THESIS

# IF WE BUILD GREEN, WILL IT APPRAISE?

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ABSTRACT

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This study investigates the current status of sustainable value integration in real estate markets within Colorado. It was discovered that the property appraiser is in an opportunistic position to influence all stakeholders and potentially increase the demand for sustainable building practices. Therefore, the dynamics of the appraisal process, necessary inputs, and rules and regulations will be the main focus of the study. This research focus builds on the education and professional practices in both real estate and construction realms and therefore, has the potential to impact all professionals involved with any aspect of real estate property.

This research uses an exploratory sequential mixed methods approach to conduct a cross-sectional study through archival research, a survey distribution, and the collection of quantitative and qualitative data. The investigation begins with a discovery of relevant terms to the study parameters and assessment of the necessary qualifications and processes to becoming a licensed appraiser, followed by a summary of the typical property appraisal process. Then, a comparative analysis of those sustainable education requirements and resources is conducted to discover the status of appraisal regulation and practices relative to sustainable building features. A survey was distributed to collect data on the perceptions of appraisal professionals toward the existence of sustainable value integration, the degree of their consideration, and their perspectives to its impact on economic value.

The study confirmed that real estate appraisers in Colorado are progressing toward integrating sustainable building features in their appraisal assignments. However, the research confirmed several complex challenges to sustainable value integration exist: (1) sustainable feature recognition remains a challenge for a portion of the appraiser population, (2) appraisers are continually challenged by the

inability to measure and quantify the economic impacts of sustainable building features, and (3) there is limited information and data related to sustainable building features available for appraisers to utilize in their analyses. Continuing efforts for mandated education focused on sustainability are needed. Further research is directed toward developing methods and processes to measure and quantify sustainable building features and their impacts, discovering efficient and accurate methods to record property and market data relative to sustainable building features, and case studies examining the impacts of specific building features and their influences on economic value.

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| Appraisal | "A written or oral analysis, opinion, or conclusion relating to the nature, quality, value, or utility of specified interests in, or aspects of, identified real estate that is transmitted to the client upon the completion of an assignment (State of Colorado Department of Regulatory Agencies, 2013)." |
| Conventional Building | Refers to "a building built according to the common practice of a specific country in a specific period (Sartori et al., 2007)." |
| Energy Efficiency | "A way of managing and restraining the growth in energy consumption. Something is more energy efficient if it delivers more services for the same energy input, or the same services for less energy input (International Energy Agency, 2014)." |
| Energy Modeling | "Energy modeling, or simulation, is the practice of using computer-based programs to model the energy performance of an entire building or the systems within a building. A whole-building modeling provides valuable information about the building and system energy use as well as operating costs (Altanova-Sustainable Construction and Real Estate, 2013)." |
| Green Building | "Also known as sustainable or high performance building - is the practice of: (1) Increasing the efficiency with which buildings and their sites use and harvest energy, water, and materials; and (2) Protecting and restoring human health and the environment, throughout the building life-cycle: siting, design, construction, operation, maintenance, renovation and deconstruction (United States Environmental Protection Agency, 2012)." |
| Sustainable Development | "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987)." |
| Sustainable Value Integration | Integrating building characteristics that are aligned with the economic, environmental, and social dimensions of sustainability into the financial analysis of real estate property. |

# Chapter 1: Introduction

In the United States, buildings account for forty-one percent of primary energy consumed (U.S. Department of Energy, 2011). With a rapidly growing population inducing the need for more housing and building, energy consumption continues to trend upward. As a result of energy consumption, buildings contribute 39 percent of the total carbon dioxide emissions in addition to other greenhouse gas emissions (Pearce, Hahn Ahn, & HanmiGlobal, 2012). It is speculated by scientists around the world that the combination of natural resource depletion and greenhouse gas emissions is the cause behind many climate issues we face today including global warming, the rapidly depleting icecaps, a rise in average temperatures, and increasingly severe weather occurrences (Pearce et al., 2012). It seems only appropriate that since the building sector contributes such a large proportion of these negative environmental impacts, this sector has huge potential to cause change and induce reverse effects through decreasing energy consumption and emissions. This could be achieved through sustainable building and development strategies.

## The Problem

Building sustainably remains largely a voluntary action in the building industry worldwide. Despite the advances being made by policy makers and several government organizations (Pearce et al., 2012) along with overwhelming evidence pointing to the potential benefits sustainable building could offer to its stakeholders, there remains much resistance to the "green movement" in the construction industry (Warren-Myers, 2011). Earlier literature has produced a thorough list of barriers to sustainable building including, but not limited to lack of knowledge and understanding, economics, and dynamic stakeholder relationships (Hakkinen and Belloni, 2011; Pearce et al., 2012; Warren-Myers, 2011). However, financial incentives and affordability were ranked as the most important driver and barrier, respectively, for sustainable building by Pitt, Tucker, and Longden (2009). Therefore, the economic

values of sustainable building features must be understood, recognized and accepted by stakeholders to be able to effectively promote sustainable building practices. This study will focus on the current status of appraisal practices and methods relative to sustainable building materials and technologies in real property markets to begin to understand the relationship between construction and real estate industries and their impact on achieving sustainable value integration.

## The Significance

This research focus builds on the education and professional practices in both real estate and construction realms and therefore, has the potential to impact all professionals dealing with any aspect of real estate property. A physical building is the end product in these realms and all stakeholders involved in the process of this building's conception leave some degree of impact on the final product, whether it be a decision made to create the best financial benefit to its investors or a decision on the type of carpet that will be installed. All of these stakeholders also have the opportunity to decide on implementing sustainable building materials and technologies. This research will build on the importance of understanding barriers and drivers to sustainable building integration in order for these industries to be knowledgeable advocates of smarter building practices in their respective stakeholder positions.

In relation to the real estate realm, by analyzing the relationships among the key stakeholders and their roles in sustainable building, it was found that the appraiser holds a unique position in being able to inform and influence all stakeholder groups (Lorenz, 2008; Warren-Myers, 2013). Property appraisers use their expertise, knowledge, and educated opinion to educate stakeholders including builders, investors, mortgage lenders, insurance providers, and homebuyers on the cost and value of sustainable building features and technologies. Within these stakeholder relationships, appraisers are faced with the constraints set on the appraisal assignment by their employer. The purpose of the assignment will determine what information is needed to reach the conclusion sought by the employer.

If the employer does not wish to consider certain features in the appraisal value, then the appraiser is not responsible for collecting and reporting on that information. The reason for purchasing the subject property may lend itself to constraints on what the appraiser will include in their report.

Accurate property appraisals have the opportunity to correct the misconceptions that many consumers have surrounding cost and return on investment of sustainable building features. As mortgage lenders and insurance providers become more informed about lower utility costs to tenants and associated risk relationships through property appraisals, they can provide incentives and special products that will make sustainable building more accessible to investors and homebuyers. Because appraisers are in a position of legal responsibility and trust where the stakeholders believe that the opinion the appraiser places on the value of a property is a real and true representation of worth in that particular market, appraisers are capable of aligning appraisal value with market value and thus increase demand for sustainable building practices. As demand for sustainable building increases the number of sustainable homes on the market should increase, making it easier for the appraiser to find comparable properties for evaluation. Considering this chain of potential influences, an examination of appraisal professionals and their potential to influence change and promote sustainable building in the residential sector is worthy of further research.

In addition to appraisers' opportunities for educating stakeholders, this research will also give the construction realm the opportunity to understand how the appraisal process works, more specifically in relation to sustainable building features, so that the construction related stakeholders can align their practices with those of the appraisal professionals' in order for the full potential of sustainable building features to be realized for the building's entire life cycle. Understanding at what point in project procurement sustainable investment decisions are made and the kind of information and data that needs to be collected during and after construction to support those decisions will be key. To achieve a clear understanding of this topic, these two bodies of knowledge from construction and

real estate professionals need to be transparent. This idea suggests that, in the ideal situation, construction professionals would have the same education as real estate professionals and vice versa. However, this solution is impractical and unrealistic.

The ability to procure funding for these investment decisions will also be affected by the continuing research on this topic. In addition to the credibility of the organization asking for funding, lenders are also concerned with risks associated with the end-product they will be providing funding to build. The degree of accuracy, credibility and familiarity to the information being reviewed by the lender will determine if they will be willing to gamble on the investment. Buildings with more 'extreme' sustainable building concepts, such as earthships, straw bale, and rammed earth are much more difficult to convince banks to support because the materials and methods are unconventional, and the information available in most markets about their soundness, safety, reliability, and value is not available. Many other 'conventional' sustainable building features face this same challenge of little information about the technologies, how they function and the risk relationships to the rest of the building. Therefore, banks see more risk in supporting loans relative to these types of structures.

The following research begins to suggest that a meeting of the minds could be achieved through a discovery of what each group already knows and what they have yet to discover, specifically focused on sustainable building methods, materials and technologies. Targeting this bigger picture, the results of this research may affect thinking on education, federal and state laws and regulations, methodologies, and industries practices.

## The Context

Definitions of key terms used in the industry and the needs in current research have justified the following parameters of the study. The term "green building" owns no clear-cut, industry accepted definition, but is commonly thought of in reference to the physical building structure that has incorporated materials and technologies that are related to sustainability. Just as every construction

project is unique, all green buildings have a different set of value-impacting characteristics or properties that will differ from the next. Therefore, defining a green building as a specific set of characteristics is not feasible. However, the industry must also keep in mind those conventional buildings that have incorporated sustainable features, but are not labeled "green." As the Appraisal Practices Board points out in their Second Exposure Draft: Valuation of Green Buildings: Background and Core Competency, while it is also important for the appraiser to determine if the market recognizes green certifications, labels and energy efficiency ratings, "knowledgeable appraisers are expected to remain focused on the characteristics, performance and risk profile of a given property, and the degree to which the market values those characteristics, when analyzing the effect on market value (2014, p. 12)." Therefore, this study will not focus solely on buildings that have a green label or certification, but will include those conventional buildings that have sustainable features.

Previous research studies on this topic have included a mix of building types. However, the majority of these studies focused on the commercial market because the residential market was viewed as difficult to study due to the low number of available properties, the lack of property transaction information, and a focus on green labeled or certified buildings. Therefore, assuming that the principles discussed in previous research in association with the commercial market are viably applicable to the residential market, the study will collect information on both commercial and residential markets.

The existing body of knowledge on real estate practices and sustainable value integration has focused largely on the commercial real estate market in locations such as UK, Germany, Australia, and New Zealand (Bakens, Foliente and Jasuja, 2005; Bartlett and Howard, 2000; Lorenz, Truck, and Lutzkendorf, 2006; Lutzkendorf and Lorenz, 2007; Warren-Myers, 2013). Because there have not been many research studies on sustainable value integration conducted on real estate markets in the United States, this study will do so. The study will focus on the appraiser population in Colorado where the building industry is healthy and developers are currently building with sustainable features. There is no

prima facie evidence that the findings are not generalizable to other states, but one limitation of this study necessitated by data collection constraints is the inclusion of results from a single state.

As discussed previously, appraisal professionals are in a position to influence change and create informative relationships with the stakeholders on this topic. Appraisers are also in a position to see the economic influences that sustainable building features have on property value due to the compilation of many factors including local market, initial costs, operating costs, risk-impacts, and yield rates. Therefore, this study will collect data from appraisers that have valuated buildings that are not "green labeled" or "certified" buildings per say, but rather any building that has features that are in-line with sustainable principles. In this approach, the study examines how the industry is able to account for individual features and real performance metrics for all real properties, not just those that are certified as green or sustainable.

Much of the previous research on residential and commercial markets was based on normative theory where the research speculates what 'should' happen in the real estate market, but little empirical research exists on what 'is' happening as a result of adoption of sustainable building practices in real estate market(s) (Warren-Myers, 2011). Therefore, this study will use an exploratory sequential mixed methods approach to collect qualitative and quantitative data on the current appraisal practices to explore the status of sustainable value integration in appraisal practices. The data obtained and the analysis conducted within this study will provide a foundation for further research into the challenges of sustainable value integration facing appraisers, stakeholder education, and economic influences that sustainability may have on building practices in the United States.

## Research Aims

This study seeks to examine where sustainable value integration exists in current property appraisal practices in Colorado. The examination in this study is designed with the intent to meet several aims. First, this study aims to investigate the nature of sustainable value integration within current

appraisal practices in Colorado real estate markets. The research will investigate what elements of a typical appraisal process differ from that which must include sustainable building features. By discovering appraiser processes and the necessary factors, data and information considered in conducting an appraisal, the study can begin to understand how this compilation forms an appraiser's opinion of value. The research will then examine how appraisers obtain this information and how this translates to collecting information about sustainable building features.

Second, this study aims to discover the degree of alignment between state mandated criteria for appraiser licensure and their knowledge of sustainable building techniques, materials and technologies among the current appraiser population. The research will investigate the state mandated experience and educational requirements to obtain an appraisal license relative to sustainable building features and then compare those requirements to industry suggestions for continuing education and professional development. This comparison will reveal areas that are sufficiently or insufficiently meeting the market needs for appraiser competency.

Third, this study aims to analyze the transparency of construction industry knowledge to the appraisal industry in relation to sustainable building techniques, materials and technologies. Depending on the findings of the study in regards to what information the appraisal industry is lacking in order to achieve sustainable value integration, these findings can lead to recommendations on how the construction industry can contribute to developing thorough and efficient ways of collecting and communicating necessary information and data. The co-dependent relationship between real estate and construction professionals should be seen as cooperative to realize a building's full value potential.

Fourth, this study aims to explore perceptions of real estate appraisers on the economic implications of sustainable value integration. The study is seeking insights on how appraisers have seen this concept develop through their personal appraisal experiences, if they see it adding value, and how they see it growing into an everyday practice as real estate markets become more saturated with green

building concepts. This qualitative data will help to support the quantitative results and give the study a deeper insight into what is truly happening in the industry.

The remainder of this thesis continues first with a literature review that further elaborates on the specific issues already addressed relating to the financial barriers to sustainable building, appraisers' relationship with relative stakeholders, determining associated value of sustainable building features, the integration of this value in property appraisal and missing information desired by the industry and research communities. Next, the research goals and objectives are explained to establish the overarching aim of this study and the processes taken in conducting the research. An explanation of the methodology follows outlining the research design. Finally, the outcomes of the data analysis, contributions to the present body of research and the implications for further research are discussed.

# Chapter 2: Literature Review

Despite extensive climate research that proves the health and well-being of our planet is declining and new proven technologies that have been developed to mitigate this decline, the general public, developers and builders are still hesitant in adopting sustainable design and construction. Some of these reasons include knowledge barriers surrounding energy consumption and the impacts that current design and construction techniques create on the environment, professional barriers in lacking design or building expertise when planning a building project, material barriers such as a lack of sustainable building materials or land to include in a building program. Even though the 'green building movement' arguably started over twenty years ago, there still exists several factors, including financial barriers, that inhibit the wide spread use of energy saving and sustainable strategies in the building industry. In the present paper, these financial barriers to implementing sustainable design strategies in both commercial and residential building sectors are investigated. It is hypothesized that if financial barriers can be mitigated, the property valuation and appraisal strategies may present the most convincing argument for builders and developers to accept sustainable building strategies into every project. The following five topics related to financial barriers within property assessment and valuation attempt to exhibit the potential support of this hypothesis.

## Property Assessment & Valuation

First, property valuation creates an interdependent relationship with market value. This relationship revolves around two key concepts; (1) the market value of a property is dependent on the value that the public perceives those features are worth within the respective market, and (2) property value is dependent on the quantitative and qualitative values the real property appraiser reports on the characteristics of the building. In this section, the connection between public perceptions and property

value will be made clear through evidence presented by previous research, and further strengthen the argument for research into current real property appraisal methods and practices.

It is evident that there is a need to inform the public and educate surveyors and appraisers about the social, environmental and economic benefits of sustainable design and construction. (Bartlett et al., 2000; Leopoldsberger et al., 2011; Lutzkendorf and Lorenz, 2005; Pitts and Jackson, 2008). It has been noted by Pitts et al., (2008) that even though Austin, Texas is known for its Green Building Program, homebuyers have not placed a higher value on energy-efficient homes. Wolff (2006) also found that in a 2004 survey conducted by the National Association of Home Builders (NAHB) 51% of respondent's preferred larger homes and the other 49% preferred higher quality homes. If people don't know how to evaluate the benefits of a sustainable feature, they cannot make informed decisions in relation to investing and/or building sustainably. Through various case studies on methods used for financial analysis Wolff reports that even "very simple green features with high rates of return are not being implemented because their quantifiable financial benefits are not fully recognized." With the first half of the relationship dependent on the public, misconceptions surrounding the benefits and value of sustainable features which markets have placed on a property could lead to a misrepresentation of actual economic worth. Therefore, initial perceptions of the costs of implementing sustainable design features into buildings are explored.

