. Mattias Fredberg says that inspiration was actually drawn from college campuses in the U.S. whereby, people constantly face one another on common ground. At the same time each building can house different departments, which all converge and meet spontaneously in the atrium. The unique, one-of-a-kind glass façade of UARDA 5 is something that has not been attempted before, but according to Fredberg worked out fine. The building turns out to have one face for the day (Figure 18) and another for the night (Figure 20).
From Figure 18 and 20, the mostly average sized and evenly placed windows can only be seen at night when the tell-tale lighting from the inside of the building passes through the glass façade. Without direct or exact figures, Fredberg suggested that this design of the heavy structure not only saves energy, but may have translated to lower cost to construct. However, the placing of the glass façade had to be done by hand and was labor intensive. When asked about the procurement of the glass, Fredberg said that it had to be imported, but noted that the transport cost and embodied energy for similar products from Sweden may have cost as much.

UARDA 5 in Solna is a very interesting project because all stakeholders, including the tenant, Vattenfall, joined forces very early to design and engineer what looks to be a very efficient, green, development. As a result of this early cooperation, Vattenfall Head of Nordic Real Estate & Asset Management, Linda Jansson, was confident that they were able to meet their own internal ISO requirements while helping to be sustainably responsible (Vattenfall office, Stockholm 13 March). And, according to Mattias Fredberg, there seemed to be less friction between the human-ecology and economic imperatives because of early commitments made by stakeholders (Archus office, Stockholm, 25 April). Vattenfall is the largest sole tenant, not including a small restaurant downstairs. They remained actively involved in the designing of the building and motivated the investors to bypass certain economic constraints to make the building not only energy efficient, but as sustainably balanced as possible. The building was essentially custom-built for Vattenfall. In the case where more interaction between public and private was required, the friction would probably begin to raise it head. This is not the case for UARDA 5 though. The building is a secure location as
the head office of a major infrastructure company. In fact, we were not able to tour the building’s inner parts because of it.

Technical characteristics

UARDA 5 says that they have achieved levels up to 64% below BBR standards. The area between massive framework, cladding, and façade serves as a climate neutral buffer zone that prevents dramatic temperature fluctuations, while underground geothermal thermal cooling storage from 70 drilled hole in solid rock, each 200m deep allows for free cooling and savings of up to 13.5 kWh/m²/yr. Together, they allow tremendous energy consumption rate savings. Other sustainable means includes a semi-passive perimeter climate system that has been pre-calibrated to the tenant’s indoor environmental quality requirements, vegetated sedum roofs capable of collecting rainwater and melted snow, efficient LED lighting, semi-smart energy control systems that shuts lighting off when users are not present. Moreover, its renewable energy system includes HVAC with static regenerators to recycle heat, 95% vapor heat recovery, and southern facing PV solar panels on two buildings for hot water heating and cooling during the summer, but the envelope is connected to central heating and cooling. This consequently allows UARDA 5 to sell excess energy back to the Norrenergi.

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*Energy

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* These numbers were taken from actual energy calculations conducted at UARDA 5, which were provided by Archus

**Based on numbers provided by Fabege to GreenBuilding 2011 to receive the GreenBuilding 2012 Award

Table 3: UARDA 5 Facts
Source: Fabege, 2013; Archus, 2013; PEAB, 2013

Kv Jungmannen 3, Western Harbour, Malmö

Jungmmanen 3 is located at Skeppsgatan and Jungmansgatan at the Western Harbour along the Öresund straight in Malmö, Sweden. The area was once used as a major port and shipyard, but is being actively redeveloped as part of a planned urban renewal project. Since its onset, Western Harbour aspires to become one of Europe’s first carbon neutral districts in Malmö. It is accessible by foot, bicycle, car, and public transportation. As we toured the area by foot, it was clear that scattered construction sites were actively working to complete this decades-long project. There are a few listed buildings in the area as well as redevelopment continues around them. Almost every newer building in the area is different from each other not only by design, but in color. Jungmannen 3 is not an exception to this eclectic planning scheme. It’s a modern building in an up-and-coming area. Ola Dellson, chief architect for Jungmannen 3 said that a mixed-use design is part of the sustainable development requirements of all new buildings in the area, including residential and public accessible spaces to promote social interaction and bring life to Western Harbour (White Architects Malmö Office, 26 April).
For now the area has an isolated industrial feel irrespective of City efforts to create a dynamic social context. As a consequence, Jungmannen 3 contains built-in possibilities for improvements for retail on the ground floor and residential apartment spaces on the top floor, despite the dominating office space presence on all floors. Oddly enough, the area is currently zoned for office and light industry. As such, the area contains some industrial activity with one active facility directly adjacent to Jungmannen 3 on Skeppsgatan. On the same adjacent complex on SW side, across Jungmansgatan, lays the Malmö World Trade Center. The fact that there’s still industrial activity, however, seems to make it unlikely that round-the-clock social activity will be going on where Jungmannen 3 sits any time soon, aside from the usual events and conventions, especially when most retail and restaurant purveyors still have not located there.
Nonetheless, the potential for Jungmannen 3 immediate area for growth lingers in the air with residential growth just a short NW walk around the Turning Torso area. The Turning Torso is a 190 meter residential skyscraper that makes a $90^\circ$ twist and is the tallest building in Scandinavia. Marked in red, Jungmannen 3 can be seen from the aerial Photograph #, below, near the Turning Torso which is surrounded by sustainably inspired single and multi-family homes and medium-density residential complexes.
Ola Dellson pointed out that the constraints of the building were due mostly to regulations and the investment client’s need to build an energy efficient, yet cost effective investment. The details of what happened with the economic imperatives are unknown, but Dellson was clear to say that their clients’ best interest always comes first. And, because of the parcel constraints, White Architects needed to create augmented spaces in a small area. Dellson added that the building was the result of piecing together three different volumes that rise up augmented floors sitting on top of one another with different vantage points of the surrounding area. This also created different layouts for each floor, with options for terraces on some. The size and portion allocation of windows also makes the building feel bright, even though one employee pointed out that too much light actually penetrated certain areas of the building, whereby they needed to install indoor shades.

Given the small size of the building, we were pleasantly surprised that it felt open and inviting. Surprisingly, each floor has a clearance height of 3 meters with windows that continue up to the ceiling, and 4 meter high clearance on the ground floor where an inviting conference room, kitchen, cafeteria, and lounge can be found. Most of the common areas on the ground floor are easily accessible by stairwell or elevator at the center of the building. Interestingly, the living areas on the top floors seem oddly placed, especially when the initial plan was to build student housing there as per the City’s requirements as part of vibrant urbanization plan. Now, however, the floor space is not freely accessed. It is apparently occupied or reserved for visiting Ramböll employees. In terms of the space itself, however, knowing that the building is designed for flexibility to accommodate shops or cafes on the ground floor, there is a sense of something missing as if the mixed-use plan may actually work in providing liveliness and activity to the building in the future.
Technical characteristics

Jungmannen 3 is capable of 56% energy savings below BBR standards (Midroc, 2013). In fact, its operational energy consumption rate is actually quite close to the actual designed figures. This was possible by a semi-passive design built on a massive concrete structure and automated exterior metal elements that shades the building’s windows from solar heat. The building envelope is connected to district heating and cooling, but energy usage remains low thanks to a very efficient variable air volume (VAV) system with active air diffusers allows for different air flows depending on specific need monitored by occupant interfaces and temperature sensors. Sensors are also part of a semi-smart energy control systems that shuts lighting off when users are not present. Along with indoor environmental considerations, there are vegetated sedum roofs capable of collecting rainwater and melted snow. Its renewable energy system includes heat exchangers capable of recovering 80% of heat from returned air.