## Initial Cost Perceptions

Willingness to accept or believe in an idea is based on the information, knowledge and experience that the person questioning this idea has absorbed, as with decision- makers on sustainable building projects. Previous research has presented conflicting statements on the initial costs of building with green features, so it is no wonder why the general public is not confident in these investments. Guidry (2004) presented collaborative information from RS Means and other research authors on a cost comparison of environmentally friendly materials versus conventional materials. From this comparison,

the author concluded that costs, per square foot or by the unit-in-place method, associated with green buildings were usually higher than those for conventional buildings. Guidry states that this could be because resource-efficient materials cost more to purchase and install than traditional materials (2004). This research is contradicted by a later study done by Adomatis (2010) who explored the value of high performance houses and stated that it does not always cost more for green construction. The author noted that experienced builders had found that many sustainable building strategies take less time to build and save money through less material waste and construction debris. Finally, in a government funded report performed by the Sustainable Building Task Force on green buildings in California, Kats et al. (2003) found that "minimal increases in upfront costs of about 2%, on average, to support green design would result in life cycle savings of 20% of total construction costs."

In regards to quantity surveyors and property appraisers, their perceptions of sustainable design and construction fall in line with those of the general public previously mentioned. In a survey conducted in the UK, Bartlett et al. (2000) reported that quantity surveyors believe there is a five to fifteen percent increase in initial cost to build an energy efficient building. In the same study, it was concluded that the quantity surveyors over-estimate the initial costs of energy efficient features and strategies and underestimate the potential for cost savings over the life of the energy efficient feature. However, research suggests that the process of evaluating costs of green building features is moving away from just the initial cost to a focus on the whole life cost of the feature. Pitts et al. (2008) contributes further in stating that initial construction costs are typically higher for a green building, but these extra costs may be recouped through operating savings and reduced energy and maintenance costs. Therefore, it can be reasonably assumed that if builders and developers can't realize long-term life cycle cost benefits or sufficient returns on investment, they will choose not to implement them. There is an obvious need for a tool that will provide tangible proof of the benefits of sustainable strategies to decision-makers.

Second, the property appraisal and market value relationship is also dependent upon the appraisers' approach to assessing property worth. Traditionally, appraisers perform their assessment of the property and then compare it to other relatively similar properties in the same market region to determine a value as in the sales comparison approach. However, this approach presents several issues. First, the level of comparability between properties is left up to the judgment of the appraiser. Second, the sustainable building market is not saturated thoroughly to provide enough comparable examples in every real estate market. And third, the appeal of sustainable buildings may not be well represented through this approach (Wilson et al., 1998). Appraisers must find new ways of analyzing the value of building characteristics and their economic impacts.

Lutzkendorf et al. (2005) established a list of requirements utilizing elements of life cycle costing (LCC), life cycle assessment (LCA) and post-occupancy evaluation (POE) that take a full 'cost-benefit' approach to placing value on sustainable features. Each requirement is assigned a weight according to the appraiser's assessment of the value of that feature relative to the market. Once requirements are established, it is important to streamline the measurements so that they are simple enough to be understood and adopted industry wide. Guidry (2004) and Adomatis (2010) suggest categories of sustainable features for evaluation tools, but they failed to incorporate adequate methods of measurement in their studies. One method presented by Lorenz et al. (2006) goes further in developing key performance indicators (KPI's) as an assessment tool. Lutzkendorf and Lorenz, (2011) suggests multiple methods of translating sustainable building features into input parameters to evaluate their influence on value. Mathematical formulas can also be applied to a property assessment approach. Leopoldsberger et al. (2011) established six categories for building quality from 532 observations in 57 German cities. Each category was assigned a quality rating for each observation. From this system, they were able to deduce relationships between energy costs and rent pricing using hedonic pricing models. Previous research teams have attempted to develop assessment tools using many strategies. However,

the lack of accurate property and market data was an issue in all of the articles researched for this review.

Recent research on property valuation and appraisal strategies agrees on the need to develop standard measurements and tools to evaluate building characteristics and their impacts on value. These standards need to incorporate social and environmental benefits as well as whole life cycle costs to achieve a more accurate representation of the value of sustainable building features. As acknowledged in the follow-up research to their previous paper, Lutzkendorf et al. (2007) noted the value placed on a building characteristic could change according to the interested buyer's perspective. Therefore, it can be reasonably assumed that by expanding the availability of property data, improving property appraisal techniques and educating stakeholders, real property appraisal experts will be able to align market value and it's perceptions with a more accurate value of sustainable property characteristics.

Thus far, previous research has established that perceptions on initial costs of sustainable building strategies and features are over-estimated and under-valued by builders, developers, and homeowners. This misconception of price can be accredited to the lack of knowledge and education about green building strategies and the lack of participation of property valuators in the sustainable building market. The lack of measurement tools and vocabulary to express the benefits of sustainable design and construction contribute to the inability of valuators to educate the building market. Educating appraisers and providing more thorough appraisal techniques and strategies that incorporate sustainable building techniques and elements could improve many of these deficiencies in current property appraisal strategies. However, property appraisal techniques also affect insurers' decision-making processes, which are discussed next.

### Insurance Providers

Third, circumstances surrounding insurance companies and the insurability of a sustainable project are also affected by property appraisal techniques. Pricing for both conventional and green

buildings depends on the risk associated with that building. Insurance underwriters perform a risk analysis examining the borrower and the property itself. Poor environmental, social, and economic performances are seen as investment risks. Therefore, it is important to develop accurate and thorough measurement and assessment tools as previously described to aide in determining building quality. One approach suggested by Lorenz et al. (2006) could be to use quantifiable descriptions based on certain building performance criteria to define building quality. Many building performance criteria such as indoor air quality, energy efficiency, water efficiency, and renewable energies affect certain risks within the building. To support this theory, further research on performance-based building should be explored. According to Bakens et al. (2005) the program developed by their research team for the performance based building approach allows for documentation and the assessment of needs and requirements, as established by the stakeholders, at the same level needed for assessment of qualitative aspects of property valuation and market value. This approach may represent a solution to provide complete qualitative and quantitative data on building characteristics to property appraisers up front as a whole package rather than having to go through the process of quantifying tangible and intangible characteristics after the building has been built and the stakeholders have dispersed (Bakens et al., 2005). This subject is outside the scope of this paper, but does merit further investigation to those focusing on performance based building strategies.

Once building characteristics and performance criteria are implemented in appraisal strategies, insurance companies can begin to develop their risk analyses. It has been suggested by multiple research teams that relationships exist between sustainable design strategies/systems and risk reduction when those features are implemented appropriately. Lutzkendorf et al. (2005), acknowledged relationships between sustainable design and risk management such as worker health and safety resulting in lower workers' compensation claims and litigation, property loss prevention due to a lower likelihood of physical damages, liability loss prevention due to lower business interruption risk, and

natural disaster preparedness due to the implementation of renewable energies in sustainable buildings. Loss-prevention benefits were also examined by Mills (2003), through the Energy Analysis Department at the University of California. The research team found 78 examples of energy efficient measures and technologies that offered insurance loss-prevention benefits.

These relationships present multiple advantages to sustainable buildings and places insurance companies in a position to influence the decision-makers choice in implementing green features. Insurers could offer financial incentives and specialized policies and products to those who choose to implement sustainable building strategies because of the reduced risk in such projects. Specializing in sustainable technologies also has the potential to create a competitive advantage for insurance and risk management companies (Mills, 2003). However, both papers previously discussed cite the need for a standardized system for the risk assessment of sustainable building characteristics. As with property valuation and appraisal, the lack of building performance data and information creates a dilemma for insurers when trying to accurately assess a building for insurance purposes. Further empirical research on the relationships between risk management and sustainable features is needed to provide quantitative data for the development of property assessment tools for the insurance industry.

### Mortgage Lenders

Fourth, mortgage lenders and their perception of sustainable buildings are also affected by property appraisal techniques and risk assessment. Interest rates on property loans are determined in direct relation to the risk associated with that property. Therefore, the higher risk assigned to the property, the higher the interest rate will be on the loan. Lutzkendorf et al. (2007) contributed an interesting statement that could lead to the exclusion of borrower ratings in mortgage lenders' evaluation process. The authors stated that the qualities of the property asset can determine both the possible loss in the event of loan default, which is represented by the value of the property, and the probability of loan default, which is determined by the risk assessment which is also based on the value

of the sustainable features of that property, making the rating of the borrower sometimes irrelevant. If this were always the case, this circumstance could have enough leverage to convince builders and developers to implement sustainable features in all of their building projects.

In addition to interest rates, mortgage lenders also evaluate the ability of the borrower to regularly make their mortgage payments. The New York State Energy Research and Development Authority (NYSERDA) in conjunction with Lutzkendorf et al. (2005) noted that the probability of credit default for real estate loans on sustainable properties was reduced. Arguably, since sustainable properties have been shown to boast increased marketability and a stable income stream, this is a real insight to the credibility and financial benefits of sustainable buildings over conventional ones.

Price stability is another factor to consider when taking out a loan on a property asset. Several studies have shown some evidence of the influences of green features on cash flow and added value. Lorenz et al. (2006) report that traditionally, hedonic pricing studies include building characteristics that focus on location, size, age, structural, internal and external features. Through a series of linear hedonic regression models performed on 20,697 observations of property transactions in Germany, the authors found that flats in preferred locations outperformed their competitors in terms of price stability. Price differences due to the flats' environmental performance could not be determined in this study due to insufficient property transaction data. The authors support the notion with an explanation of the "the vicious circle of blame." The circle is comprised of four main factors; (1) Occupiers who would like to have sustainable buildings but believe that there are very few available, (2) Constructors who can build sustainable buildings but state that the developers do not ask for them, (3) Developers who ask for sustainable buildings but who believe that the investors will not pay for them, and (4) Investors who would invest in sustainable buildings but believe that there is no demand for them. Therefore, the presentation of empirical proof of the positive effects of sustainable design features and the ability of

sustainable buildings to generate cash flow, add value, and reduce investment risks needs to be presented.

### Future Rental & Lease Rates

Finally, future rental and lease rates are another decisive factor that an investor will examine, in addition to the re-sell value relative to the local market. Pitts et al. (2008) believe that green buildings are leasing at above normal market rates with lower tenant turnover. Sustainable design advocates spaces that are healthier and safer for employees. As a result, higher productivity rates, lower absenteeism rates, and higher employee satisfaction have been seen in the commercial sector. The National Real Estate Investor (2013) affirms the previous point in their list of "Five Reasons You Should Have a Green Lease". In the residential sector, there is some evidence that energy efficient properties are valued slightly more than conventional ones. Leopoldsberger et al. (2011) concluded from their studies that energy cost had a significant effect on the rent prices of flats in Germany. The higher the energy costs, the lower the rent rates. This may suggest that if the energy costs were higher, the space may have been more difficult to rent or lease, so the property owner lowered the price. Research in this area is still very scarce due to the lack of information in real estate databases and a lack of understanding on how to assess the relationships between building characteristics and rental or lease rates.

Thus far, this literature review indicates that the effects of these five financial barriers are seen across building, construction and financial industries throughout the world. Among the relationships between these five topics lie three common challenges, which the appraiser may hold an opportunistic position to impact and change; (1) gathering thorough and accurate information and data relative to building characteristics and performance, (2) the development of an assessment tool to translate these characteristics and their benefits, tangible and intangible, into numerical qualities, and (3) educating the

public, building and construction industries as well as property valuation, insurance and financing professionals about the economic factors of sustainable building.

The relationship that the appraiser holds with key stakeholders relating to these financial barriers has also been revealed. While the market value of the property depends largely on the public's knowledge and perceptions, the initial assessment placed on the building characteristics depends on the judgment and knowledge of the appraiser. However, perceptions among homeowners, property developers, and property appraisers about the initial cost and value of sustainable design and construction investments is mixed, with a tendency toward the misconception that sustainable design always costs more. Thus, it is necessary to align public perception and economic value determined by information and data collected by the appraiser to create a more accurate representation of the value of sustainable features in buildings.

For insurers, the risk assessment process similarly relates back to property appraisal techniques in that the process of assessing the cost, value, function and performance of the sustainable features is the same process an insurer utilizes to perform a risk assessment. This leads insurance companies to become more involved in the sustainability market as appraisers are bringing to light the relationships between sustainable features and technologies and their reduced risks. Furthermore, mortgage lenders depend on the risk assessment of the property and the borrower to determine if the property is worthwhile and, if so, what interest rate to place on the loan. Therefore, the appraiser's relationship with the stakeholders in all five financial barriers suggests that the appraiser has an advantageous position to push decision-makers over the edge of misconception and into the land of sustainable opportunities.

## The Big Picture

Despite the overwhelming evidence of the benefits of sustainable buildings (Pearce et al., 2012), stakeholders in construction building practices rely on the fundamental economics in the business

sense, affordability, payback, and financial incentives when determining whether to invest in the green real estate (Lutzkendorf et al., 2007; Pitts et al., 2008; Wolff, 2006). The financial barriers to implementing sustainability in construction were discovered through a review of the literature and classified into five categories as follows; Initial Perceptions of Cost, Property Assessment and Valuation, Insurance Provisions, Mortgage Lending, and Property Yield.

Cadman (2000) contributed a fundamental principle in understanding the dynamic relationships between stakeholders; the 'vicious circle of blame' (Figure 2.1). Through an examination of the relationships that exist between occupiers, constructors, developers, and investors, it was determined that the adoption of sustainability in the real estate market will be limited as long as the 'blame' of not promoting sustainable building is passed from one stakeholder to the next in this 'vicious circle.'

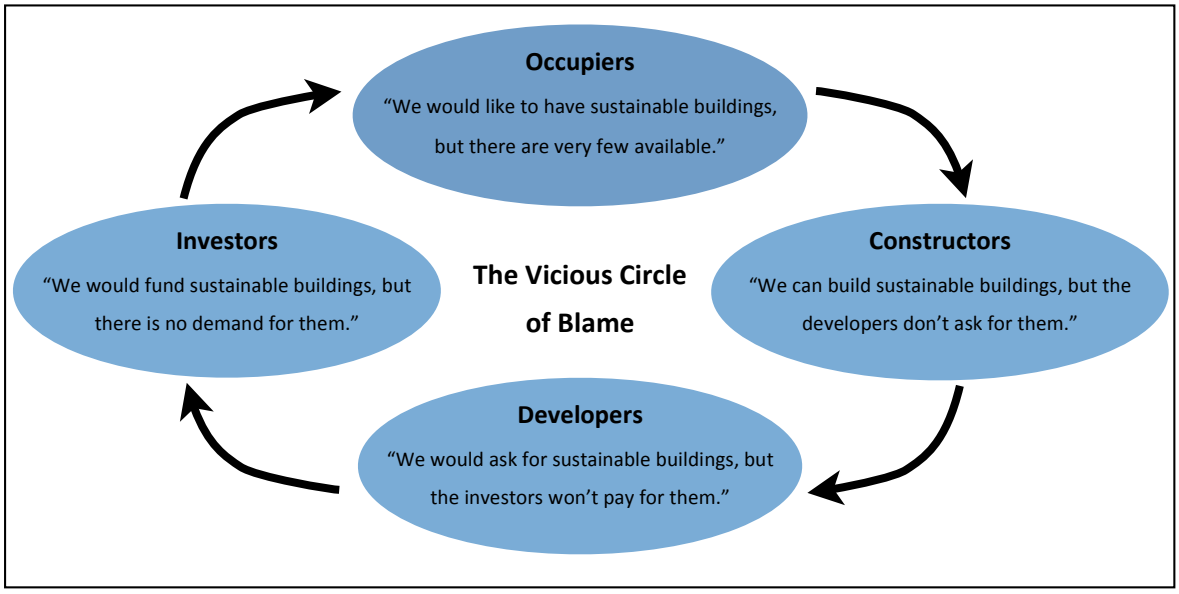


**Figure 2.1. The Vicious Circle of Blame, Cadman (2000)**

Stakeholders include occupiers, constructors, developers and investors (Cadman, 2000). With the consideration of the five categories of financial barriers previously mentioned, it was determined that insurance providers, mortgage lenders, and appraisers have a stake in the adoption of sustainability as well. Lorenz (2008) contributes to this idea in his contradiction of the 'vicious circle of blame' with the

inclusion of researchers, educators, policy makers, and owner associations in addition to the aforementioned in the stakeholder group (Figure 2.2). By analyzing the relationships among all of the key stakeholders and their roles in sustainable building, it was found that the appraiser holds a unique position in being able to inform and influence all stakeholder groups (Lorenz, 2008; Warren-Myers, 2011).