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* Though this figure is actual energy consumption over one year, it may not reflect energy returns from renewables. Thus, the actual used energy may be lower than what is reflected.

Table 4: Jungmanne 3, Malmö, facts
Source: Midroc, 2013; White Architecture, 2013; Ramböll, 2013
8.4 International Case Study (BREEAM-In Use Certified)

Kanyon Center, Istanbul, Turkey

The Kanyon Center represents what is happening to the face of urban landscape in Istanbul as more and more people move to urban cores. An estimated 16-17 million people now live in Istanbul with a rather large separation between its socio-economic classes. Upon entering Kanyon Center, one of the first striking features of this mixed-used office, residential, and retail center is its airport-like security. This is very interesting considering that the center is in the district of Maslak, one of the rising affluent middle-class areas of Istanbul. Unfortunately, sidewalks are not very well designated and disconnected throughout the city. As a result, people usually travel to and from Kanyon Center by car or Metro at the Levent Station. We arrived by Metro and going through security, there is a long, wide, corridor that eventually arrives at the cavernous open-air area surrounded by shops and cafes (Appendix M).

Greenery and low-lying fountains also occupy the area. Each floor that rises around you is highlighted by smooth stone edges and well-rounded corners like those of a real canyon. This is modernism architecture at its best; and described by the partner architecture firm, Tabanlioğlu’s, Murat Cengiz, as an attempt to emulate the original face of the canyon where it now lies (Tabanlioğlu Architecture & Consulting, 10 April). As you continue along passing ground floor stores, cafes, and restaurants, elongated low-lying water fountains, an even larger open amphitheater-like area created in part by the interconnected shop floors behind and around, and cut-out of the underbelly of the half-globe shaped theatre can be found. It feels immense, but this design does in fact serve a purpose. Concerts are sometimes held there and the retail floors serve as extra vantage points. It is also from the ground floor area there that people can see the high-rise residential area that continues from the fifth retail floor. Even on an overcast day, the interplay of light spreads throughout this mostly-open air center.

Figure 23: Kanyon Center Section Plan
Source: Jerde, 2013
As visually stimulating pictures may be, it is hard to appreciate the modern architectural qualities of Kanyon Center without setting foot there. The weight of the project is subjective, but it can be said that it is heavy-set sitting on-site. The main construction contractor, Tepe Construction’s regional director, Tolga Yardımcı said that there is an estimated 35,000 tons of tubular steel lattice frame just for the theatre globe external shell superstructure. This does not include tremendous amounts of stone façade cladding to create its striking architecture. And, there is an environmental quality to it that must be felt when observing spaces there. It’s not the typical box construction or over-laden with angles that disorientates; it’s open and inviting, despite a relative lack of greenery. In fact, the climate controlled covered areas allows for visitors and inhabitants to enjoy the center year-round. This observation may certainly lend to what may be described as a harmony between the material, space, and architecture inhabitants interact with. In the end, however, it’s still easy to feel consumed like you are sitting on a spaceship because the natural human-ecology interaction is replaced by a design context that cannot replace the free, unrestricted feelings evoked only by nature. What can’t be seen without actually looking down from one of the towers at Kanyon Center, however, are green roofs and overhangs. The top of the half-globe theatre, for example, offers greenery and open recreational space.
It was built in 2006, but was later post-construction BREEAM In-use certified (BES 5058), which means the property now meets certain sustainability criteria which was based on materials use, energy and water consumption, health and comfort, land use and ecological impacts, waste management and evaluated transport areas (Eczacıbaşı, 2013). This is one of the reasons why it is also a great case study to analyze. Built in 2006, it also shows that Turkey can build advanced projects that have the potential to be green and sustainable.
Researchers at like Professor Dr. Handan Türkoğlu, Head of Architecture Faculty at the Istanbul Technical University Urban and Regional Planning Department, disagree that projects like Kanyon Center can truly be sustainable. For one, many projects are not connected to efficient power and utility systems and processes outside its envelope. District heating, for instance, does not exist in Turkey. Thus, power and utility reliability is a big question. We actually experienced a power outage at Kanyon Center before one of our interviews there. Another controversy is that the design of Kanyon engenders segregation through a “vertically gated” community concept as Dr. Aliye Ahu Akgün explains. The fact that this center clearly caters to a particular socio-economic class within its own walls is apparent. Premium stores and luxury brands make up the bulk of the retail space; highly rated restaurants occupy various floors, and large corporates like owner/operator Eczacıbaşı have their offices there. One can observe from walking around not far from the center that the area is still mostly underdeveloped lending to a juxtapositioning between the old and new. Neighborhoods are disconnected not by metro or car, but by the lack interconnected sidewalks. So, in a sense, the Kanyon Center is an oasis in the urban landscape. Dr. Akgün further explains that some of these neighborhoods are squatter areas part of a larger urban renewal plan, waiting to be revitalized. This essentially means that illegal inhabitants there will most likely have to relocate as the Sisly and Levent area continues to be modernized.
The speed of development in Istanbul seems to highlight the friction between the human-ecology and economics. For instance, in the view of Architect and Ph.D student Burak Kaan Yilmaz soy, the urban revitalization of Istanbul that first took place in the 1950’s when the new Turkish Republic took over the government is being driven by economics. Fueled by Turkey’s explosive growth and urbanization, the government may not be considering the long-term effects to the human-ecological aspects. This is not to say that they are not considering the social aspect, however. The problem lies with large projects that are not transparent to the Istanbul planning community. Proper environmental assessments of many government projects are not entirely possible, making it entirely possible that academic institutions involved with sustainable development have little say in what the government will ultimately approve for development. This kind of power likely puts the public’s environmental rights at risk. In fact, the world’s largest airport in the NW sector of Istanbul is being built on what were once large green areas. There is not much justice to ecology in this case. Furthermore, this particular airport, which is among two that already exists to serve Istanbul This is promoting some social and environmental risks. Ultimately, however, the long-term effects will eventually affect the properties themselves economically.

**Technical characteristics**

Murat Cengiz says that it was always important for Kanyon designers to consider how such a large, mixed-use, property will require large amounts of energy, water, and generate waste. For sustainability measures before the practical use of CBTs in Turkey, Kanyon Center enlisted the participation of a number of non-governmental
organizations, private research institutions, and universities during the conceptual phases, and post-construction that ultimately led to a BREEAM In-use certification in August 2010. The process aiming to reduce consumption and waste, however, essentially started in 2008. Owner and occupant, Eczacibasi Holdings, Inc., aimed to reduce electricity and natural gas consumption of the administrative and commercial buildings in Turkey by 7 and 14%, respectively (Eczacibasi Group Sustainability Report, 2011). Post-construction consultants, Turkeco, audited the property. Within the overall reduction of 9 percent in 2010 was Kanyon Center in Istanbul by reducing approximately 5.2 percent of its total yearly consumption, which is significant considering that the property is the largest non-industrial asset Eczacibasi owns.

As a result of upgrades required in Part 1 of BREEAM In-use, both public and private areas subsequently installed conservative water and energy efficient systems, reuses cooling water, efficient water towers, motion-activated escalators, and energy sleep-mode elevators. All common areas also now use LED lights over incandescent and halogen to save power. The residential areas contain semi-smart systems that allow tenants to adjust temperature according to the weather. Moreover, its wide-ranging renewable energy system includes HVAC with static regenerators to recycle heat, chimney flutes with vapor heat recovery, and 100 new PV solar panels for hot water heating that is estimated to be equal to 58,454 m$^3$ of natural gas (ibid, 2011). These systems are intended to subsidize upwards of 35% of total energy requirements of the project. There is also a waste management recycling system that collects paper, glass, plastics, compost, and cooking oil for bio-fuel. This recycling program is also the first in Turkey capable of collecting electronic refuse. However, according to Tolga Yardimci, there is no district heating and cooling in Istanbul leaving larger project designers to figure it out.

Though the office building at Kanyon Center is not reported to be classified for Part 3 of BREEAM In-use, which focuses on office buildings, the materials used for the structure are considered efficient. For example, the glass façade is designed to take full advantage of solar heat and light. Newer office humidifiers installed in 2011 were also expected to be 94% more efficient by consuming up to 219 MWh less per year.

In some ways, BREEAM In-use may serve to be a good enabler of sustainable behavior for users and managers at Kanyon Center because of its inclusive policies. For instance, Kanyon began a “Green Employee” program to raise “employee awareness and sensitivity about sustainability issues” (ibid, 2011, p.17), which is consistent with Part 2 of BREEAM In-use.

<table>
<thead>
<tr>
<th>General Facts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Year built</td>
<td>2006</td>
</tr>
<tr>
<td>Project start/end</td>
<td>2003-2006</td>
</tr>
<tr>
<td>Zoning</td>
<td>Mixed-Residential/Commercial</td>
</tr>
<tr>
<td>Owner</td>
<td>Eczacibasi</td>
</tr>
<tr>
<td>IS Real Estate and Investment (IS GYO)</td>
<td></td>
</tr>
<tr>
<td>Physical address</td>
<td>Büyükdere Caddesi No:185 Levent, 34384 Istanbul.</td>
</tr>
</tbody>
</table>

78
### Awards
- Cityscape Architectural Review Award 2006
- Urban Land Institute (ULI) 2007 Award for Excellence
- ICSC 2007 European Shopping Center Commendation
- ICSC 2009 Solal Marketing Award
- ICSC 2011 Gold and Silver in Solal Marketing and Gold and Silver Mercury Awards
- Municipality of Sisly 2012 Certificate of Appreciation
- 2007 International Design and Development Merit Award
- 2010 Stevie Award
- “Customer Service Complaints Team of the Year” — represents Turkey for the Ruban d’Honneur for “Environmental Awareness”
- 2011, Two Stevie International Business Awards
- 2012, Two Mercomm Mercury Awards
- WWF-Turkey 2012 Green Office Certificate

### Contracted Build Type
- Turn-key

### Certification Type
- BREEAM In-Use

### Renewable Energy

### Stakeholders
- **Contractor**: Tepe Construction
- **Architects**: Jerde Partnership, Tabanlioglu Architects
- **Engineers**: ARUP
- **Interior Designers**: Sevil Peach Gence Associates, Brigette Webber
- **BREEAM Auditor**: Turkeko construction and Energy Inc.

### Physical Facts
- **Total floors**: 27
- **Total floor area**: $250,000\text{m}^2$
- **Office floor area**: $35953\text{m}^2$
- **Retail floor area**: $37533\text{m}^2$
- **Residential floor area**: Approx. $41000\text{m}^2$
- **Other floor area**: $126707\text{m}^2$
- **Site area**: 7.4 acres

### Building Certification

<table>
<thead>
<tr>
<th>BREEAM In-Use</th>
<th>Score (%)</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 1</td>
<td>68.92</td>
<td>Very Good</td>
</tr>
<tr>
<td>Part 2</td>
<td>80.91</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

### Economic Facts
- **Project cost**: 66M SEK

### Urban mixed-use
- Retail: 160 stores
- Residential: 179 units, $80\text{m}^2 – 381\text{m}^2$
- Sub-parking: 6 levels, 3,100 spaces
- Cinema: 9 rooms, 1,600 seats
- Office
- Communal Garden: *non-income generating

### Energy
- $\pm 17481 \text{ MWh/yr}$
- $\pm 341 \text{ MWh/yr}$: Pre-certification, Up to 2010 before upgrade process
- $\pm 219 \text{ MWh/yr}$: Lighting, LED for common areas and office bldg
- $\pm 349 \text{ MWh/yr}$: Office humidifier, 94% more efficient than previous
<table>
<thead>
<tr>
<th>± 16572 MWh/yr</th>
<th>Post-certification</th>
<th>Based on sustainability report for 2010-2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>* These numbers represent the office tower and common areas only and can be found in Eczacibasi’s Sustainability Report for 2011. The total number or for MWh/yr was estimated from the reported 5.2% reduction of the total consumed in year 2010. This is not representative of its current yearly operational consumption rate.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Kanyon Center, Istanbul, facts

9. Results

This research began asking if the right sustainable strategy can be profitable while reducing the friction between the human-ecology and economic imperatives. In short, we believe that we have found a workable framework and strategy that can be used to do this. To come to this result we embarked on a set of objectives designed to fulfill the purpose of this research with Denzin (2012) and triangulation in mind. We wanted to see the consistencies and differences between research and industry practices to not only answer our research question, but to see if there was some kind of framework and strategy dedicated to pacify this friction. As such, we needed to triangulate answers from qualitative and quantitative data. This meant examining absolute, calculated numbers, as well as abstract, normative, sustainable aspects. As it turns out, a criteria-based framework and strategy can potentially bring these two things together in a dynamic process. Together, the friction between the human-ecology and economic imperatives can be reduced. The framework provides a workable path of using an SI, CBTs and MCA to build sustainable developments that are not only energy efficient with a predominant focus on environment, but respectful of the human-ecology imperatives.

However, criteria derived from valuation are not enough to create a comprehensive sustainable development. The importance of knowledge management and understanding unique contexts can help ensure that the scope of sustainable projects is clear and comprehensive. Thus, consultants and stakeholders can value aspects of sustainability while understanding why certain sustainable solutions are better than others, despite what they may personally believe. Furthermore, evidence found suggests that sustainable perspectives are not only project specific, but country-specific causing bounded-rationality issues. It does not help that sustainability is often interpreted subjectively when it has not be predefined for each project, lending to possible discourses later. As such, a broader, more ontological perspective is required to tackle unique, country-specific contexts that influence sustainable perspectives.

Before we delve into the results of our research into the human-ecology and economic friction, let us first reiterate how this research problematized a strategy designed to pacify the friction problem. We systematically framed a series of previous research, concepts, and models, which was not only meant to answer the research question at hand, but to establish the foundation of a strategy. Through the framework laid out in the literary review, we were able to draw out what ultimately turned out to be a rational strategy to reduce the friction between the human-ecology and economic imperatives.
At the same time, we were able to enhance this likelihood of this strategy of working by critically analyzing its major components around case studies, field research, and best-practices. Furthermore, industry experts and academics lent their valuable knowledge towards our analysis.

The major areas of focus in this broad, in-depth, research are broken in sections to keep things clear. The reason being is that our triangulation of several approaches outputted several interesting results, which together were valuable in answering our research question and lending credence to our developed framework and strategy.