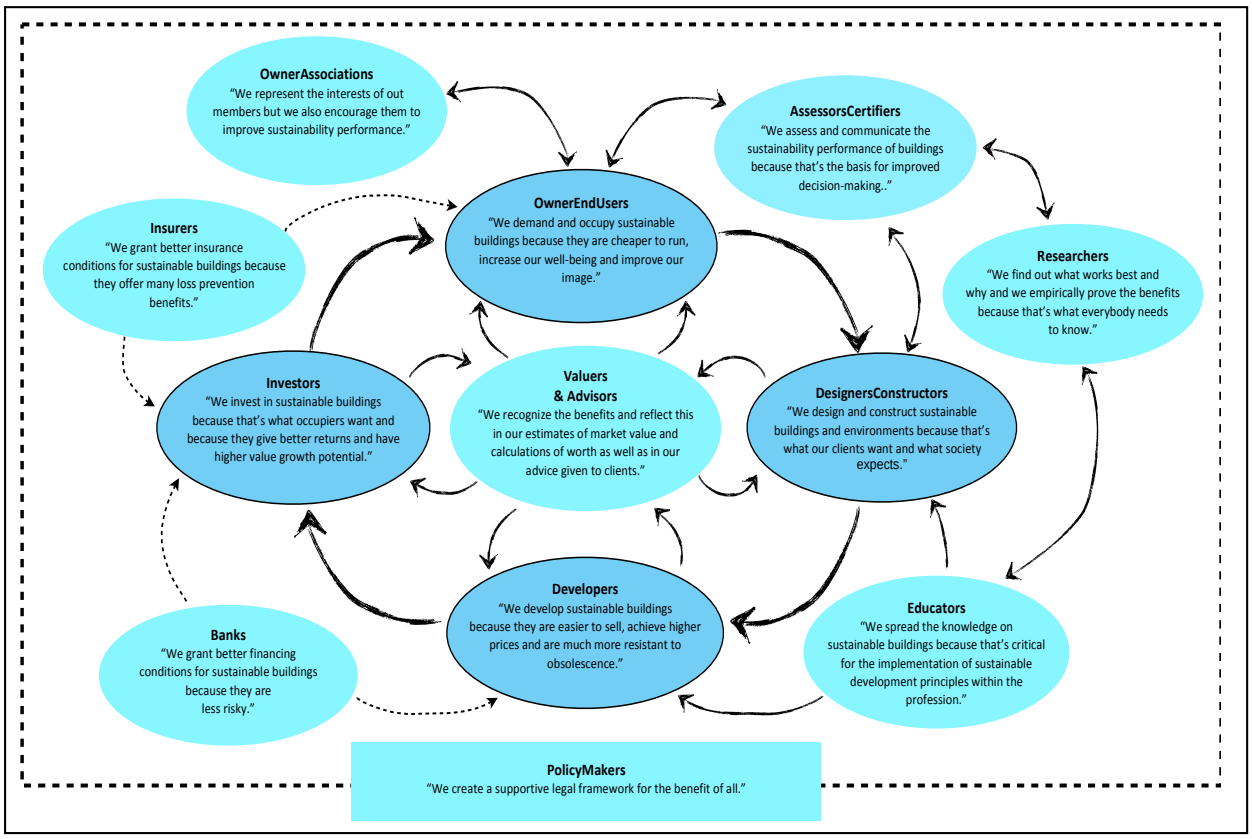


**Figure 2.2. A Contradiction: The Virtuous Circle of Blame and Feedback Loops, Lorenz (2008)**

## Challenges Facing Appraisers

The research available on sustainable residential real estate is more prevalent in European countries such as Germany, Austria, and the UK where sustainable housing and energy efficiency guidelines and reporting methods are more advanced (Leopoldsberger et al., 2011; Lorenz et al., 2006).

In general however, the integration of sustainability in current valuation practice is limited (Warren-Myers, 2011). To better understand this issue, research has expanded on the following areas:

- Establishing a relationship between energy efficiency and rent prices
- Rating tools to quantify value associated with sustainable building features
- Methodologies to integrate sustainability with traditional property assessment techniques
- Establishing relationship between sustainability and market value
- Establishing valid and reliable measurement tools for assessing sustainable building features

Within these topics, numerous challenges facing appraisers in the realization of sustainability advancements in valuation practices are discussed.

The **lack of education and understanding about sustainability and its applications** is cited by many authors as the underlying key to unlocking solutions to subsequent challenges. Muldavin (2010) suggests that new knowledge may be the missing link to sustainable value integration, not changes in the valuation methods and practices. To achieve this, researchers suggest an increased focus on sustainability in the education of teachers, students, and current professional appraisers on sustainability and adapted assessment techniques (Adomatis, 2010; Cochran, 2010; Lutzkendorf et al., 2011; Warren-Myers, 2011).

Extending from the previous challenge of education stems the **lack of awareness of existing rating tools** to assess and quantify the value of sustainable features (Warren-Myers, 2011). As mentioned in the literature, there are probably hundreds of sustainability rating tools that cover the social, economic and environmental elements of sustainability similar to LEED, ENERGY Star, NAHB green, and BREEAM (Adomatis, 2010). However, many of these rating tools offer independently developed point systems that calculate to a certification level for the building. Although this rating system can help an appraiser determine the definition, impact, and importance of building features, this type of system does not take in account the value of the building as an asset.

Appraisers are also challenged with the **complexity of suggested integration methodologies.** As seen in the following examples, research has developed suggested methodologies outside of the sustainability rating tools to offer value integration guidance to appraisal professionals. However, the mathematical skill level required to perform several of these proposed methods extends beyond the capability of the average appraiser. Their inexperience with many of the quantitative solutions offered renders them unsuitable (Warren-Myers, 2012). Gross rent multiplier analysis, paired sales analysis, survey of builders, (Adomatis, 2010) cost-benefit analysis, discounted cash flow analysis (Muldavin, 2010), net present value calculations, and residual analysis are a few of these suggestions offered in the literature (Warren-Myers, 2012). The issue remaining here is in number of methodologies, which suggests the need to develop a standard system (Lutzkendorf et al., 2011; Pitt et al., 2009).

In addition, appraisers must determine how to assess and incorporate the value of intangibles into their assessments. Looking beyond immediate cost savings and payback, **the capability to incorporate "Value Beyond Cost Savings"** as Muldavin (2010) suggests, remains a challenge. Sustainable buildings offer many potential benefits that arguably should be the convincing factors to invest in this type of real estate; healthier living/working environments, better indoor air quality, increased productivity from employees due to worker satisfaction and health, low maintenance, and less environmental impact to name a few. However, it is noted that it is not easy to assign a monetary value to these types of intangible benefits. Therefore, it will be important for future research efforts to develop a method for qualitative analysis in addition to quantitative analyses (Adomatis, 2010).

**Property assessment is two-fold: building valuation combined with market value** (Warren-Myers, 2012). Once appraisers have determined the appropriate economic impact value relative to sustainable building features, they then have to compare this to how the local market associates with that asset. This complex relationship between the physical property impact and the market value challenges the appraiser to balance what they know about local market trends with the information

they are trying to use to educate the consumers within that market. Research has yet to produce a solution to this challenge.

Another challenge to appraisers in real estate assessment is the **availability of building documentation, building performance information and relative property transaction data** (Cochran, 2010; Lutzkendorf et al., 2011). Building documentation related to the sustainable building feature characteristics, their cost, function, and age are necessary for appraisers to perform an assessment. In the literature, researchers have suggested ways to collect this pertinent information; talk to the client, builder, manufacturers, designers, financiers and insurers to obtain any 3rd-party ratings or energy reports that were performed, existing utility bills to prove energy usage/savings, gain design and construction insight, and discover incentives available to the owner (Adomatis, 2010). However, as discussed next, this information does not always exist.

The **lack of unbiased, empirical evidence** to support appraiser's judgment leaves professionals insecure in approaching sustainability valuation. There is a difference between what people say they will do and what people actually do (Warren-Myers, 2012). Much of this research has been based on normative theory where the research speculates what 'should' happen in the real estate market, but little empirical research exists on what 'is' happening as a result of adoption of sustainable building practices in real estate market(s) (Warren-Myers, 2011).

The requirement to find comparable properties when appraising real estate has heightened the awareness of the **minimal number of comparable sustainable properties in real estate markets** (Adomatis, 2010; Warren-Myers, 2011). With limited sustainable properties in the market, appraisers are forced to pick the next best thing to make a comparison. As discussed by several researchers, this creates inaccurate assessments, which increases risk to appraisers and perpetuates the lack of reliable information and property data available to market the real value of sustainability.

## Need for Further Research

Increasing investment and demand in sustainable building practices is the common goal within previous literature (Pitt et al., 2009; Warren-Myers, 2011). However, as a body of knowledge, the literature acknowledges the following needs for further clarification and exploration in order to overcome barriers and achieve further integration of value associated with sustainable building features in real estate markets.

- Adopt sustainability into education and continuing education requirements for appraisal professionals.
- Create a standardized measurement system to assess qualitative and quantitative benefits of sustainable building features and their economic impacts to real estate property.
- Develop property transaction databases to enable accurate and reliable comparative studies from one property to the next.
- Collect empirical data on what 'is' occurring in the property appraisal industry relative to sustainability.

This study will begin to fulfill the need for empirical data by collecting information from practicing professionals in the Colorado real estate markets regarding their current appraisal practices. By discovering where the integration of sustainability value exists in current real estate appraisal in Colorado, a baseline will be created for future research to expand on the needs previously mentioned.

# Chapter 3: Research Methodology

The purpose of this project was to create a new understanding of the current status of property appraisal practices as they relate to recognizing value associated with sustainable building features, specifically in real estate markets in Colorado. Specific objectives of the proposed research were four-fold:

- To investigate the nature of sustainable value integration within current appraisal practices in Colorado real estate markets.
- To discover the degree of alignment between state mandated criteria for appraiser licensure and their knowledge of sustainable building techniques, materials and technologies among the current appraiser population.
- To analyze the transparency of construction industry knowledge in relation to sustainable building techniques, materials and technologies to the appraisal industry.
- To explore perceptions of real estate appraisers on the economic implications of sustainable value integration.

This paper establishes a foundation for further research into examining the residual effects that acknowledgment and integration of sustainability value in property appraisal have on building practices in Colorado. This following content will elaborate on the theoretical and practical elements of how the research was conducted.

## Exploratory Sequential Mixed Methods Design

This mixed methods study addressed the status of the appraisal practice relative to sustainable value integration in real estate markets in Colorado. This cross-sectional study collected data through archival research that pertained to current appraisal practices and collected survey data from current, licensed appraisers in Colorado. A mixed methods approach was used to collect quantitative and qualitative data. This method offered several advantages to this study; one data set had the potential to explain the other, collecting two sets of data would provide a validity test to the research, and collecting

qualitative data offered the opportunity for a much richer examination of the phenomenon being studied (Creswell, 2014). More importantly, the origins of this research approach from Campbell and Fiske (1959) suggested mixing the quantitative and qualitative methods to ensure any resulting variance within the data sets was reflected in what was being studied and was not a result of the specific method being used (Creswell, 2014). This concept was later termed 'triangulation' (Denzin, 1978).

In the Exploratory Sequential Mixed Methods approach there were two phases of data collection (Figure 3.1). In the first phase, the researchers conducted archival research to investigate qualitative information related to the mandated laws and regulations for appraisal in the state of Colorado. Then, the researchers discovered methodologies and tools suggested by industry organizations and related research that was already available to appraisers for sustainable value integration. By comparing these two initial investigations, an understanding of the sustainable knowledge gap between mandated appraisal practice and those opportunities to understand and integrate information related to sustainable building features and technologies began to appear. These findings are discussed further with the survey results in the next chapter. The researchers used the data collected in this first phase to develop the content in the survey measurement tool for the second phase of data collection.

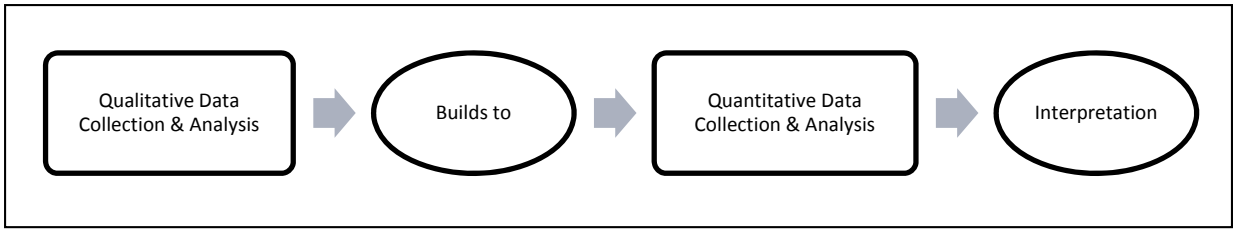


**Figure 3.1. Exploratory Sequential Mixed Methods Process, Creswell (2014)**

In the second phase of data collection, the researchers distributed the survey to a population of 322 appraisers to collect, primarily, quantitative information related to how many appraisers are aware of sustainable value integration, the types of features they have experience in appraising and if they believe sustainable building features have an economic impact to building appraisal. Using the

developed system, the researchers interpreted the results of the survey for the mixed methods study. Further discussion of the processes and actions taken for this mixed methods study continue in in the following section.

## Limitations of the Study

One limitation to the data collected in the study lies in the lack of a uniform definition for the term 'sustainable'. Often 'sustainability,' 'green,' and 'energy efficient' are used interchangeably in discussion about the same concepts. These phrases may have different meanings dependent on their context and theory of application. Preliminary definitions for sustainable and green could have been provided in the survey to define their meaning in this specific study for the respondents. However, these parameters are still open to interpretation based on participants' knowledge and experiences with sustainable building features.

Another limitation to the study lies in the types of sustainable building features that were defined for the survey participants. Due to the ambiguity of 'sustainability', 'green' and 'energy efficiency', the researchers developed a list of sustainable features to reference in survey questions and responses to provide participants with more concrete concept of the types of building features the research was referring to. The list compiled by the researchers included Site Orientation, Building Envelope Quality, HVAC, Building Performance Energy Rating, Insulation, Renewable Energies (Solar Panels, Wind), Lighting Controls, Appliances/Equipment Selection, Water Efficiency, Proximity to Community and Public Transportation, Indoor Air Quality, Utility Cost (Electric, Water, Wastewater, Stormwater), and Daylighting. However, this list presents several issues for the study.

First, it is comprised of both sustainable building features and sustainable building concepts. Many of these terms could still be considered broad and ambiguous to the readers. For example, when considering water efficiency, this term could be referring to low flow plumbing fixtures, gray water systems, xeriscaping, etc. Second, it is difficult to differentiate between a single building feature like

insulation and an entire concept like energy efficiency. When looking at this list of features and concepts, it is difficult to define what benefits appraisers need to be aware of and capable of calculating to valuate. Is the benefit being seen from the type of insulation, or is the benefit being seen in a better building envelope and therefore lower energy use? Thus, it is difficult to determine which features and/or concepts are good proxies to measure survey inquiries.

A third limitation to this study is created by the heterogeneous nature of property and the types of interest they hold. This study examined the typical property appraisal process as mandated by USPAP and the three primary appraisal approaches. The study did not consider the nature of sustainable value integration relative to appraisal practices covering specific types of rights and interests relative to the subject property. Also, the study acknowledges that appraisers are often held to include certain criteria for the appraisal by their employers. Rules and regulations pertaining to required criteria and their extents for all property appraisals was beyond the scope of this study.

A fourth limitation to this study lies in the archival research conducted to discover where education related to sustainability and building practices was present in mandated curriculum for initial licensure and continuing education requirements. One limitation to the evaluation of the initial curriculum required for licensure is that the researchers did not review every course outline for content related to sustainability. USPAP defines the topics needed to meet their curriculum requirements, however, they do not develop the specific outlines or lesson plans for each class. Therefore, there are many sources to get a real estate appraisal education. It was determined by the researchers that a review of every class offered was unrealistic. It is possible that issues related to sustainable building features are discussed and applied within other curriculum topics.

Finally, the survey population also limits the study. Those members who are listed on the National Registry are active and licensed appraisers and those listed in the AI Registry are also active and licensed, but have an invested interest in being more experienced and knowledgeable of appraisal issues

and trends. These AI members have also taken the initiative to earn an additional AI designation, which means they have additional education above and beyond the requirements of USPAP. Therefore, the appraisal population selected for this survey may have been slightly in favor to the study because of their additional experience and education. Overall, there was still a portion of the survey population that was not aware of appraisal practices relative to sustainable building features and did not have sustainable value integration experience.