9.1 Human-ecology and economic friction

The friction between the human-ecology and economic imperatives was examined because aspects of human-ecology critical for the long-term success, profitability, and value-addedness of sustainable developments are often outweighed by the economic imperative. Head of Technical Management at Aberdeen, Christopher Köhler, said investors may fail to adequately factor in sustainable applications not because they do not care, but because they are in the business of profitable investing (Aberdeen Stockholm Office, 26 March). Though he supports responsible, investing the government can do a lot in terms of how the industry behaves. As we see from Istanbul where redevelopments may be doing little for sustainability, Tepe Construction Regional Director, Tolga Yardımcı, echoes this sentiment when he says that legislation shaping rules and regulations play a vital role if industry is to become more sustainable; Investors would simply have to follow suit as industry norms change (Kanyon Center, Istanbul, 15 April). The investors we spoke with do not deny following institutional investment strategies consistent with industry institutional behaviors, but some like client-side PM, Erkaya, Gökçe, at Jones Lang LaSalle hope that they can make a difference with their in-house sustainability experts. They actually believe the quest for profitability to be a key ingredient feeding the persisting division between sustainable development and economic imperatives. Otherwise, they would probably be out of jobs. At the same time they could agree to what Lehmann (2012) says about how change should come from enforcing policies and regulations at the political and governance levels—a view that is predominantly shared amongst our interviewees in both Sweden and Istanbul.

Concerning profitability, Bartelmus (2010) and Gasparatos (2010) said that rationalizing positive economic results with normative sustainable analysis can be difficult no matter how well-intended designers and developers want to harmonize projects to the ecological aspects. The results show that this should not be such a surprise, especially since Warren-Myers (2012) already said that there was not enough tangible evidence to suggest values in sustainability with profitable investment strategy. We can both agree and disagree with this view. Investors need to place reliable, absolute, calculations on intangible aspects of sustainability to determine if it works within their investment strategy, but it Holdworth (2011) seems to have valid concern about issues of morality mixing with economics without social and environmental responsibility. Nonetheless, investors and stakeholders respond quicker to economic incentives. This rule seems to also apply to government. In all, the green economy is growing and so is social and environmental awareness giving rise to CSR. This is a
major reason why we believe that the right framework and strategy to value aspects of sustainability is needed—that the consultancy industry can profit why still being responsible.

As we conducted our field research, in the back of our minds was what Ngo and O’Cass (2009) pointed that investors and patrons create value together and that demand defines the marketplace our moral wants dominate. As a result we remained critical and found that supposedly sustainable developments may not be offering more of what is needed in terms of what Baumgärtner and Quaas (2010) said. In Sweden, there seems to be more emphasis on balance, whereas, Istanbul projects seem less so as they are economically dominated in a state of hyper growth. To get to the bottom of it, we spoke to large companies and how they view sustainable development. Large investment firms like Vasakronan and Aberdeen sees the growth of the green economy. They first examine their own internal ISO standards and then find sustainable qualities in prospective properties that can be improved or altered, if needed to suit their tenants and provide some kind of social value. In terms of their efforts to be more sustainable, Sustainability Director, Anna Denell, at Vasakronan says that they are proud of their assets and progress they are making (Vasakronan office, Stockholm, 14 March). This endeavor is met with their own form of SI analysis coupled with using the appropriate CBTs.

Interestingly, the individual sustainable development is still under the influence of principles laid out in our literary review, which states how the dynamic between human-ecology and economic is inherent to the embodiment of societal constructs that make up context even though Sen (2009) seems correct in saying that economics can be one-sided. Sustainable development must be viewed holistically and considered through a mixing of disciplines (Markard, et al, 2012) that would evolve and strengthen the sustainable resolve. We also find that Waring (2010) is right when he says that ecological economics and neoclassical economics actually forms the debate impetus in sustainable development. In Turkey, this debate seems to be occurring in the background, muted by government power. As such research does suggest that society is connected ontologically as Martins (2011) had pointed out in sustainability economics in Section 5.3. Baumgärtner and Quaas (2010) would say that justice for the combine aspects of human-ecology means that deficient justice for either one would harm both. We did not see the harm that would be created in Sweden as much as we observed it to be in Turkey. There, a sustainable transition according the Markard, et al (2012) is still hard to see.

Given the contextual differences, a sustainable tradition has not yet rooted itself in Istanbul, while the human-ecology conditions there indicates that governmental powers may be capitalizing on the public’s unawareness. As a result, perhaps the implications of not calling for more sustainable development epitomizes the risks that Healey (2003) had warned of to the public and what Flyvbjerg (1998) said are unknown risks that government may be creating. As a result, the sustainable direction of Istanbul is unclear as many interviewees actually do not fully comprehend the government’s intentions or how the context they are creating in the new Istanbul is going to unfold in the long-run.
For many academics shaking their heads at the large questionable developments in Istanbul, the Turkish government has grandiose plans to modernize and make Istanbul a global hub at any cost. With a build now, ask later policy, sustainable developments seem fit to be a function of economics that does little to harmonize the human-ecology imperatives. You can literally walk out of The Kanyon Center there and immediately know that you just walked out of a ‘gated community’. Thus, to highlight a point of friction with human-ecology, Waring’s (2010) poignant point that a debate persists between ecological and neoclassical economics—neoclassical economics, which had been fundamentally explained by Smith (2002) and Sidgwick (1874) hundreds of years ago, seems to be clearly imprinted on the urban makeup in Istanbul where exclusive developments are placed in the middle of where squatter neighborhoods exists. Our hope is that as injustices and inequalities become greater there, they are pushed into the political arena for change (Colantoni, et al 2011).

So how about the Swedish case studies and the friction between the human-ecology and economic imperatives? To begin with, it is true that energy efficiency does not have to weigh social or environmental aspects unless we are talking about legal requirements. Second, decisions about sustainable solutions used in the Swedish case studies were made under the auspices of economics like all other projects. What made these developments interesting is that they are both two of the most energy efficient buildings in Sweden, but we wanted to look beyond the energy efficiency; we wanted to determine why these developments should be considered value-added in the long run. As it turns out CBT certification is only a part of the story. Jungmannen 3 in Malmö, for example, feels like a pilot project rather than a comprehensive sustainable design. The mixed-use quality of the building is not at all reflected there today. In fact, there is virtually no public interaction with the building aside from onlookers or traffic passing through. The layout is open and inviting and it is energy efficient, but the industrial feel of the area seems to permeate into the property as well. This does not seem to bode well towards the human-ecology qualities of the buildings, highlighting the economic imperatives to reduce costs based on energy. The question then is if low consumption can be maintained if the building experiences more activity or tenancy changes. Whatever the case may be, the building does show the ability to be flexible as it was designed to be.

9.2 Making sense of intangibilities in sustainable development

To begin with, there doesn’t seem to be a lack of expertise or know-how in architecture and engineering to develop greener, more sustainable, projects. Next, without a strong valuation framework or strategy for designers and engineers to use, sustainability seems to be very subjective. That is, it would seem common for consultants to have a different approach to achieve a comprehensive sustainable development. In terms of a mission statement, we find this to have the potential to be counter-productive. Consultants should be able to make sense of the sustainable scope with reasonable expectations at the earliest stages of the design and engineering phases, together. In terms of what Hammond and Jones (2008) says about a true carbon neutral project that can potentially be value-added by giving back the entire quantity of energy it consumes, while having the added quality of long-term social benefits, we are skeptical.
because in-depth LCA and embodied energy calculations are difficult, expensive, and complex.

Coincidentally, designing energy calculations in all of our case studies were different from the actual operating energy consumption rates. On the other hand, with his long international consultancy experiences working for Sweco, helping to develop Symbiocity, and current position as Senior Advisor of Energy Strategies in the Energy Division of Ramboll, Sweden, Gunnar Norberg, says that sustainability is not impossible even with today’s technology. That is, the consultancy is intuitive and knowledgeable enough to know how to achieve low consumption numbers, but economic and political pressures faced by members of the project coalition may be instigating friction and lack of commitment. On the other hand, we discovered that even calculating good figures for energy efficiency does not necessarily make for a comprehensive sustainable development. On the contrary, most sustainable developments like produce different performance results during its operational phase. Thus, it is not just about technology and engineering; nor is it even about spending more money. What we see is the interaction of human-ecology in the built environment as something key for long-term sustainability success, especially when people will spend a great deal interacting with the built environment. Buildings must be of use and remain functional in the short and long-term to be value-added.

The human-ecology interaction with the built environment is critical because it proves that relying on economics to decide on what sustainability is or how it should be accomplished may actually be risky. It would be over-reliant on changing trends followed by marketing, for example. Flexibility derived from considering human-ecology can make projects value-added and profitable in the long-run. Yet, flexible attributes must also be understood by knowing how intangible sustainability qualities affect property. Earlier, Warren-Myers (2012), Fuerst and McAllister (2011), and Moldan, et al (2012) highlighted the importance of bridging inconsistencies with sustainable development and investment value in real estate; that is, measuring sustainability in real estate is difficult and often unreliable. Evidence shown by theories and concepts concerning the implications of sustainability was later confirmed in this research by numerous experts and academics. They actually acknowledge that by taking intangibilities and giving them values only makes things more clear for stakeholders to develop value-added criteria conducive not only to individual investment strategies, but for the over-all sustainability success of the project, especially when a general consensus is found with MCA. This holds true for projects that are not supposed to be subjective, but objectively based.

Using SI and CBTs for measurements, criteria are then supposed to be plugged into MCA to perfect the project mission. Since understanding project scope to reduce risk comes at the earliest stages of the PLC, we problematized the early stages of the PLC to determine how to best do this and found that in terms of our research, Martins (2011) is right about the importance of ontology for sustainable approaches. It also makes it possible for good knowledge management mentioned in Section 5.2. There Sense (2011) mentions the learning organization that breaks from the positivist epistemological frame of traditional organizations because they share and acquire knowledge from different sources. This makes it possible to triangulate qualitative and
quantitative data important for solving complex issues with sustainability that contains both intangible and tangible aspects.

From our field research unique contexts surrounding sustainable developments makes each project unique, and even more so between countries. In this case, we believe that Zimmerman (2009), Neuman (2005), and Ketelhöhn and Quintanilla (2012) is correct when they say that country-specific conditions affect company performance even if they have expertise and technology at their disposal. Without firm knowledge of the country-specific context, a comprehensive sustainable project is far more unlikely. Our Turkish case study is a good example of how this works because of the complicated conditions that shape sustainability there today. Istanbul’s different societal context can be a large barrier to overcome without knowledge and cooperation. Nevertheless, the proposed framework and strategy in this research can be applied both Sweden and Turkey because it takes into consideration each of their unique geographical, climatic, political, economic and human-ecological contexts. Nonetheless, it should be noted that many consultants do not have experience in BEA systems. This makes it hard to evaluate and consolidate best practices in Sweden to build the best assessment tools under the Swedish sustainability perspective (Retzlaff, 2008).

Our quest to fulfill our research objectives confirmed many positive points about our strategy to approach sustainable developments using sustainability economics, SI, CBTs, LCA, and MCA. In fact, various forms of measuring sustainability exist today, but we did not find any particular framework that is as comprehensive as the one we propose. All these points were confirmed in our case studies and interviews as well. In fact, measurements are still relatively absolute; that is, designs are measured for efficiency, and still often lack measurements for social and environmental quality. As it has been put to us, many stakeholders are still at the early stages of valuing intangible sustainable aspects and often rely on CBT assessors if they have not already employed them in-house. These assessors apply and assess investments, whereby the investors essentially want to be told what is required for certification. This raised the valid question of whether CBTs are being considered more for investment and marketing purposes, rather than for a moral, responsible, move towards sustainability. Internal EMS like ISO also exists in companies like Vasakronan and Aberdeen, but they are company specific despite them being tied to industry standards. Their sustainability extent then becomes difficult to analyze without facing confidentiality problems. As both of their asset holdings show, green investing is on the rise. Investors see that more sustainable buildings provide long-term value in terms of energy savings regardless of their intention with CBTs. On the other hand, buildings that are built just for energy efficiency do not entirely fit a comprehensive sustainable development, which requires the right balance between the human-ecology and economic imperatives.

Considering that there is no shortage of competent and bright design and engineering consultants in the industry today, results shows that there is slight confusion over what sustainable development is. People do not dispute its value, but some still wonder about its relevancy. This is both interesting and sobering. This also applies at the highest levels of planning. Most researchers in Istanbul would agree that cooperation between sustainability researchers and government is very weak along with poor commitment because of economic pressures. This in turn translates to weak
sustainability legislation that lacks the teeth to enforce their otherwise high envisioned social and environmental standards. In Sweden, the much hailed consensus-building approach to sustainable development is also affected by the pressures of economics, despite a pre-established and widely accepted holistic approach. The point here is that buildings in Sweden can still be even more efficient if economics was not the highest priority in the long-run. In this case, we also discovered that despite the value of CBTs to help frame sustainability, it is more often used to rationalize an economic approach to green, sustainable building. In other words, it is helpful in creating a sustainable project, but is instead often used as a marketing tool for property owners. CBT organizations benefit either way. Regardless, our research still points to how CBTs can be valuable in helping investors see why certain costs are necessary in the long-run by establishing value criteria anticipated to be value-added. Unless consultancies take the initiative first, investor are also empowered by knowing more about sustainability.

9.3 Sustainability values and consensus

Results, Vasconcelos and Ramirez (2011) were right when they said that proper communication, interpretation, and clarification must accompany design and engineering know-how. In fact it is clear that the complex and ambiguous nature of unique sustainable solutions applied in the projects we examined would not have been possible without this understanding. The fact is that it is possible to measure sustainability values in real estate. Fuerst and McAllister (2011) are wrong when they says that that there’s no compelling evidence showing a strong relationship between environmental/energy performance with rental and capital value because the long term energy, management, and operational savings of green buildings can be tremendous compared to the traditional build. All three case studies we examined were either designed to consider these savings, or eventually took measures to find these savings at the post-construction phase, as the case with Kanyon Center in Istanbul. And, in all three cases, the values of sustainable applications were foreseen during design and engineering or post-calculated by CBT assessors and engineers. What is important to remember in this case is that these calculations were not just based on absolute figures, but also on human and environmental interaction. Semi-smart systems for instance not only allow for variable tenant comfort zones, but require the interaction of people.