## Research Implementation

This research process consisted of four primary phases, or objectives, corresponding to the four research aims for the work identified. Tasks and subtasks were assigned to the research aims according to the process needed to accomplish the research goal (Table 3.1)

**Table 3.1. Research Objectives and Tasks**

| Objectives (The WHAT) | Tasks (The HOW) |
|---|---|
| 1) To investigate the nature of sustainable value integration within current appraisal practices in Colorado real estate markets. | 1.1) Designate definitions for critical terms within the appraisal process and align these with the parameters of the study.<br>1.2) Summarize the necessary steps and qualifications to becoming a licensed appraiser as outlined by The Appraisal Foundation.<br>1.3) Summarize the typical property valuation process taken by licensed appraisers in Colorado when appraising real estate properties. |
| 2) To discover the degree of alignment between state-mandated criteria for appraiser licensure and their knowledge of sustainable building techniques, materials and technologies among the current appraiser population. | 2.1) Examine state laws regarding maintaining certification and continuing education requirements for licensed appraisers.<br>2.2) Examine primary resources for sustainable building information and data offered by professional organizations for appraisers. |
| 3) To analyze the transparency of construction industry knowledge in relation to sustainable building techniques, materials and technologies to the appraisal industry. | 3.1) Develop a survey targeting the appraiser, their current practices, and knowledge about recognizing value for sustainable building features.<br>3.2) Construct a survey population list representative of the current appraisal professional population in Colorado.<br>3.3) Collect data on current valuation practices, any known knowledge about methodologies and tools currently available to appraisers, and perceptions on the effects of integrating sustainable building feature values and the acceptance or rejection of this concept in theory and practice. |
| 4) To explore perceptions of real estate appraisers on the economic implications of sustainable value integration. | 4.1) Analyze the data collected from the appraisers through the survey.<br>4.2) Draw conclusions by comparing and contrasting the current appraisal practices with the suggested methodologies and tools as well as attitudes of the surveyed appraisers to find the sustainable value integration gaps.<br>4.3) Make recommendations for further research direction. |

## Objective One: Investigate the Current Nature of Sustainable Value Integration

### *Terminology*

In objective one, researchers evaluated the mandated appraisal qualifications, methods and practices used to appraise real property in Colorado to establish the baseline for subsequent research. First, a list of critical terms to this subject was compiled considering concepts throughout the literature review content and initial research phases. Definitions for these terms and their sources have been provided in the beginning of this paper under List of Keywords. Using these definitions, the parameters of the study were better defined. Considering the meanings of sustainability and green concepts, this study will include those conventional and non-conventional buildings that have sustainable building features, to any extent.

### *Governing Authority on Appraisal Rules and Regulations*

The U.S. government currently regulates all real property appraisers nationwide. Congress has authorized the Appraisal Foundation (TAF) as the sole source of appraisal standards and appraiser qualifications for all states in the U.S. Governed by a board of trustees, the Appraisal Foundation is a non-profit educational organization made up of three independent boards. First, the Appraisal Practices Board (APB) offers voluntary guidance on recognized valuation methods and techniques for all valuation disciplines to appraisers, regulators and users of appraisal services. Second, the Appraisal Standards Board (ASB) is in charge of developing, interpreting and amending the accepted appraisal standards, Uniform Standards of Professional Practice (USPAP). Third, the Appraiser Qualifications Board (AQB) establishes the minimum education, experience, and examination requirements for real property appraisers to obtain a state license or certification, among other ancillary duties.

For Colorado specifically, according to the Colorado Real Estate Manual developed by the Department of Regulatory Agencies (DORA), Colorado Division of Real Estate and LexisNexis, the

Colorado Board of Real Estate Appraisers has been granted rulemaking authority by Colorado legislature for matters related to the real estate appraiser profession and appraisal management companies. (2013, p. 11-1). The complete manual can be found on the DORA website at http://cdn.colorado.gov/cs /Satellite/DORA-DRE/CBON/DORA/1251652909661. This manual is a collaborative effort between the Real Estate Commission, the Board of Real Estate Appraisers, the Board of Mortgage Loan Originators and the Conservation Easement Oversight Commission. A compilation of their official rules are available at www.sos.state.co.us/.

### *Qualification Criteria for Appraisers*

"States are required to implement appraiser licensing and certification requirements that are no less stringent than those issued by the AQB in *The Real Property Appraiser Qualification Criteria* (2013, p.2)." After the AQB developed these criteria, the organization adopted the idea of offering supplementary information or *Guide Notes* to help further explain, describe, and interpret the criteria and all its necessary requirements to appraisers and state appraiser regulatory agencies. Just as the building industry is very dynamic, there is a need for appraisers to keep up to date on building materials, methods, performance, and their associated impacts to real property appraisal. Therefore, AQB is periodically updating their criteria to ensure that licensed appraisers are fit to appraise. To accurately assess current issues facing appraisers, the AQB submits periodic exposure drafts to the public with the opportunity to review proposed revisions to the criteria and gain their insights and opinions on how to keep the qualifications for licensure balanced with what needs exists in the industry.

The AQB established four classifications of appraisal licenses. First, the Appraiser Trainee classification scope includes the appraisal of those properties which the supervising certified appraiser is permitted by his/her current credential and that the supervising appraiser is qualified to appraise. Second, the Licensed Residential Real Property Appraiser classification applies to the appraisal of non-complex one-to-four residential units having a transaction value less than $1,000,000 and complex one-

to-four residential units[1] having a transaction value less than $250,000. Third, the Certified Residential Real Property Appraiser classification applies to the appraisal of one-to-four residential units without regard to value or complexity. Fourth, the Certified General Real Property Appraiser classification applies to the appraisal of all types of real property.

The Colorado Real Estate Manual outlines four levels of appraiser licensure for the state of Colorado specifically, which align with those described by the AQB with the exception of one. Colorado includes a Licensed Ad Valorem Appraiser certification, which is specifically utilized for appraiser employees of county tax assessment offices. The Licensed Appraiser, Certified Residential Appraiser, and Certified General Appraiser certifications all correspond to the AQB classifications above.

A set of General Criteria was established by the AQB to supplement specific requirements to the four classifications. Appraiser guidelines relative to USPAP compliance, existing credential holders, generic education criteria, generic examination criteria and generic experience criteria are elaborated. In addition to the general criteria, each of the four classifications has their own specified set of qualifications in education, experience, examination and continuing education. The core curriculum requirements for the Colorado Certified General Property Appraiser are summarized in Table 3.2.

**Table 3.2. Core Curriculum Requirements for Colorado Certified General Appraisers**

| Core Curriculum Requirements for Colorado Certified General Appraisers | |
|---|---|
| Curriculum Description | Requirement |
| 1) Basic Appraisal Principles | 30 Hours |
| 2) Basic Appraisal Procedures | 30 Hours |
| 3) 15-Hour National USPAP Course | 15 Hours |
| 4) General Appraiser Market Analysis and Highest and Best Use | 30 Hours |
| 5) Statistics, Modeling and Finance | 15 Hours |
| 6) General Appraiser Sales Comparison Approach | 30 Hours |
| 7) General Appraiser Site Valuation and Cost Approach | 30 Hours |
| 8) General Appraiser Income Approach | 60 Hours |
| 9) General Appraiser Report Writing and Case Studies | 30Hours |
| 10) Appraisal Subject Matter Electives | 30 Hours |
| 11) Bachelor's Degree or higher from an accredited college or university | N/A |

[1] Complex one-to-four family residential property appraisal means one in which the property to be appraised, the form of ownership, or the market conditions are typical (AQB, 2013, p.12).

A summary of the qualification criteria for Certified General Real Property Appraiser is included as insight into the extents of the required qualifications for state licensure (Table 3.3). The criteria for the

**Table 3.3. Certified General Real Property Appraiser Qualification Criteria**

| Certified General Real Property Appraiser Qualification Criteria | |
|---|---|
| Qualification Criteria Category | Specified Criteria |
| 1) GENERAL | a) The Certified General Real Property Appraiser Classification qualifies the appraiser to appraise all types of real property.<br>b) All Certified General appraisers must comply with the COMPETENCY RULE of USPAP. |
| 2) EXAMINATION | a) The AQB approved Uniform State Certified General Real Property Appraiser examination must be successfully completed. There is no alternative to successful completion of the examination. |
| 3) QUALIFYING EDUCATION | a) Applicants must hold a Bachelor's degree or higher from an accredited college or university, unless the requirements of the following Section III.B are satisfied.<br>b) Applicant shall successfully pass all of the following collegiate level subject matter courses from an accredited college, junior college, community college or university: (total 30 semester credit hours or its equivalent)<br>• English Composition<br>• Micro Economics<br>• Macro Economics<br>• Finance<br>• Algebra, Geometry, or higher mathematics<br>• Statistics<br>• Computer Science<br>• Business or Real Estate Law<br>• Two elective courses in accounting, geography, agricultural economics, business management, or real estate.<br>c) The prerequisite for the AQB approved examination is completion of 300 creditable class hours. The applicant shall complete the *15-Hour National USPAP Course*, or its equivalent, and examination.<br>d) Applicants must demonstrate that their education includes these core courses listed with particular emphasis on non-residential properties. Residential is defined as "composed of one to four residential units." |
| 4) EXPERIENCE | a) 3,000 hours of experience obtained during no fewer than 30 months is required, of which, 1,500 hours must be in non-residential appraisal work. |

state of Colorado align with those established by the AQB. A full breakdown of all qualification criteria necessary for all appraiser classifications can be found in *The Real Property Appraiser Qualification Criteria and Interpretations of the Criteria* document, developed by the AQB and available on the Appraisal Foundation website at https://netforum.avectra.com/eweb/DynamicPage.aspx?Site=taf&WebCode=RPCriteria. These criteria for Colorado appraisers can be found in Chapter Two of the Colorado Real Estate Manual (2013, p.2-1). Standards for qualifying education programs, licensing

examinations and applications for licensure have been created and included in this manual to ensure that the quality and content of these building blocks for all professional appraisers are consistent throughout the industry.

### *Typical Valuation Process*

The researchers then discovered the typical property valuation process taken by licensed appraisers. The following series of steps takes the process from defining the appraisal assignment

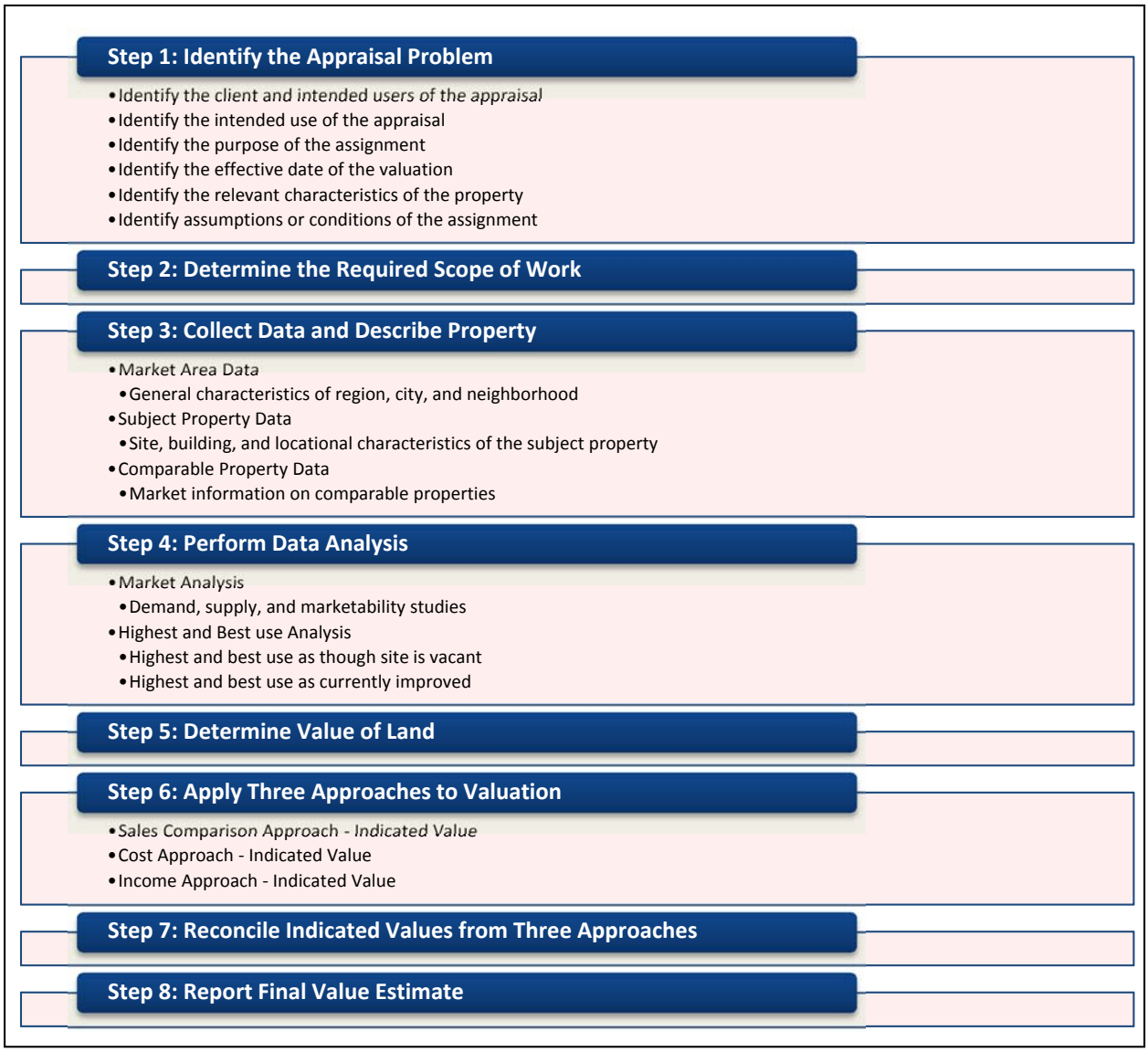


**Figure 3.2. The Valuation Process, Adapted from Ling and Archer (2013)**

through the final appraisal report on value. First, the appraiser must identify the problem by investigating the intent of the appraisal and its users. The type of value to be estimated, the date of the appraisal, any relevant characteristics of the property, and critical assumptions or conditions of the assignment will also be determined.

Next, the appraiser will determine the required scope of work based on what the standard procedure would be in that particular case, with any deviations clearly justified. Then, the appraiser will begin to describe and collect data specific to the market, subject property and comparable properties. This information may include general characteristics of the city or neighborhood where the subject property is located, site and location characteristics, and transaction data on comparable properties in the market. The appraiser will then perform a data analysis where the market analysis and the highest and best use concept will be used to determine value of the land.

Finally, the appraiser will apply the most relevant valuation approach method to reach an indicated value for the subject property. After this value is reconciled, the appraiser will develop an appraisal report, presenting the final value decision and explaining all processes and justifications needed to reach that decision as shown in Figure 3.2, The Valuation Process, as outlined by Ling et al., in *Real Estate Principles: A Value Approach* (2013, p. 165). The information discovered in this objective formed the baseline for comparison to the next objective. The current regulations, qualifications and methods will be compared to those specifically relative to sustainable building features and their value integration with appraisal practices in Objective Two.

### Objective Two: Illustrate Availability of Sustainable Integration Information and Tools

The baseline from objective one, where current state laws governing the appraisal process exist, will be compared to the availability of methodologies and tools for sustainable value integration to analyze the transparency of construction industry knowledge in relation to sustainable building techniques, materials and technologies to the appraisal industry. First, the study examined state laws

regarding certification maintenance and continuing education requirements. Then, primary sources for sustainable building information and data offered by professional organizations will be compiled.

### *Rules and Standards of the Uniform Standards of Professional Appraisal Practices*

In developing *the Second Exposure Draft of Valuation of Green Buildings: Background and Core Competency*, the APB summarized the sections of USPAP that are relevant to sustainable or green buildings. The USPAP Competency Rule, appraisal reporting with insufficient knowledge and experience and the USPAP Ethics Rule are three elements that support discussion in sustainable value integration challenges (2014, p. 24-28).

First, in all contexts of appraisal, appraisers are legally held to a level of competency dependent on the appraisal assignment. Appraiser, as defined by the Colorado Real Estate Manual, "means a person who provides an estimate of the nature, quality, value, or utility of an interest in, or aspect of, identified real estate and includes one who estimates and who possesses the necessary qualifications, ability, and experience to execute or direct the appraisal of real property (2013, p. 11-5)." The type of certification relates to the competency of that appraiser, and if an appraiser is assigned to a property that has sustainable or green building features, they should be equipped with the knowledge, understanding and experience of how to integrate these features into the valuation process.

Second, the process and reporting standards that USPAP has developed were done so to ensure that the results of appraisal assignments are accurate and credible. However, because sustainable or green building features are not 'traditional' *per say*, appraisers are challenged to figure out how these characteristics fit the mold of current appraisal standards. Analyzing market response to these features also poses a challenge due to limited information and comparable properties. And, if the appraiser is not knowledgeable about these sustainable features, or they are not obviously visible, the features may be overlooked altogether.

Third, appraiser bias relative to sustainable or green buildings is a concern, where an appraiser

concludes that green buildings are worth more than those that do not have sustainable features. The opposite can be said of bias to brown buildings, or those that do not have sustainable features, where the appraiser ignores any potential impact on value from green buildings or properties. An appraiser is required to conduct an objective analysis on factual data to reach an opinion of value, not create an opinion based on personal perception. Next, the study examined the educational requirements for appraiser licensure to discover where sustainability-related education is emphasized.