In terms of embodied energy, which requires extensive calculations, it only seems like a reasonable approach if there is firm commitment by users before and then during the operational phase to keep consumption at a level the building was designed for. In this case, we believe that proven systems and processes is only less efficient because of this. We were made aware that for newer green developments like UARDA 5, for example, the SGBC is given a signed energy consumption rate certificate by the tenant. On the other hand, developments often turn out to be less efficient during operation, not including the effects of unexpected design flaws. Users obviously cannot be entirely blamed for such outcomes. Design and engineering consultancies have a responsibility. Engineers at Ramböll suggest that less emphasis be put on adding more systems and processes to reduce consumption and waste. This practice is incidentally a weakness with sustainability offsetting with CBTs—that is, weak performance in one area of sustainability should not simply be offset automatically by more technical solutions that demands more energy and costs. Instead, over-all consumption and waste in
sustainable developments vitally need the cooperation and participation of users, but this possibility must be predesigned. This means that behavioral changes are in line with long-term sustainably goals and desired values critical for reducing the over-all consumption of developments, which is innovative.

Given that certain aspects like parameters delegated for completion by specific stakeholders becomes less flexible as PLC progresses, stakeholders should have firmly conducted a sustainable analysis at the earliest stages using a more robust EMS, SI, and BEA frameworks to build project value and to understand possible contingencies. This is due to the fact that in most cases projects will face unforeseeable problems later in the PLC with the potential to cause delays and cost escalations. This is why it is so important to understand the most intangible values of sustainability to grasp the scope of the sustainable project from the very beginning of the PLC and continually re-evaluate it during the rest of the project phases. Even though disagreements between architects and engineers will persist, this does not have to be a bad thing. Good knowledge management makes it so the roles of stakeholders may not require them to be proficient in all aspects of sustainability. Cagno, et al (2007) and Frappaolo’s (2006) make a strong case about the risks involved in development and the required expertise and knowledge needed from multiple stakeholders. This means that aggregated expertise that is less individually subjective can raise the possibility of project success—even raising the likelihood that the energy consumption estimates during the design phase will not be dramatically different when the building becomes fully operational.

Nevertheless, even with the right parameters and calculations, a consensus must be found. Architects, engineers, and academics we interviewed point to the importance of transparency that comes from proper communication, interpretation, and clarification. Moreover, examining the differences between the Swedish and Turkish sustainable perspectives allowed us to look beyond an otherwise myopic view of one sustainability perspective because sustainable solutions are greatly influenced by contexts. For the design and engineering consultancy, Xu and Greenwood (2006) are right about top-down planning problems. This was seen in both the Turkish government and in the case of investor clients defining sustainable developments when they didn’t have adequate knowledge of what and how it can be achieved. They depend on researchers, designers, and engineers to do the measuring, but may ultimately not listen. From what we’ve observed in Turkey, the majority of developments are not sustainable except for those touted pilot and exclusive projects that do not represent Istanbul’s unique urban context. For the consultancy, it would be very critical to seize upon the opportunity to form partnerships with Turkish business with local knowledge to ease into developments and break through contextual barriers.

In Sweden, where a holistic planning approach is implemented, top-down planning helps the sustainable development, whereas in Turkey, top-down planning hinders it. In other words, our findings from both the Turkish case study and interviews with design and engineering experts, and ITU academics suggest that government economic planning dominates the most responsible sustainable approach, irrespective of sustainability research findings. For instance, many ‘secret projects’ outlined in red in Appendix H are not included in the Istanbul Urban and Regional Planning
Department’s Master Plan. This fact, however, does not mean that the government is not thinking about long-term consequences. They say that they intend on modernizing Istanbul with the help of research institutions. The problem here is that they don’t seem to fully understand the consequences of not heeding to sustainable values and environmental assessments presented to them. Intangible values of sustainable development are driven by these contextual pressures, which is less felt in Sweden where sustainability is now firmly rooted in both the private and public realms.

CBTs can certainly help the industry in both countries develop; to help them see the values of intangible sustainability aspects; and to encourage the investment market to follow suit. If anything, certifications are great for marketing, but not generally required to build a very efficient sustainable development. The problem then is that there would be no comprehensive sustainability performance measurements aside from energy calculations. Though many consultants in Sweden and Turkey are not familiar with it, they often employ the help of CBT assessors because they see the usefulness and value of CBTs beyond that of energy savings. The largest real estate companies in Sweden and major investment firms like Jones Lang LaSalle in Turkey, for example, now employ internal and external CBT consultants. Many consultants like multiple CBT certified assessor, Maria Perzon, also recognize that the higher the level of certification, the more emphasis is placed on all aspects of sustainability to be built into a project. But it is neither cheap nor easy to attain high levels of sustainability without commitment and cooperation. In light of not having certification path, a holistic approach should always come first in order to have a comprehensive sustainable development, especially when CBTs provides a conceptual framework that includes what can otherwise be missed.

When it comes to sustainability and consensus, every one of our interviewees agrees that sustainable development is a complex, multi-faceted, endeavor. When asked about the technical aspect, however, sustainable values can seem rather subjective because the objective approach can often lack actionable values. This can result in inconsistencies between stakeholders that can raise economic risk. The framework and strategy provided here can change that because all agree that reaching a more objective and comprehensive project mission is essential at the very early stages of the PLC, especially when multiple systems and processes must be combined towards a comprehensive sustainable solution. A CBT and MCA would surely be helpful, if it is easy to implement between all the stakeholders. Perhaps the implementation and growing use of BIM in the industry can help make this happen, but that is for another research to help determine.
10. Discussion

Though most people are headed in the right direction by focusing on the social, environmental, and economic, the imperative to balance them is very much still dominated by neoliberal economics. This is no coincidence because people have a natural tendency to seize opportunity and profit as Smith (2002) and Sidgwick (1874) would propose. As such, they even say that our morals are influenced by wanting and needing. For sustainability in today’s world, however, Baumgärtner and Quaas (2010) and Martins (2011) make a distinction between wanting and needing; economic utility; and what human-ecology justice means. They try to streamline how sustainability can be accomplished. And, with so much evidence pointing to how considerations for human-ecology can be value-added and profitable, the design and engineering industry should be able to seize upon how to do it. In fact, many design and engineering consultants are confident that the possibilities do develop sustainable innovations that are value-added is more likely without the economic friction constraint.

Unfortunately, economic friction is something that you cannot simply remove any more than the human-ecology imperative. Sustainable solutions should be rationalized and made sense of so that investment behavior can change. Even if the economic imperatives still dominate decisions, it should be remembered that most experts working on some of the largest green projects argue that higher costs often associated with sustainability can be insignificant when all things are considered in the long-run. This is true even in Sweden where a more holistic approach is taken compared to that of Turkey. After travelling to Istanbul, and speaking with experts and researchers in the field of sustainability, green building and designing, and urban planning, there is a strong consensus pointing to Turkey’s infancy in the matters of implementing comprehensive sustainability plans. This obviously has serious repercussions for the individual build as the design and engineering industry have weak government support and guidance.

Given that there is a high level of knowledge and expertise in the industry to greatly reduce energy consumption and the impacts of human development, a framework and strategy to reduce friction is important. Commitment and cooperation is far more likely when stakeholders see how value is generated from the long-run interaction of human-ecology and the built environment. It is like looking at an abstract painting; some people see it, while others don’t. In other words, even if the time-value-of-money concepts still dominate the investment mindset, designers and engineers should remember that the additional costs for higher quality green building are often less than the overall costs associated with lesser quality non-sustainable buildings. In the end, we believe that most experts would agree, but more research and education is needed to elaborate on this point. In Sweden, as in Turkey, it should also be remembered that economics is a result of social constructs. With that, it is hard to dismiss the importance of measuring the intangible along with the intangibilities of sustainability to help balance out what is best for human-ecology and economics, together.
11. Recommendation

In consideration to the comprehensive results of our research, we developed a strategy for Ramböll that helps consultants understand the abstract and normative topic of sustainability and the value of absolute calculations for the early stages of the PLC. Our main findings suggest evaluating 1) sustainable internal and external knowledge management system to help with governance, knowledge sharing, and compliance during the PLC, 2) a tangible consensus-based framework to value both the tangible and the intangibilities of sustainable aspects and to find criteria for a successful, value-added, comprehensive, sustainable development, and 3) partnering and cooperation in different domestic or country-specific contexts. In terms of valuing tangible and intangible aspects of sustainability, Section 5.5, MCA, can certainly help derive the highest expected value addedness from aggregated consensus and narrow down “preferences (value, utility or priority)” from intangible effects faced under different contexts. The systematic approach was initially laid out in our literary review, but was problematized for consistency. As a result, a simplified conceptual framework that contains this approach was also developed in a flowchart in Figure 24 as follows:

![Figure 24: Strategy framework](source: De Robles (2013))
A framework may also allow to properly catalogue and categorize areas that should be reevaluated on an ongoing basis. SI analysis, LCA and embodied energy calculations should also be reevaluated throughout the PLC. The reason being is that there is a difference between designed energy consumption estimates and the actual operational energy consumption. The industry habit of only calculating front-end energy use will eventually cause problems in the long-run. Though this is being mitigated with the application of user energy consumption certificates, the consultancy needs to gain more commitment from users if they are truly interested in conserving energy and saving money. Solutions to reduce purchased energy instead of simply increasing renewables to offset demand can also help. Another solution is to show how both energy costs and delays associated with making cost-cutting decisions can cost more money in the long-run. Moreover, the larger projects are in terms of useable and/or leasable space the more critical sustainable solutions become. That is, a few months of inoccupancy and higher energy costs can effectively deprive the investor of preconceived value from lost income and higher operational costs. In this case, cooperation, commitment, sustainability measures, and quality of build make a very big difference. Internationally, this is where understanding context plays the biggest difference. Without understanding this process in different unique, country-specific, contexts, a consultant stands to face barriers to entry or even sustainable design inadequacies. However, this also includes employing the assistance of Turkish contractors to break through barriers, employing sustainable local labor, and learning more about contextual knowledge which would otherwise be locally situated.

Unforeseeable future risks and the complexities of country-specific contexts make international sustainable development consultancy strategy complex. Understanding other sustainable perspectives only simplifies things to empower those applying the Nordic holistic approach and makes consultants more adaptable to unique country-specific contexts. Since country-specific contexts shape conditions surrounding sustainable solutions, it seems best that the consultancy focuses not only on exportable technology and know-how, but also on considering local knowledge to increase profitability and project success. In this regard, there is no need to re-invent the wheel, especially in societies that have already adopted modern practices and technological solutions. Instead, knowing what the legal or societal imperatives are and how they play a major role in sustainability may be more critical. With these points in mind, knowledge on how to minimize the friction between the human-ecology and economic imperatives makes a lot of sense, especially when there is increasing environmental and social awareness. In the end, understanding the dynamics of context to find value-addedness, reduce operational and management costs, and providing higher intrinsic value depends a lot on internal knowledge management and the ability of stakeholders to cooperate and commit. Lastly, our field research findings indicate that a holistic sustainable approach is something that is very marketable, if context is taken into consideration with a larger breadth of sustainable knowledge. In this case, knowledge about SI, CBT, and MCA is certainly helpful.

We have also seen that the most successful projects using CBTs where planned very early. Not only where the readily cooperating and committed with design and engineering consultants, but actively participating with on-going evaluations of systems and processes. The degree to which clients were given follow-up documentation is undetermined, but we assume that there communication remained fluid and learning along with any social, environmental, political, economic, or technical challenges that may suddenly arise. High vacancy rates and on-going upgrades and renovations, for instance, cannibalize future income. In the case of economics that can cause inflexibility as the project progresses, it should be remembered that value to clients can be secured with less maintenance, operational costs, and reliable systems that are combined with a holistic approach. Along with the proposed strategy, the friction between the human-ecology and economic imperatives can certainly be reduced.
Interestingly, conducting a LCCA did not seem to be the most efficient way to determine what the total cost of a project would be to an investor, unless it was purely for estimation purposes. Our results show differences between designed and operational consumption rates that could potentially erode the total income of the LCCA. Thus, future calculations for procurement should be adjusted for inflation and additional systematic risks if applied. And, though common area energy consumption and bought energy is easily estimated, the interaction of people with the development creates a more fluid, fluctuating, consumption rate that is tricky to estimate the larger the project. In this case, more efficient systems to target the lowest consumption rates below minimum requirements may be the best solution. These systems may also promote better behavior and less use of bought energy even as consumption rises. Another solution, of course, is to foster strong partnerships and cooperation with end-users, whom, regardless of smart automated systems, will be the ultimate determinant of energy consumption and waste. As seen in our results, it is usually not technology or expertise, but commitment that makes the biggest difference.

12. Conclusion

It was our contention that the intangibilities of sustainability should be understood and valued to be relevant to every stakeholder. In the process of researching what this meant, we discovered that utilizing SI, LCA, CBT’s, and MCA within a workable strategy is important for sustainable developments. As slow legislation and lack of initiatives to break away from the neoclassical economics continues to create friction with sustainable developments, the framed and systematic strategy offered in Section 5.2 on is a workable way to encourage cooperation and commitment because stakeholders would have a way of understanding the components of the sustainable project and how it can be tuned appropriately under unique contexts. As a result, the potential of sustainability can be rationalized to help ease the friction between the human-ecology and economic imperatives.

The proposed strategies allows for many steps in the right direction when it comes to achieving a comprehensive approach, but obstacles still exists. Our survey at Ramböll, for example, shows that knowledge in sustainability is fragmented, despite well-intended designing and engineering. What this means is that projects may still risk being imbalanced when it comes to achieving a comprehensive sustainable development. Economics still weighs heavily and often prevents the formation of consensus, cooperation, and commitment. The fact that there are value-added benefits in sustainability means understanding intangibilities that were vague before suddenly becomes valuable for stakeholders. There is even better evidence to suggest that being responsible by providing what society needs is not a waste of money. On the contrary, the long-term interaction of inhabitants in the built environment forms a positive synergy that can potentially raise real estate values.

Evidence also suggests that there are obstacles beyond that of the economic imperatives. From what can be seen in the industry today, there is a large knowledge gap between what may reduce future PLC risks that endangers profitability. As difficult as it may be to accept for many investors, economics cannot be the sole dominating force behind sustainable projects. The facts are clear in suggesting the long-term repercussions for not putting more weight on the intangibles of
sustainability. Again, the right strategy can solve this. Certifications, for instance, can play a vital role, regardless if designers and engineers criticize it as a marketing scheme because CBTs have the potential to provide value for those sustainability aspects that are hard to grasp. If anything, they can even promote sustainable awareness and enforce a growing green mitigation industry that is increasingly aware of the environmental impact of the built environment.

Both Sweden and Turkey have their own country-specific contexts. From the Swedish perspective, it is evident that there are similarities with the Turkish one. However, the friction between the economic and human-ecology is heightened in Turkey that’s experiencing high growth. Istanbul alone has an estimated 17 million inhabitants, which is nearly twice that of all of Sweden. Moreover, the socio-economic and human capital quality in Istanbul is still less developed than Stockholm, for example. As a result, the pressures associated with sustainable development in Istanbul are quite different, especially when the citizens themselves are still trying to make sense of what sustainability means to them. Researchers agree that sustainability knowledge and what is most socially and environmentally valuable is not widely spread. This kind of knowledge can remain mostly in the hands of planners and researchers who have been privy to the proper education and experience in the field.