### *Continuing Appraiser Education*

The Colorado Real Estate Manual has outlined the following requirements for continuing education as a condition of renewal for appraisers. Pertaining to initial licenses, those issued on or after July 1 of any year do not require continuing education as a condition of renewal when the initial license expires December 31 of that year. However, for those initial licenses issued before July 1 of any year, appraisers must complete 14 hours of continuing education as a condition of renewal before the expiration on December 31 of the same year of issue. All other license renewals require a minimum of 42 hours of continuing education within the three-year period before the license expiration. (2013, p. 11-37).

These continuing education courses are intended to maintain and improve the skill sets, breadth of knowledge and competency levels of appraisers. Therefore, standards for continuing education providers and their responsibilities to participants are outlined, keeping with the same strategy for the initial education of appraisers, to ensure some degree of quality control in professional development within the appraiser population. Course topics for continuing appraiser education credits suggested by The Colorado Real Estate Manual include:

- Ad Valorem Taxation
- Arbitration
- Business Courses Related to Practice of Real Estate Appraisal

- Construction Cost Estimating
- Ethics and Standards of Professional Practice
- Land Use Planning, Zoning and Taxation
- Management, Leasing, Brokerage and Timesharing
- Property Development
- Real Estate Appraisal (Valuation/Evaluation)
- Real Estate Law
- Real Estate Litigation
- Real Estate Financing and Investment
- Real Estate Appraisal Related Computer Applications
- Real Estate Securities and Syndication
- Real Property Exchange

As part of the continuing appraiser education courses, appraisers are required to complete the 7-hour National USPAP Update Course(s) every two years (2013, p. 11-38).

These continuing education requirements have substantial weight in forcing appraisers to stay up to date on current and trending issues and methodologies in the industry. Again, appraiser competency, knowledge, and experience are critical to producing credible opinions of value. Appraisers act as reporters of relationships and behaviors they observe within trending data and information relative to property characteristics. This relates to sustainable and green building features as well. To maintain the kind of accuracy appraisal requires, the appraiser has the responsibility to familiarize themselves with any relevant standards within subject markets and to objectively analyze whether, or not, these factors cause change in market value (APB, 2014, p. 20).

From the brief observation made after conducting this investigation into mandated continuing education requirements relative to sustainable building features, two questions for further evaluation were raised. First, why education is not focused on sustainable building materials and technologies as a requirement for initial appraiser licensure. Second, are there opportunities for appraisal professionals to access this information? The researchers then discovered and compiled a list of resources for

continuing appraiser education courses related to sustainable and green building features and concepts present in appraisal practices.

### *Continuing Appraiser Education Resources*

The researchers investigated three primary resources influential in appraisal industry regulations and standards, TAF, The Appraisal Institute (AI) and the Colorado DORA-Division of Real Estate (Figure 3.3). It was discovered that TAF offered several links on their websites to resources about the undergraduate and graduate degree programs approved by the AQB. Emphasis on Real Estate Review and Real Estate Policies and Procedures are both offered. AQB approved and USPAP equivalent course offerings are also available for reference.

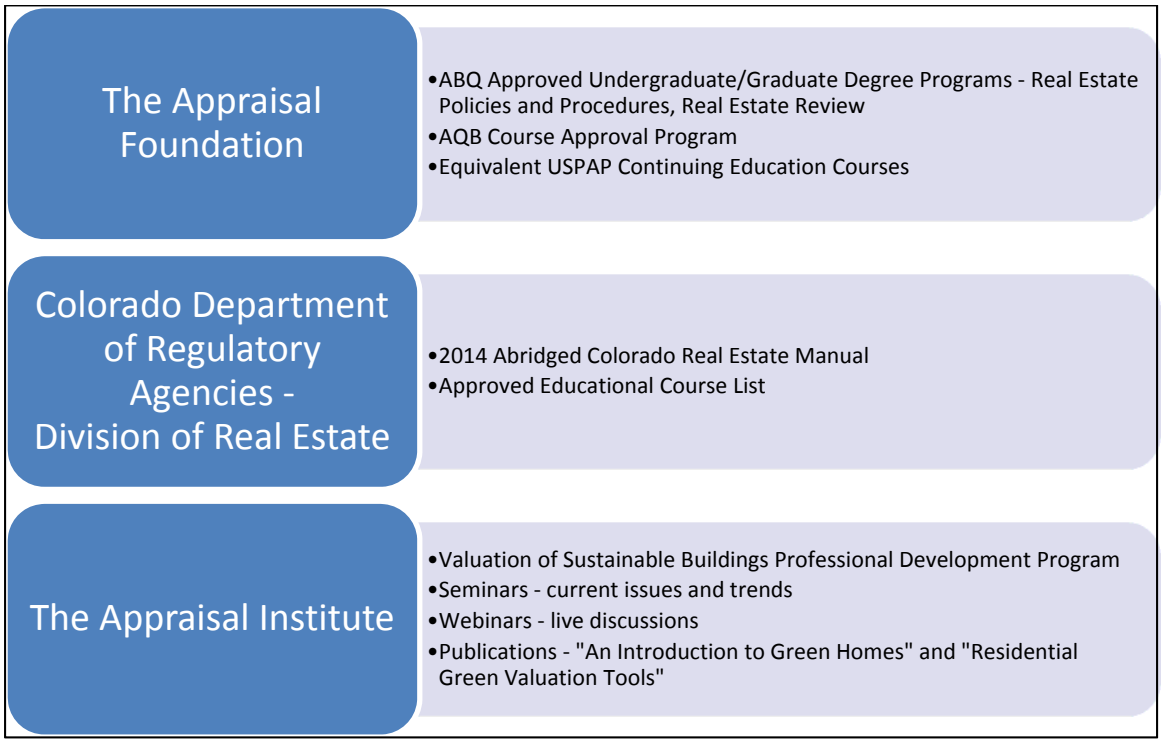


**Figure 3.3. Sustainability Related Continuing Education Resources**

The AI offered many more resources for sustainable building related continuing education. The Institute offers a Valuation of Sustainable Buildings Professional Development program, in which courses are offered to anyone who is interested in learning this information. The development program

consists of four courses: (1) Introduction to Green Building, (2) Case Studies in Appraising Green Residential Buildings, (3) Residential and Commercial Valuation of Solar, and (4) Case Studies in Appraising Green Commercial Buildings. These courses are approved for state and AI continuing education credits.

The AI also offers seminars, like *Residential Green Description Made Easy*, that focus on educating appraisers about current issues and trends. Webinars featuring live discussions with industry professionals on the latest happenings in the valuation arena are also accessible. Finally, the members of the AI have produced many publications evaluating and discussing issues related to sustainable buildings and their challenges in appraisal. Two of the recent publications available for purchase are *Residential Green Valuation Tools*, which purports to provide methods and resources for appraisers when analyzing six green features of residential properties: site, water usage, energy efficiency, indoor air quality, materials, and operations and maintenance. Also available is *An Introduction to Green Homes*, which provides green home case studies and methodologies that can be applied by appraisers to measure how green features affect home values.

### *Sustainability Related Informational Resources and Tools*

In addition to continuing education resources, it was determined that there is a large body of resources related to sustainable building rating and labels systems, performance metrics, and building codes and standards available for appraisers to utilize. These resources are summarized in Table 3.4, Sustainability Related Information Resources and Tools, which were adapted from the compilation presented by the APB in the *Second Exposure Draft-Valuation of Green Buildings: Background and Core Competency* (2014, p. 31).

| Sustainability Related Informational Resources and Tools |
|---|
| **Energy Efficiency Scores, Rating Labels and Tools** |
| **EPA Energy Star:** Energy Star for Homes and EPA Portfolio Manager for Commercial)<br>http://www.energystar.gov/ |
| **Energy Information Administration (EIA)**<br>http://www.eia.gov/consumption/commercial/ |
| **Office of Energy Efficiency and Renewable Energy (DOE)**<br>http://www.eere.energy.gov/ |
| **Institute for Market Transformation energy use disclosure law summary website**<br>http://www.imt.org/resources/detail/guide-to-state-and-local-energy-performance-regulations-version-3.0 |
| **Residential Green Ratings, Labels and Tools** |
| **Appraisal Institute Residential Green and Energy Efficient tax credit (Form 820.0)** |
| **National Green Building Standard (NGBS)**<br>http://www.homeinnovation.com/green |
| **RESNET/Home Energy Rating System (HERS)**<br>http://resnet.us/ and http://www.energy.ca.gov/HERS/ |
| **Home Energy Score (HES)**<br>http://www1.eere.energy.gov/buildings/residential/hes_index.html |
| **Build it Green (Green Point Rated)**<br>http://www.builditgreen.org/greenpoint-rated/ Fannie Mae Green Initiative<br>https://www.fanniemae.com/multifamily/green-initiative |
| **American Society of Heating, Air Conditioning Engineers (ASHRAE)**<br>ashrae.org\greenstandard |
| **Northwest Energy Efficient Alliance (NEEA)**<br>northwesternenergystar.com/sites/default |
| **Living Building Challenge and International Living Future Institute (ILFI)**<br>http://living-future.org/lbc |
| **Commercial Green Ratings, Labels and Tools** |
| **U.S. Green Building Council(LEED)**<br>http://usgbc.org (especially Resources), also http://gbig.org |
| **Green Building Institute (Green Globes)**<br>http://www.greenglobes.com |
| **New Buildings Institute**<br>http://newbuildings.org/ |
| **Passive House Institute US**<br>http://www.passivehouse.us/passiveHouse/PassiveHouseInfo.html |
| **Passivhaus Institut**<br>http://passiv.de/en/ |
| **Building Codes** |
| **International Green Construction Code(IgCC)**<br>http://www.iccsafe.org/cs/igcc/pages/default.aspx |
| **ASHRAE Green Standard 189.1 (Standard for the Design of High-Performance, Green Buildings)**<br>https://www.ashrae.org/resources--publications/bookstore/standard-189-1 |

**Table 3.4. Sustainability Related Information Resources and Tools, (APB, 2014)**

Utilizing this information gathered about sustainable building related information within USPAP regulations and standards, continuing education requirements, and informational resources available to appraisers, the researchers conducted an initial analysis to determine which areas needed to be investigated further within the research survey tool. The data collected in this first phase of research was referenced when deciphering the data collected in the second phase through a survey tool. The study aimed to separate the appraisers who have experience with sustainable building features from those that are inexperienced and targeted further investigations to relevant building characteristics, methodologies, and awareness of each situation. If appraisers were aware of practices to integrate sustainable building features in their appraisal processes, the investigation continued further into the types of features they have experience appraising, the methodologies they have used, and their perspective on the impact, if any, that integration has on value. If the appraiser was not aware of ways to integrate sustainable building features in appraisal, the investigation explored what the appraiser perceived sustainable building features as being, their confidence level in being able to recognize sustainable features, and their awareness of available educational and informational tools to develop this competency. Insights into both types of respondents' perspectives on challenges facing sustainable value integration and the information and tools that are left wanting were discovered.

### Objective Three: Discover Appraiser Attitudes on Sustainable Value Integration

The second phase of research used an anonymous survey tool to discover the attitudes of appraisal professionals toward the existence of this practice, the degree of their acceptance, and their perspectives to its future in the industry. Information related to professionals' knowledge of continuing education possibilities and the availability of methods for integration was collected for comparison to the actual academic programs and proposed methodologies that are available in the research findings to uncover gaps in communication between practicing and research professionals.

### *Develop Survey*

The researchers developed the survey questions involving specific mandated appraiser processes, documents, and the tools and methodologies for value integration to discover respondents' current depth of knowledge, utilization and perceptions of future impacts of sustainable value integration. The survey was created to collect both quantitative and qualitative data on current appraiser behaviors and attitudes regarding sustainable value integration. The quantitative data (close-ended questions) provided the initial statistical results as to how many appraisers are integrating value currently, and the qualitative data (open-ended questions) provided a richer analysis in that survey respondents were able to provide more in-depth information as to the reason behind integration implementation or the lack thereof (Denzin, 1978). The measurement scales or categories for each question response were also determined according to the appropriate context discovered during the archival research. The variables and themes were coded as a data collection format to use later in data analysis.

The survey tool was appropriate for this study because the accurate information needed to evaluate current appraisal practices and perspectives related to sustainable value integration could only come from active appraisers directly. The study collected empirical data on actual behaviors and attitudes, not perceptions of others on what they think is happening. Survey research has been shown to contribute greater confidence and generalizability of the research results (Creswell, 2014; Jick, 1979) and the researchers wanted to aim for a large survey population to be able to generalize the results to the entire appraiser population in Colorado. However, due to the small sample size received, these data results may not be generalizable to the population of all appraisers.

A pilot test of the survey was conducted to ensure the questions were understandable, response options were appropriate, responses could be measured, and that the survey was efficient. Members of the Construction Management department at Colorado State University (CSU) as well as

several active members of the appraisal industry took the survey to examine its clarity, format and time to participate. The appraisers that pilot-tested the survey did not participate in the final survey population in order to prevent the study from collecting biased data.

The Research Integrity & Compliance Review Office (RICRO) at CSU required the survey, an email narrative and verbal consent narrative be submitted for approval from the Institutional Review Board (IRB) before proceeding with the research. The verbal consent and email narratives were developed to recruit participants' email addresses for the population list and to give consent to participate in the survey, respectively. Both documents summarized basic information of the study and its researchers, reason(s) for the research, risks and benefits of participation, and indication of consent for participation.

The questionnaire was built in Qualtrics and consisted of twenty-two questions total where the respondents were asked to choose their responses from the options listed and/or provide short narrative responses. The survey collected both quantitative and qualitative data and was designed to take respondents ten to fifteen minutes to complete. Depending on the nature of the responses, respondents were directed to different sections of the survey, so the maximum number of questions a respondent was asked to answer was thirteen. Primarily, the questions were designed to determine how appraisers were addressing sustainable building elements in real property appraisals currently and their perspectives on the issues they face when doing so. If respondents had not appraised real property with sustainable building features, their survey continued with questions that focused on their perspectives to their own ability and confidence in recognizing sustainable features that were listed, along with any barriers to sustainable building appraisal opportunities they have experienced. A copy of the survey can be found in the Appendix.

### *Constructed Survey Population*

The survey population was developed from two industry resources; the National Registry and the Appraisal Institute (AI) Membership Registry. The National Registry contains only state certified or

licensed appraisers that are authorized under Federal law. This resource can be found through the Appraisal Foundation website at https://www.asc.gov/National-Registry/NationalRegistry.aspx. The AI is a professional association of real estate appraisers whose mission is to advance professionalism, ethics, global standards, methodologies, and practices through professional development. Therefore, their members were ideal candidates for the survey population. Their appraiser resource list can be found at http://www.myappraisalinstitute.org/findappraiser/.

To refine the survey population to fit the parameters of the study, the researchers first narrowed the National Registry to include Colorado appraisers and then further to include only active Colorado appraisers. Then, the AI Colorado members were cross-referenced against the National Registry to determine the survey distribution list. This process provided several advantages to the validity of the study. First, the credentials of the survey population are definite and confirmed by the requirements of two separate sources, the National and the AI registries. This process validated that the study data was collected from licensed, Colorado appraisers only and therefore is directly in line with the research parameters. Second, the license information for the appraisers was confirmed through the cross-reference between these two resources, increasing the validity of their credentials. Third, the AI offers continuing education and appraiser designations above and beyond the mandated curriculum for Colorado state licensure and those appraisers who want to be a part of this professional association have dedicated their time and resources to do so. Therefore, the AI members have an invested interest in their careers and the industry as a whole, further validating the data they contribute to this study.

### *Collecting Data on Current Valuation Practices*

The survey was distributed to the 322 appraisers in the population list using the Qualtrics Survey Mailer on Thursday, September 18th, 2014 at approximately 4:30 p.m. Survey distribution permitted the respondent to open and submit the survey only once to avoid ballot stuffing or single respondent submitting different responses to the same questions, invalidating the data. Respondents were allowed

to use the back button considering the potential for misunderstanding questions once they had progressed further into the survey. Participants were also allowed to save their responses and complete the survey in more than one on-line session.

To encourage participation and information sharing, survey respondents were allowed to email the researchers in response to receiving the survey. Many respondents chose to reach out to the researchers and included a variety of commentary, perspectives, and resources for further information on the study topic. Because of the large email response, the researchers were able to encourage participation and to share the survey with other appraisers in their professional networks.

This study relied on simple descriptive statistical analysis to deduce conclusions from the collected data. To translate the quantitative data, the closed-end questions were assigned multiple choice style responses; some of which allowed multiple answers and others accepted only a single answer. The Qualtrics survey tool automatically tracked question responses as percentages of the total number of responses. Therefore, the Final Survey Results Report generated was utilized to evaluate certain information. Within this report, the responses were evaluated based on each questions' relationships to the other questions on the survey. This allowed for some degree of validation among questions that pertain to similar issues or information. If similar data points had little to no variance, then it was reasonably assumed that the data was reliable. The opposite would be said of large variances in similar data where these questions and responses will need further investigation as to the possible reasons for the variance and consideration of the data being unreliable or inconclusive.

To decipher the qualitative data collected in the survey and email responses, a spreadsheet was created to organize all responses relative to the questions. Then keywords were selected from those responses that correlate back to the underlying issues first hypothesized in this paper based on the needs for further research. For example, lack of property transaction data, lack of comparable properties, knowledge of sustainable building methods and technologies and the inclusion of market

values were all challenges facing appraisers discovered through the literature review. It is expected that the qualitative data may also reveal other barriers or deficiencies that were not foreseen by the research team. After these keywords were collected, they were organized into categories and color-coded to relate back to graphs and tables used to communicate these results in the discussion.

### Objective Four: Explore Perceptions of Economic Implications

After the data was collected from the survey, an analysis explored the perceptions of real estate appraisers on the economic implications of sustainable value integration. As iterated in the research methodology, the study used the first data set culminated from the literature review process and objectives one and two and the second data set from the survey to compare and contrast current appraisal practices and perceptions with those of suggested methodologies and tools for sustainable value integration. The relationships among topics within this data may reveal the degree of transparency of information between building and appraisal professionals as well as possible sustainable value integration gaps. The quantitative data was used to provide descriptive statistics to the study results while the qualitative data revealed conclusions about the attitudes and perceptions of the surveyed appraisers. Analyzed together, the validity of the data was tested by examining the consistency among similar question contents and responses. Based on the results from this data analysis, the researchers concluded the study with a discussion of the final conclusions and research questions that have evolved from this particular inquiry into the current status of sustainable value integration in appraisal practices in Colorado.

# Chapter 4: Data Presentation

## Survey Tool Statistics

The survey was distributed to 322 licensed and active appraisers in Colorado determined from the National Registry and the AI Member Registry. From that population, 5 distributions were undeliverable and 133 emails were opened representing 41.3% of the total survey distributed. A total 64 surveys were started, or 19.8% of the total distributed, and 45 of those started surveys were completed equaling a 13.9% response rate. According to Figure 4.1, Survey Start Dates, most survey respondents chose to participate when the survey was first sent out, on Thursday, September 18, 2014 and then again when a reminder to participate was sent to the population list on Thursday, September 25, 2014. The researchers communicated with many of the survey participants who had responded with

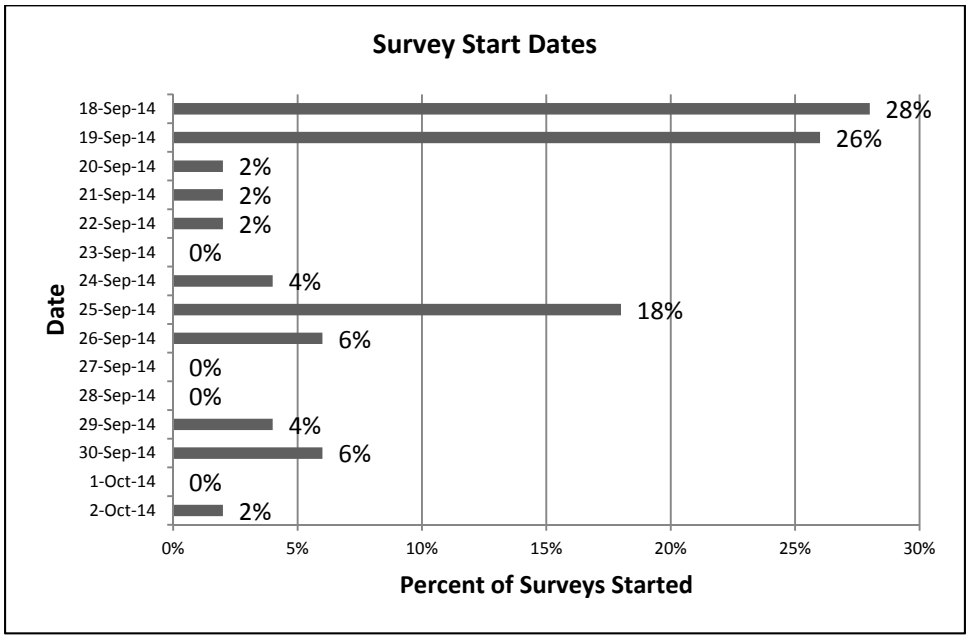


**Figure 4.1. Survey Start Dates**

additional commentary through email during the weekend of September 27, 2014 to encourage their participation and ask for their support in passing the survey along to anyone in their appraiser networks willing to participate; a snowball sampling technique. This most likely explains the sudden upward trend

in the number of responses during September 29 and 30, 2014. The survey was deactivated and closed on Friday, October 3, 2014.

When the survey was pilot tested, it was estimated that the time to complete the survey would be about 15 minutes for any respondent. The short answer questions that required narrative responses would lengthen the time, depending on the quantity of information participants were willing to contribute. Figure 4.2 shows that 15 of the respondents took 6 minutes, 23 respondents took 12 minutes, and 7 respondents took 18 minutes to complete the survey. The remaining 4 respondents took 42 minutes or more to finish the survey Figure 4.2). Participants were allowed to save their responses and complete the survey in multiple on-line sessions.

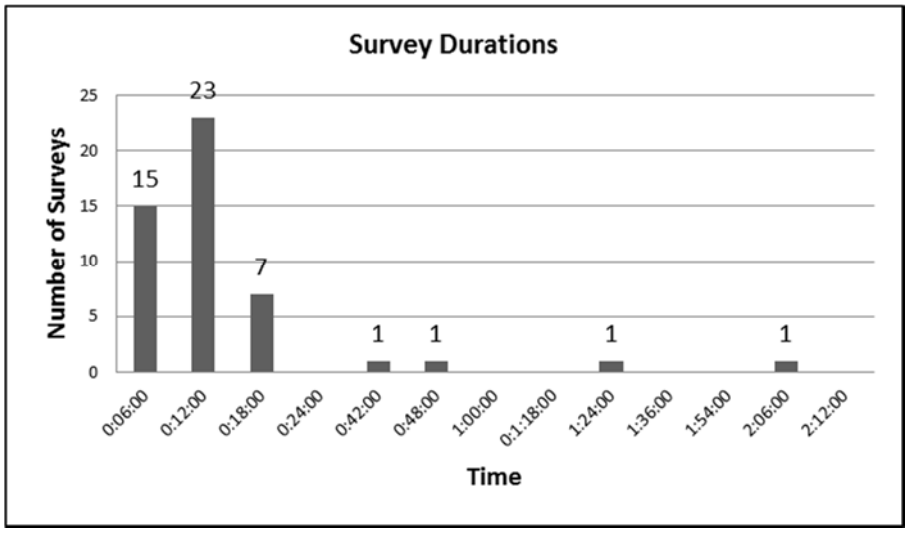


**Figure 4.2. Survey Participation Duration**

The overall goal of this research was to discover the current status of sustainable value integration in appraisal practices in Colorado. Simply stated, are appraisers recognizing and including sustainable building features in their appraisal assignments? Therefore, the survey questions were designed to accommodate the appraisers who fit into the two potential responses to this question (1) those who were aware of sustainable value integration in property appraisal (Group 1) and (2) those who were not aware of sustainable value integration in property appraisal (Group 2). In addition to questions that were relevant to both responses, specialized questions were also developed to explore

the opportunities to collect data and information from both groups. Thus, two groups of questions were identified as shown in Table 4.1.

**Table 4.1: Survey Question Outline.**

| Survey Question Outline | |
|---|---|
| **All Survey Participants Were Asked…** | |
| (50) I have read and understood the above consent form and desire of my own free will to participate in this study. | |
| (45) What format do you follow in the appraisal process? Please check all answers that apply. | |
| (45) Are you aware of appraisal methods and practices to valuate sustainable building features that are implemented in real property today? | |
| (45) Have you appraised real property in which sustainable/green building features are incorporated into the valuation process? | |
| **YES to experience with Sustainable Features Were Asked…** | **NO to Experience with Sustainable Features Were Asked…** |
| When did you first notice sustainable features being incorporated into the appraisal process? Please check only one answer | |
| In which building category did you first notice sustainable features being incorporated into the appraisal process? Please check only one answer | |
| What building category do you most often appraise? Please check only one answer. | What building category do you most often appraise? Please check only one answer. |
| Based on the building category, you most often appraise, which sustainable features are considered in the appraisal process? Please check all answers that apply. | Have you been assigned to appraise real property in which any of the sustainable features listed above could be incorporated into the valuation process? |
| Do you require documentation of any of those sustainable features to support the appraised value? | Which sustainable features were factors considered for appraisal in those assignments? Please check all answers that apply. |
| Which sustainable feature areas do you require documentation for validation of the appraisal? Please check all answers that apply. | How satisfied are you in your ability to recognize the following sustainable features and their elements? |
| Based on your experience, which sustainable features add the3 most quality and economic value to a building appraisal? Please check all answers that apply. | How would you rate your ability to appropriately valuate the following sustainable features and their elements? |
| What would be your preferred method of analysis to appraise the value of sustainable features in residential property? | There are opportunities for appraisers to gain additional experience and education on green building related to appraisal practice outside the mandated curriculum for appraiser licensure. Have you participated in any of the following? |
| In your opinion, what sustainable building attributes should be included in the appraisal process that are not currently used and why? | Please describe the barriers that prevent you from participating in these opportunities. |
| From your perspective, what information and/or tools used to valuate sustainable building features are needed but no currently available to you? | From your perspective, what information and/or tools used to valuate sustainable building features are needed but no currently available to you? |

## Presentation of Data Results

### Questions Addressed to All Survey Participants

The study began with 50 survey respondents who gave their consent to participate in the survey after reading a short narrative outlining the purpose of the study, any risk(s) associated with participation, expectations of participation and confidentiality of the study (Table 4.2).

**Table 4.2. Consent to Participate in the Research Survey**

| Q1: | I have read and understood the above consent from and desire of my own free will to participate in this study. | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Yes | | 50 | 100% |
| 2 | No | | 0 | 0% |
| | Total | | n = 50 | 100% |

From the 50 participants, 45 chose to continue with the survey after providing their consent. Table 4.3 outlines the various formats that the survey respondents have used in their appraisal processes. The highest percentage of participants use a narrative reporting format at 87%, and the Uniform Standards of Professional Appraiser Practice forms at 60%. Government mandated criteria was used by 33% of the appraisers and 24% have used pre-printed forms provided by the Appraisal Institute. The forms used the least be appraisers include those provided by Veterans Affairs at 7% and Other at 13%. The six narrative responses specified for Other include (1) Each client has different formats and rules that an appraiser must follow. This question contains too many options that do not align. Part of the question refers to reporting and part of the question refers to development; these are two different functions in appraisal. You probably should have had an appraiser review your survey prior to publishing, (2) Uniform Appraisal Standards for Federal Land Acquisitions, (3) FIRREA, (4) Review, (5) ACI, and (6) Cost of Professional Ethics (CPE) of the Appraisal Institute.

**Table 4.3. Format Followed by Appraisers for Appraisal Process**

| Q2: | What format do you follow in the appraisal process? Please check all answers that apply. | | | |
|---|---|---|---|---|
| # | Answer | | # of Responses | % of respondents who chose this answer |
| 1 | Appraisal Institute - Preprinted Form | | 11 | 24% |
| 2 | Narrative | | 39 | 87% |
| 3 | Client Provided - Bank, Mortgage Broker | | 9 | 20% |
| 4 | Government Mandated Criteria | | 15 | 33% |
| 5 | Uniform Standards of Professional Appraiser Practice (USPAP) | | 27 | 60% |
| 6 | Federal Housing Administration (FHA) | | 8 | 18% |
| 7 | Veterans Affairs (VA) | | 3 | 7% |
| 8 | Other: Please Specify | | 6 | 13% |
| | Total | | n = 45 | |

The survey also discovered that 84%, or 38 out of 45 total respondents, were aware of appraisal methods and practices to valuate sustainable building features (Table 4.4). Only 16 %, or 7 out of 45 respondents, were not aware of appraisal methods for sustainable value integration. This question defines those participants and data belonging to Groups 1 and 2.

**Table 4.4. Awareness of Appraisal Methods and Practices**

| Q3: | Are you aware of appraisal methods and practices to valuate sustainable building features that are implemented in real property today? | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Yes | | 38 | 84% |
| 2 | No | | 7 | 16% |
| | Total | | n = 45 | 100% |

## Questions Addressed to Group 1 Participants

The data from Question 4 revealed that 82%, or 31 out of the 38 total respondents that were aware of sustainable value integration, have appraised real property in which sustainable building

features were incorporated into the valuation process (Table 4.5). Only 18%, or 7 out of 38 total respondents, had not done an appraisal assignment where these features were incorporated.

**Table 4.5. Appraiser Experience with Incorporation**

| Q4: | Have you appraised real property in which sustainable/green building features are incorporated into the valuation process? | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Yes | | 31 | 82% |
| 2 | No | | 7 | 18% |
| | Total | | n = 38 | 100% |

Table 4.6 revealed that 22 survey respondents, or 58%, first noticed sustainable building features being incorporated into the appraisal process between 4 and 7 years ago and 8 respondents between the present and 3 years ago. Only 5 respondents said to have seen these features being incorporated 8 to 12 years ago while 2 respondents answered over 13 years ago. One respondent still has not seen sustainable building features being incorporated into the appraisal process to date.

**Table 4.6. Sustainable Building Feature Incorporation Timeline**

| Q5: | When did you first notice sustainable building features being incorporated into the appraisal process? Please check only one answer. | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | 0-3 years ago | | 8 | 21% |
| 2 | 4-7 years ago | | 22 | 58% |
| 3 | 8-12 years ago | | 5 | 13% |
| 4 | Over 13 years ago | | 2 | 5% |
| 5 | I have not noticed sustainable features being incorporated. | | 1 | 3% |
| | Total | | n = 38 | 100% |

It was discovered that the building type in which sustainable building features first started being incorporated in appraisal from the Group 1 survey respondents were almost equally divided between two building categories (Table 4.7). 19 out of 38 appraisers, or 50%, first saw sustainable building features in commercial building appraisal while 18 out of 38, or 47%, first saw these features in residential building appraisal. One participant still had not noticed sustainable building features being incorporated into the appraisal process.

**Table 4.7. Building Categories Incorporating Sustainable Building Features**

| Q6: | In which building category did you first notice sustainable features being incorporated into the appraisal process? Please check only one answer. | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Commercial | | 19 | 50% |
| 2 | Residential | | 18 | 47% |
| 3 | Industrial | | 0 | 0% |
| 4 | Other: Please Specify | | 0 | 0% |
| 5 | I have not noticed sustainable features being incorporated. | | 1 | 3% |
| | Total | | n = 38 | 100% |

The data in Table 4.8 shows that the majority of the participants in Group 1 focus on commercial and residential property appraisal. With 53%, or 20 out of 38 respondents, focusing on commercial and 34%, or 13 out of 38 respondents, focusing on residential, there remains 5% of those respondents who focus on industrial properties and 8% that chose Other. Those participants specified the following responses within the Other category: (1) Wide range of commercial properties, (2) Vacant land, and (3) All types commercial – industrial, etc.

**Table 4.8. Building Categories Most Often Appraised by Group 1 Participants**

| Q7: | What building category do you most often appraise? Please check only one answer. | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Commercial | | 20 | 53% |
| 2 | Residential | | 13 | 34% |
| 3 | Industrial | | 2 | 5% |
| 4 | Other: Please Specify | | 3 | 8% |
| | Total | | n = 38 | 100% |

Survey data collected in Question 8 (Table 4.9) represents how many of the survey respondents have considered the given sustainable features in their appraisal assignments. Those features considered by highest number of appraisers were Heating, Ventilation and Air Conditioning (HVAC) at 63%, Renewable Energies at 63%, and Utility Cost (Electric, Water, Wastewater, Stormwater) at 61% of respondents. The three sustainable building features considered least in the appraisal process were

Appliances/Equipment Selection at 16%, Indoor Air Quality at 11%, and Other at 11%. The four narrative responses specified for Other include: (1) the most reliable method to consider is the Score a home earns through its sustainable and "green" features. This is measurable and easier to calculate an increase in value for based on price and market reaction. Many of the items listed are not visible to the naked eye during inspection, so verification of these is impossible, (2) most of these correlate to utility cost, (3) Above factors are technically "considered" but since one does not know the factors of the comparable sale, it is unlikely any value change will occur from them, and (4) Renewable materials such as pine beetle lumber, sustainable materials such as bamboo, reclaimed wood from older structures.