In the end, the design and engineering consultancy has an opportunity to help real estate clients in Istanbul. This can be achieved through the right consultancy strategy. Newer sustainable developments, even post-construction redevelopments are possible due to a tremendous amount of existing building stock in need of renovations and upgrades. Using the right consultation strategy can also help many buildings become green certified at the highest levels. This is socially and environmentally responsible. With lower operational costs, less waste, lower maintenance and operational costs, investors will realize value. However, knowledge management where consultants work must remain fluid and current so that multiple experts working on the same project can exchange and fill knowledge gaps. This is why while out in the field consultants should be better prepared to make responsible adjustments to the Swedish sustainable perspective to deal with unique country-specific contexts to ensure cooperation and commitment.
13. References


Sweden Green Building Council: For future, Sustainable Building: [www.sgbc.se](http://www.sgbc.se) [accessed February 2013]


13.1 Webpages

August 2010 BREEAM Consultation. The final report from the UK-GBC consultation with members on the future direction of BREEAM. UK Green Building Council.


PEAB. Available at: http://www.peab.se/Hallbarhet/Energi/Energieffektiva-hus/Green-building/Kv-Uarda-5/ [accessed April 2013]


Urbanista. Available at: http://www.urbanista.co.uk/cdn/media/company/brochure/urbanistabook_20120424-sm.pdf [accessed May 2013]
13.2 Interviews

Stockholm, Sweden

Alfredsson, Mikael, Department Head, PM Technical Chief, Huge Fastigheter AB, Pers. Comm. 25 March 2013

Bursell, Johan, Project Manager, PM Division, Ramböll Sweden AB, Pers. Comm. 20 March 2013


Denell, Anna, Sustainability Director, Vasakronan AB, Pers. Comm. 14 March 2013

Eriksson, Erik, Project Manager and Environmental Specialist, White Architects AB, Pers. Comm. 24 March 2013

Fredberg, Mattias, Architect, MSA, Archus Architects AB, Pers. Comm. 25 April 2013

Haag, Mattias, HVAC Manager, Ramböll Sweden AB, Pers. Comm. 11 March 2013


Perzon, Maria, PhD in Energy & Environment/Environmental Officer, Bengt Dahlgren AB, Pers Comm. 21 March 2013

Wennerström, Sten, Senior Project Manager, Ramböll Sweden AB, Pers. Comm. 20 March 2013
Istanbul, Turkey

Dr. Akgün, Aliye Ahu, Gated Communities; Rural Development; Urban Networks; Regional Planning, Faculty of Architecture, Department of Urban and Regional Planning Istanbul Technical University, Pers. Comm. 18 April 2013


Erkaya, Gökçe, Project Manager, Project and Development Services, Jones Lang LaSalle, Pers. Comm. 11 April 2013

Gürsoy, Nevra, Urban Planning Directorate, Istanbul Metropolitan Municipality, Master Planning Level 1/100,000 scale, Pers. Comm. 9 April 2013

Assoc. Prof. Dr. Koramaz, Turgay Karem, Urban Conservation and Renewal; Urban Design; Computer Aided Urban Design, Faculty of Architecture, Department of Urban and Regional Planning, Istanbul Technical University, Pers. Comm. 17 April 2013

Terzioğlu, Fezal, LEED AP, Landscape Architecture, Altensis, Pers. Comm. 11 April 2013

Professor Dr. Türkoğlu, Handan, Head of Architecture Faculty, Urban and Regional Planning Department, Geographical Information Systems; Urban Quality of Life; Planning Mitigation; Urban Planning and its Implementations; Urban Design, Istanbul Technical University, Pers. Comm. 18 April 2013

Assoc. Prof. Dr. Tezer, Azime, Land Use and Transportation; Urban Planning and Ecology; Disaster Mitigation; Rural Planning, Istanbul Technical University, Urban and Regional Planning Department, Pers. Comm. 11 April 2013

Yardimci, Tolga, Istanbul Regional Director, Tepe Construction, Pers. Comm. 15 April 2013

Arc. Yılmazsoy, Burak Kaan, Ph.D Student in Environmental & Cultural Heritage and Istanbul Architecture Foundation Charity Fund Board Member, Istanbul Technical University, Pers. Comm. 16 April 2013
14. Appendix

Appendix A

Source: Regeringskansliet (2013)
Appendix B

Source: Hammarby Sjöstad Case Study CP Urban Design in Planning (2007)

Appendix C

Source: Sweco Group (2012)
Appendix D

Source: Istanbul Metropolitan Municipality, Istanbul Environmental Plan, 2013

Appendix E

Source: Stockholm Royal Seaport Plan, 2012
Appendix F

1. Basic questions: Name of department? Age?
2. Do you have an academic background or company training related to Sustainability?
3. Are you a member of professional body or organization in association with Sustainability? (i.e. LEED, BREEAM, Miljöbyggnad)
4. Level of interest in sustainability, if any?
5. How relevant do you see your department’s role in contributing to the Sustainable Development?
6. What is a Sustainable Development for you?
7. How would you prioritize the importance of the following Sustainability aspects?
8. In consideration to your work, which area(s) do you see as constraints when processing projects?
9. Do you have experience working on Sustainability related projects that demonstrates good practice in Sustainable Development through its’ design, construction, and operation? (If yes, please elaborate a brief description)
10. Does your department monitor and report on Sustainable Development performances?
11. Based on the company culture, is Sustainability openly discussed in informal meetings within the office?
12. Are you familiar or have been associated with Symbiocity?
13. How would you rate the Swedish sustainable development relative to other developed countries such as in the EU, North America?
14. What is the main barrier you face when involved in projects that results deficiencies?
Appendix G

Source: Istanbul City Planning Office, Nevra Gürsoy (2013)

Appendix H

Source: Burak Kaan Yılmaz soy (2013)
## Sweden Interview Matrix

<table>
<thead>
<tr>
<th>Categories</th>
<th>Engineers</th>
<th>Architects</th>
<th>Project Management</th>
<th>Property &amp; Asset Owner</th>
<th>Municipality</th>
<th>Sustainability Consultants</th>
<th>Tenant</th>
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<td>Project Life Cycle</td>
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<td>Involvement in project phases</td>
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<td>Roles within the involved phases</td>
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# Appendix J

## Turkish Interview Matrix

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<th>Categories</th>
<th>Design &amp; Engineering</th>
<th>Construction</th>
<th>Property Owners</th>
<th>Sustainability Consultant</th>
<th>City Planning Office</th>
<th>Environment &amp; Cultural Change</th>
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<td>Regulations &amp; Legal Terms</td>
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110
Appendix K

Source: United Nations Development Program in Turkey (2011)
Appendix M
Appendix N

Source: Nevra Gürsoy, Istanbul City Planning Office (2013)

Appendix O

Source: Nevra Gürsoy, Istanbul City Planning Office (2013)
Appendix P

*This figure was developed for this research with reference made to Baumgärtner and Quaas (2010)

Appendix Q

*This figure was developed for this research with reference made to Waring’s (2010), Smith (2002), and Sidgwick (1874)

15. Additional Case Study Images
UARDA S, SOLNA