**Table 4.9. Sustainable Features Being Considered in Appraisals**

| Q8: | Based on the building category you most often appraise, which sustainable features are considered in the appraisal process? Please check all answers that apply. | | | |
|---|---|---|---|---|
| # | Answer | | # of Responses | % of respondents who chose this answer |
| 1 | Site Orientation | | 17 | 45% |
| 2 | Building Envelope Quality | | 13 | 34% |
| 3 | HVAC | | 24 | 63% |
| 4 | Building Performance Energy Rating | | 21 | 55% |
| 5 | Insulation | | 17 | 45% |
| 6 | Renewable Energies (Solar Panels, Wind) | | 24 | 63% |
| 7 | Lighting Controls | | 8 | 21% |
| 8 | Appliances/Equipment Selection | | 6 | 16% |
| 9 | Water Efficiency | | 8 | 21% |
| 10 | Proximity to Community & Public Transportation | | 11 | 29% |
| 11 | Indoor Air Quality | | 4 | 11% |
| 12 | Utility Cost (Electric, Water, Wastewater, Stormwater) | | 23 | 61% |
| 13 | Day lighting | | 6 | 16% |
| 14 | Other: Please Specify | | 4 | 11% |
| | Total | | n = 38 | |

Table 4.10 revealed that the majority of Group 1 survey participants do require documentation of those sustainable building features to support the appraised value. While 74%, or 28 out of 38

respondents answered yes to requiring documentation, 26%, or 10 out of 38 respondents, answered that they did not require documentation.

**Table 4.10. Do Appraisers Require Documentation?**

| Q9: | Do you require documentation of any of those sustainable features to support the appraised value? | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Yes | | 28 | 74% |
| 2 | No | | 10 | 26% |
| | Total | | n = 38 | 100% |

In Table 4.11, Group 1 survey respondents outlined those sustainable building features that they require documentation for validation of the appraisal. The three features chosen most by respondents were Renewable Energies with 63%, or 17 out of 38 respondents, Utility Cost with 59%, or 16 out of 38 respondents, and Building Performance Energy Rating with 56%, or 15 out of 38 survey respondents. Following closely behind are HVAC with 41%, or 11 survey participants choosing this response. Then, Water Efficiency with 15%, or 4 out of 38, Building Envelope Quality with 15%, or 4 out of 38, Site Orientation with 11%, or 3 out of 38, and Other with 11%. Those 3 who responded to the Other category specified the following answers: (1) All of the above. A HERS Rating is the best way to determine how efficient and sustainable a property is. Using EnergyStar or USGBC rating systems are also very measurable systems, (2) I don't require any documentation because I typically don't give any value towards these items, and (3) Operating Financials, LEED certification. Finally, Proximity to Community and Public Transportation was chosen by 7%, or 2 out of 38 respondents, while Lighting Controls, Appliances, Indoor Air Quality and Daylighting were all chosen by 4%, or 1 out of 38 respondents.

In Table 4.12, the data discovered which sustainable building features have been seen to add quality and economic value to building appraisals according to the experiences of Group 1 survey respondents. Utility cost was chosen by the most participants at 38%, or 14 out of 37 respondents. Following closely behind are Renewable Energies with 32%, or 12 out of 37, HVAC with 30%, or

**Table 4.11. Sustainable Features that Require Documentation**

| Q10: | Which sustainable feature areas do you require documentation for validation of the appraisal? Please check all answers that apply. | | | |
|---|---|---|---|---|
| # | Answer | | # of Responses | % of respondents who chose this answer |
| 1 | Site Orientation | | 3 | 11% |
| 2 | Building Envelope Quality | | 4 | 15% |
| 3 | HVAC | | 11 | 41% |
| 4 | Building Performance Energy Rating | | 15 | 56% |
| 5 | Insulation | | 7 | 26% |
| 6 | Renewable Energies (Solar Panels, Wind) | | 17 | 63% |
| 7 | Lighting Controls | | 1 | 4% |
| 8 | Appliances | | 1 | 4% |
| 9 | Water Efficiency | | 4 | 15% |
| 10 | Proximity to Community & Public Transportation | | 2 | 7% |
| 11 | Indoor Air Quality | | 1 | 4% |
| 12 | Utility Cost (Electric, Water, Wastewater, Stormwater) | | 16 | 59% |
| 13 | Daylighting | | 1 | 4% |
| 14 | Other: Please Specify | | 3 | 11% |
| | Total | | n = 27 | |

11 out of 37, Building Performance Energy Rating with 24%, or 9 out of 37, and Proximity to Community and Public Transportation with 22%, or 8 out of 37 survey respondents. Building Envelope Quality and Other were chosen by 19%, or 7 out of 37 respondents. The 7 respondents who chose Other specified the following responses: (1) It really depends, on the commercial side it is more of what the tenant is willing to pay for, (2) Because of the lack of rating systems, this is impossible to determine; If ALL homes were rated there might be a verifiable way to measure the impact on value, (3) In my experience, and in my primary area (Western Colorado) the market is not yet recognizing energy efficiency; The properties that have those features are almost overwhelmingly owner occupied, (4) It depends on if the

neighborhood is giving value for these items, (5) none, because it is almost impossible to know if the comparable sale/rental had any of the features or not, (6) not sure you can combine quality and economic value in this way, and (7) I review reports, about 300 per year on commercial properties along seven states in the Front Range. Insulation was seen by 16% of respondents to add value, while Site Orientation was seen by 14% of respondents. 3 out 37 respondents, or 8%, claimed that had not seen any sustainable building features adding quality or economic value to an appraisal. Those features seen the least by respondents to add value were Daylighting, Water Efficiency, Appliances, Lighting Controls, and Site Orientation all chosen by only 5%, while Indoor Air Quality was not chosen by any respondents.

**Table 4.12. Sustainable Features that Add Quality and Economic Value**

| Q11: | Based on your experience, which sustainable features add the most quality and economic value to a building appraisal? Please check all answers that apply. | | | |
|---|---|---|---|---|
| # | Answer | | # of Responses | % of respondents who chose this answer |
| 1 | Site Orientation | | 5 | 14% |
| 2 | Building Envelope Quality | | 7 | 19% |
| 3 | HVAC | | 11 | 30% |
| 4 | Building Performance Energy Rating | | 9 | 24% |
| 5 | Insulation | | 6 | 16% |
| 6 | Renewable Energies (Solar Panels, Wind) | | 12 | 32% |
| 7 | Lighting Controls | | 2 | 5% |
| 8 | Appliances | | 2 | 5% |
| 9 | Water Efficiency | | 2 | 5% |
| 10 | Proximity to Community & Public Transportation | | 8 | 22% |
| 11 | Indoor Air Quality | | 0 | 0% |
| 12 | Utility Cost (Electric, Water, Wastewater, Stormwater) | | 14 | 38% |
| 13 | Daylighting | | 2 | 5% |
| 14 | Other: Please Specify | | 7 | 19% |
| 15 | None | | 3 | 8% |
| | Total | | n = 37 | |

The data in Table 4.13 revealed the Group 1 survey respondents' preferences to methods of analyzing sustainable building features for appraisal. The majority or 73% of respondents specified their preference of Performance Based-actual costs and the HERS Rating to get information and data to appraise sustainable building features. Green Rating Tools like LEED, NGBS and others were preferred by 22%, or 8 out of 37 survey respondents. Design-Based Energy modeling was preferred by only 5%, or 2 out of 37 survey respondents.

**Table 4.13. Preferred Method of Analysis for Sustainable Features**

| Q12: | 12. What would your preferred method of analysis to appraise the value of sustainable features in residential property? | | | |
|---|---|---|---|---|
| # | Answer | | # of Responses | % |
| 1 | Performance Based-actual costs, HERS Rating | | 27 | 73% |
| 2 | Design-Based - Energy Modeling | | 2 | 5% |
| 3 | Green Rating Tools - LEED, NGBS (NAHB), and others | | 8 | 22% |
| | Total | | n = 37 | 100% |

Question 13 was formatted as an open-ended, short response question. The analysis of this data collected was conducted using content analysis. The researchers first compiled all short answer responses in an Excel spreadsheet. Then, all keywords and phrases were highlighted, color coded to highlight prominent themes and then summarized in the figure. The data in Figure 4.3 revealed Group 1 survey respondents' opinions of sustainable building attributes that should be included in the appraisal process that are not currently used. There were 34 total respondents to this question, however, some participants included multiple answers in their responses. According to 9 out of 34 survey respondents, all building attributes should be considered in the appraisal process. However, 8 survey respondents were unsure and could not name a specific sustainable feature they knew would interact positively with the markets. These participants also suggested that they did not have enough data in their past experiences to make a conclusion, or they simply did not have enough experience or knowledge to respond with a feature. There were 4 respondents who claimed the answer to this question lies in what

the market determines to add value. While 10 survey respondents supplied specific building features they felt should be included in appraisals, 3 survey respondents stated no sustainable building attributes should be included that are not currently used.

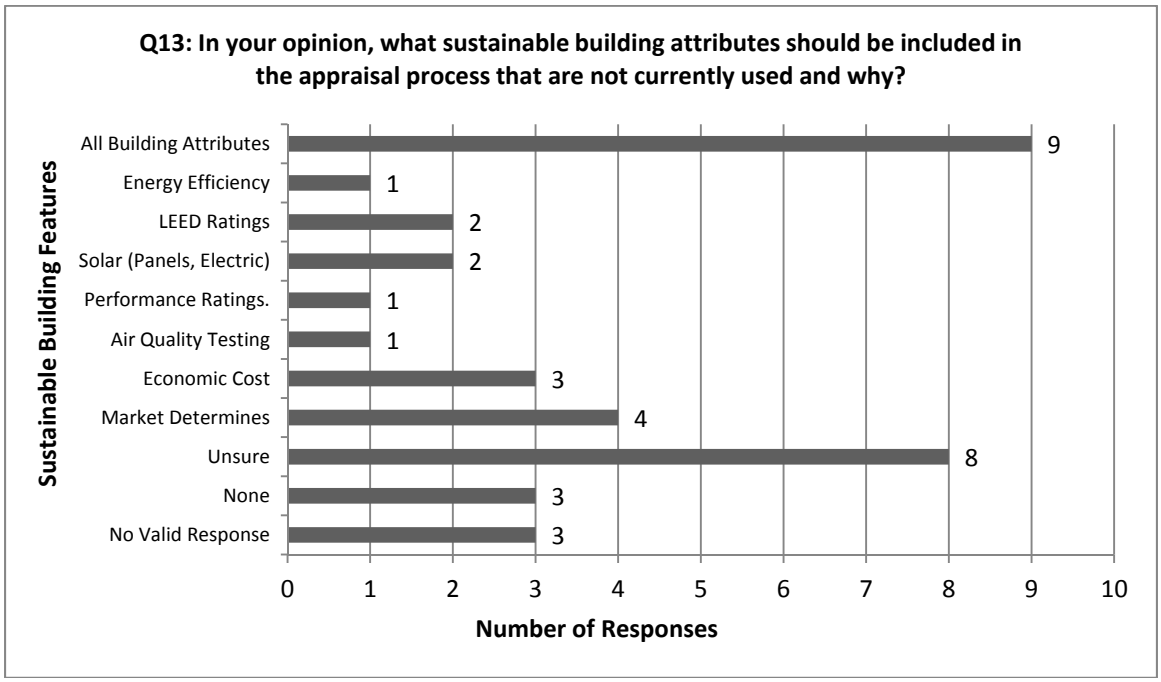


**Figure 4.3. Perceived Sustainable Attributes that Should be Included in Appraisals**

A content analysis was also conducted for question 14, which was formatted to gather data from short, narrative responses to the information and/or tools used to valuate sustainable building features that are not currently available to appraisers (Figure 4.4). Of the 34 total respondents to this question, the data revealed that 12 of those responses included topics related to the lack of information and data on Long-Term Cost benefits of sustainable building features, such as economic return, utility savings, rent premiums and billing statements. Appraisers also identified limited Comparable Sales Data 6 times within the 34 responses. Searchable Databases and updated MLS Listings specifically for sustainable features were each mentioned by 3 participants, while the need for a survey of relevant building features was mentioned by 2 participants. Performance Ratings, Property Transaction Data, Cost Comparison data, Sustainable Feature Specifications were all forms of data or information said to

be lacking by one survey respondent each. Standard Comparison Tools, Tool to Determine Quantity, Air Monitors, and ROI Models were all types of tools said to be lacking by one survey respondent each.

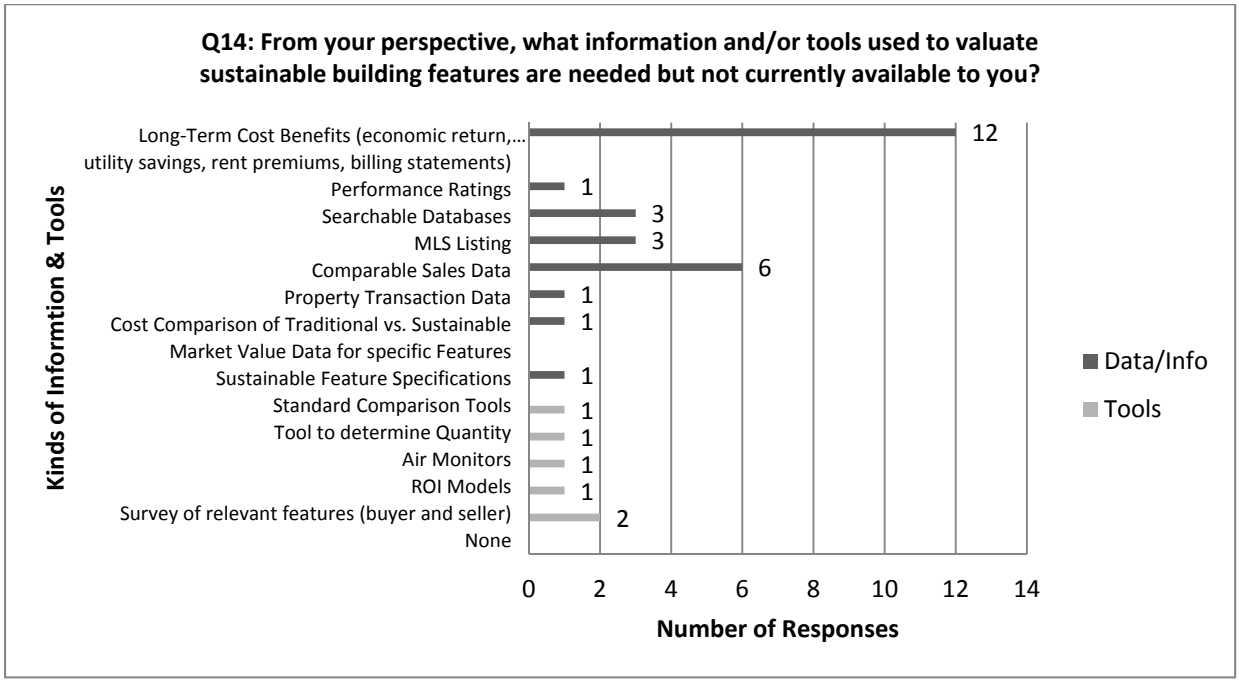


**Figure 4.4. Information or Tools Needed But Not Currently Available**

## Questions Addressed to Group 1 Participants

The data in Table 4.14 shows that the majority of the participants in Group 2 focus on commercial and residential property appraisal. With 57%, or 4 out of 7 respondents, focusing on commercial and 29%, or 2 out of 7 respondents, focusing on residential, there remains 14%, or 1 of those respondents who focus on other building categories, specified as Multifamily.

**Table 4.14. Building Category Most Often Appraised by Group 2 Participants**

| Q15: | What building category do you most often appraise? Please check only one answer. | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Commercial | | 4 | 57% |
| 2 | Residential | | 2 | 29% |
| 3 | Industrial | | 0 | 0% |
| 4 | Other: Please Specify | | 1 | 14% |
| | Total | | n = 7 | 100% |

At this point in the survey, Group 2 participants were provided a list of examples of sustainable building features. The data from Question 16 revealed that 57%, or 4 out of the 7 total respondents that were not aware of sustainable value integration, have been assigned to appraise real property in which sustainable building features could have been incorporated into the valuation process (Table 4.15). Only 43%, or 3 respondents, had not done an appraisal assignment where these features were present.

**Table 4.15. Group 2 Experience with Sustainable Building Features in Appraisal Assignments**

| Q16: | Have you been assigned to appraise real property in which any of the sustainable building features listed above could be incorporated into the valuation process? | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Yes | | 4 | 57% |
| 2 | No | | 3 | 43% |
| | Total | | n = 7 | 100% |

Survey data collected in Question 17 (Table 4.16) represents how many of the survey respondents who replied yes to Question 16 could have considered the given sustainable features in their appraisal assignments. Those features considered include HVAC with 67%, or 2 out of 3 respondents, Proximity to Community and Public Transportation with 33%, or 1 out 3 respondents, and Other also with 33%, or 1 out 3 respondents. The one appraiser who responded to the Other category provided the following answer: (1) Income performance of income producing properties is the most important issue; Will the sustainable features improve income? If so, by how much? Investors have a return requirement regardless of sustainable features.

For Question 17, survey respondents from Group 2 were asked to rank their level of satisfaction in their ability to recognize the listed sustainable building features. The researchers used a slider scale tool provided by Qualtrics to format responses on a scale from 0 to 100 corresponding to very dissatisfied, dissatisfied, somewhat dissatisfied, neutral, somewhat satisfied, satisfied, and very satisfied, respectively. See Figure 4.5 for an illustration of this slider scale.

**Table 4.16. Sustainable Building Features Considered for Appraisal by Group 2**

| Q17: | Which sustainable features were factors considered for appraisal in those assignments? Please check all answers that apply. | | | |
|---|---|---|---|---|
| # | Answer | | Response | % |
| 1 | Site Orientation | | 0 | 0% |
| 2 | Building Envelope Quality | | 0 | 0% |
| 3 | HVAC | | 2 | 67% |
| 4 | Building Performance Energy Rating | | 0 | 0% |
| 5 | Insulation | | 0 | 0% |
| 6 | Renewable Energies | | 0 | 0% |
| 7 | Lighting Controls | | 0 | 0% |
| 8 | Appliances | | 0 | 0% |
| 9 | Water Efficiency | | 0 | 0% |
| 10 | Proximity to Community & Public Transportation | | 1 | 33% |
| 11 | Indoor Air Quality | | 0 | 0% |
| 12 | Utility Cost (Electric, Water, Wastewater, Stormwater) | | 0 | 0% |
| 13 | Daylighting | | 0 | 0% |
| 14 | Other: Please Specify: | | 1 | 33% |
| | Total | | n = 3 | 100% |

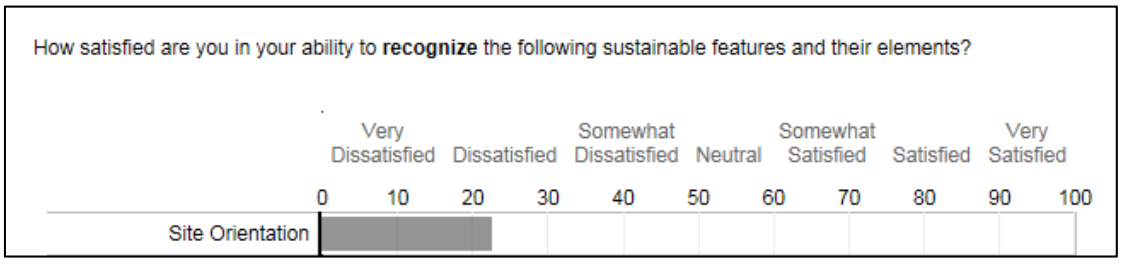


**Figure 4.5. Very Dissatisfied to Very Satisfied Slider Scale Tool Provided by Qualtrics**

There were a total of 6 survey respondents for this question, with a possible minimum value of 0 and a maximum value of 100 for each response. The average value is the sum of all 6 response values divide by the total 6 responses. The data in Table 4.17 shows that appraisers are most comfortable in their ability to recognize Proximity to Community and Public Transportation with an average rating of

57.67. Other sustainable features with ratings near somewhat satisfied or neutral include HVAC at 54.50, Building Performance Energy Rating at 52.67, Insulation at 51.17, and Utility Cost with a 50.17 average rating. Appraisers are least satisfied with their ability to recognize Site Orientation, with an average rating of 39.33 and Indoor Air Quality with an average rating of 33.67.

**Table 4.17. Appraiser Satisfaction to Recognize Sustainable Building Features**

| Q18: | How satisfied are you in your ability to recognize the following sustainable features and their elements? | | | | | |
|---|---|---|---|---|---|---|
| # | Answer | Min Value | Max Value | Average Value | Standard Deviation | Responses |
| 1 | Site Orientation | 0.00 | 70.00 | 39.33 | 25.70 | 6 |
| 2 | Building Envelope Quality | 0.00 | 79.00 | 42.17 | 27.74 | 6 |
| 3 | HVAC | 0.00 | 81.00 | 54.50 | 28.28 | 6 |
| 4 | Building Performance Energy Rating | 0.00 | 80.00 | 52.67 | 27.85 | 6 |
| 5 | Insulation | 0.00 | 70.00 | 51.17 | 26.16 | 6 |
| 6 | Renewable Energies (Solar Panels, Wind) | 0.00 | 70.00 | 49.67 | 30.24 | 6 |
| 7 | Lighting Controls | 0.00 | 80.00 | 46.67 | 30.53 | 6 |
| 8 | Appliances | 0.00 | 80.00 | 47.67 | 30.35 | 6 |
| 9 | Water Efficiency | 0.00 | 80.00 | 42.50 | 27.77 | 6 |
| 10 | Proximity to Community & Public Transportation | 0.00 | 90.00 | 57.67 | 38.24 | 6 |
| 11 | Indoor Air Quality | 0.00 | 50.00 | 33.67 | 19.41 | 6 |
| 12 | Utility Cost (Electric, Water, Wastewater, Stormwater) | 0.00 | 84.00 | 50.17 | 33.08 | 6 |
| 13 | Daylighting | 0.00 | 80.00 | 41.33 | 27.38 | 6 |
| | Total | 0.00 | 100.00 | | | n = 6 |

For Question 18, survey respondents from Group 2 were asked to rank their ability to valuate the listed sustainable building features. Again, the researchers used a slider scale tool provided by Qualitrics to format responses on a scale from 0 to 10 corresponding to Poor, Fair, Good, Very Good, and Excellent, respectively. There were a total of 6 survey respondents for this question, with a possible minimum value of 0 and a maximum value of 10 for each response. The average value is the sum of all 6

response values divide by the total 6 responses. See Figure 4.6 for an illustration of this slider scale.

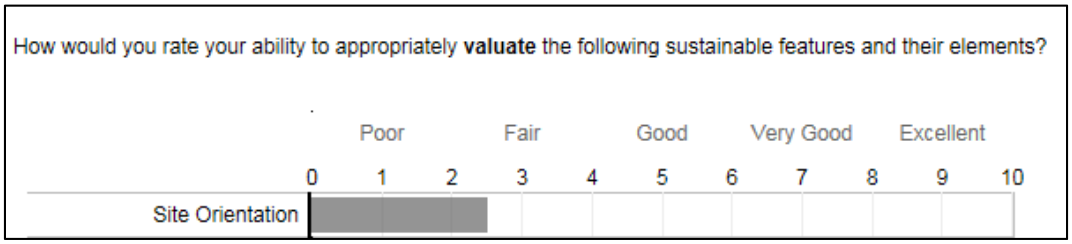


**Figure 4.6. Poor to Excellent Slider Scale Tool Provided by Qualtrics**

The data in Table 4.18 shows that appraisers from Group 2 are most comfortable in their ability to valuate Proximity to Community and Public Transportation with an average rating of 5.00. Other sustainable features with ratings near good or fair include Utility Cost at 4.67, HVAC at 4.7, Site Orientation and Building Performance Energy Rating at 3.83, and Renewable Energies and Lighting Controls with 3.50 average ratings. Appraisers are least satisfied with their ability to valuate Daylighting, with an average rating of 2.67 and Indoor Air Quality with an average rating of 2.33.

**Table 4.18. Appraiser Ability to Valuate Sustainable Building Features**

| Q19: | How would you rate your ability to appropriately valuate the following sustainable features and their elements? | | | | | |
|---|---|---|---|---|---|---|
| # | Answer | Min Value | Max Value | Average Value | Standard Deviation | Responses |
| 1 | Site Orientation | 0.00 | 7.00 | 3.83 | 2.48 | 6 |
| 2 | Building Envelope Quality | 0.00 | 7.00 | 3.33 | 2.50 | 6 |
| 3 | HVAC | 0.00 | 6.00 | 4.17 | 2.14 | 6 |
| 4 | Building Performance Energy Rating | 0.00 | 8.00 | 3.83 | 2.71 | 6 |
| 5 | Insulation | 0.00 | 5.00 | 3.33 | 2.07 | 6 |
| 6 | Renewable Energies (Solar Panels, Wind) | 0.00 | 5.00 | 3.50 | 2.07 | 6 |
| 7 | Lighting Controls | 0.00 | 5.00 | 3.50 | 1.87 | 6 |
| 8 | Appliances | 0.00 | 5.00 | 3.17 | 1.94 | 6 |
| 9 | Water Efficiency | 0.00 | 5.00 | 3.00 | 1.79 | 6 |
| 10 | Proximity to Community & Public Transportation | 0.00 | 9.00 | 5.00 | 3.41 | 6 |
| 11 | Indoor Air Quality | 0.00 | 4.00 | 2.33 | 1.37 | 6 |
| 12 | Utility Cost (Electric, Water, Wastewater, Stormwater) | 0.00 | 8.00 | 4.67 | 3.20 | 6 |
| 13 | Daylighting | 0.00 | 5.00 | 2.67 | 1.75 | 6 |
| | Total | 0.00 | 10.00 | | | n = 6 |

The data in Table 4.19 reveals those opportunities that survey respondents from Group 2 have participated in to gain additional experience and/or education on green building topics related to appraisal practices. From the information gathered in the archival research, it was determined that sustainable building information related to property appraisal could be gained through continuing education courses, professional development programs and AI designation programs. Of the 6 respondents, 4 had participated in continuing education courses and 1 had participated in the AI Designation Programs. One respondent claimed they had not participated in any of the listed opportunities due to the cost and travel distance required (Table 4.20).

**Table 4.19. Education and Experience Resources for Sustainable Building**

| Q20: | There are opportunities for appraisers to gain additional experience and education on green building related to appraisal practice outside of the mandated curriculum for appraiser licensure. Have you participated in any of the following? Please check all that apply. | | | |
|---|---|---|---|---|
| # | Answer | | Response | % of respondents that chose this answer |
| 1 | Continuing Education Courses | | 4 | 67% |
| 2 | Professional Development Programs | | 0 | 0% |
| 3 | Appraisal Institute Designation Programs | | 1 | 17% |
| 4 | I have not participated in any of these programs | | 1 | 17% |
| | Total | | n = 6 | 100% |

**Table 4.20. Barriers to Education and Experience Opportunities**

| Q21: | Please describe the barriers that prevent you from participating in these opportunities. | | |
|---|---|---|---|
| Answer | | Response | % of respondents that chose this answer |
| Cost and Travel Distance | | 1 | 100% |
| Total | | n = 1 | 100% |

A content analysis was also conducted for question 22, which was formatted to gather data from short, narrative responses from Group 2 on the information and/or tools used to valuate sustainable building features that are not currently available to appraisers (Figure 4.7). There were 6

total respondents to this question, but some of the participants provided more than one answer. The data revealed that 3 respondents included topics related to the lack of information and data on Long-Term Cost benefits of sustainable building features, such as economic return, utility savings, rent premiums and billing statements. Appraisers also identified Market Data as lacking twice. Property Characteristic Information, Other Appraisal Reports, updated MLS Listings, and Comparable Sales Data specifically for sustainable features were each mentioned by 1 respondent.

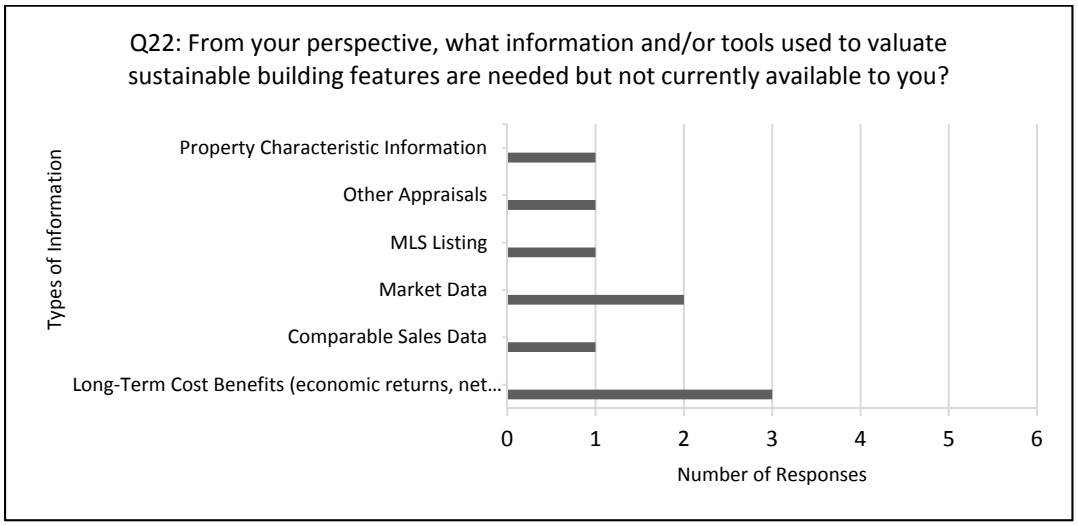


**Figure 4.7. Information and Tools Desired by Group 2**

# Discussion of Research Results

## Group 1: Data Analysis

### *Awareness of Appraisal Methods & Practices*

In general, the data from Table 4.4 states that the majority, or 84%, of the survey participants are aware of appraisal methods and practices for sustainable value integration in real property today. However, if an appraiser is aware of sustainable value integration methods, this does not mean that they have the knowledge or experience in implementing these methods in practice, or that those known features were incorporated into the final valuation. For example, when asked, "In which building category did you first notice sustainable features being incorporated into the appraisal process," one

respondent noted that they had not noticed sustainable features being incorporated even though they had previously responded that they were aware of appraisal practices and methods related to sustainable building features (Table 4.7). The next question in the survey looked at how many of the respondents had been able to incorporate sustainable features in their appraisal assignments.

### *Appraiser Experience with Incorporation*

Table 4.5 revealed that 82%, or 31 out of the 38 total respondents that were aware of sustainable value integration, had appraised real property in which sustainable building features were incorporated into the valuation process. Only 7 out of 38 total respondents, or 18%, had not done an appraisal assignment where these features were incorporated. The initial thought to this high response rate is that the majority of appraisers are able to integrate sustainable building features into their appraisal processes. Again, from this question alone, the study did not identify the specific sustainable features that are the source of reference by the respondents at this point in the survey. However, to discover which sustainable building features appraisers had experience appraising, survey respondents were then asked to identify those features that they had considered in property appraisals.

Survey data collected from Question 8 in Table 4.9 discovered that the top three sustainable building features considered by more appraisers in the appraisal process were (1) Heating, Ventilation and Air Conditioning (HVAC) at 63%, (2) Renewable Energies at 63%, and (3) Utility Cost (Electric, Water, Wastewater, Stormwater) considered by 61% of respondents. The three sustainable building features considered least in the appraisal process were (1) Indoor Air Quality at 11%, (2) Other at 11%, which included building scores or ratings and renewable materials, and (3) Appliances/Equipment Selection considered by 16% of respondents. Typically, the benefits seen from implementing the types of features that appraisers are considering create documentation that verifies those benefits. For example, the contributions seen from renewable Energies could be seen in utility bills, energy ratings,

and by reading equipment meters. This are the types of documentation needed by appraisers to validate the data inputs in their valuation calculations.

In general, the number of years of experience that an appraiser has in the industry would most likely affect the potential for exposure to different types of properties and building characteristics; a longer career in the industry would mean a wider breadth of experience and practice. Other than knowing that our survey population included active appraisers licensed in the state of Colorado, other appraiser demographics were not collected in the survey. However, inferences from the data collected in Question 5 suggest that the appraisers surveyed have a wide range in number of years of experience in the industry. When survey respondents were asked, "When did you first notice sustainable features being incorporated into the appraisal process," 79%, or 30 out of the total 38 respondents, answered within 0 to 7 years ago (Table 4.6). This statistic suggests two implications.

First, sustainable building features had not been thoroughly incorporated into building and construction until about 7 years ago. In order for appraisers to take notice, the markets would need to be saturated with sustainable building concepts to the point where they became consistent or popular. The researchers theorized that perhaps this sudden spike in the occurrence of sustainable building features in homes could be attributable to government rebates and tax credits at both state and federal levels. One survey respondent agreed with this position stating they believed the green push was initiated by the government when they decided to give rebates to those who installed energy saving features. One stated criticism of these types of government programs is that the initial cost of the sustainable features being promoted far outweighed the rebate amounts, savings accrued by lower utility and maintenance costs, and the return on investment. This concept ties into the challenge that appraisers face in being able to measure and quantify the economic benefits seen as a result of implementing sustainable building features.

Secondly, this data implies that sustainable value integration is relatively new to appraisal processes. Sustainable building is a concept that is dynamic and the building industry is continually trying to fine tune and perfect sustainable construction methods and sustainable building technologies and materials. Therefore, it could be proposed that the challenges facing appraisers in sustainable value integration have been ongoing in that their product is heterogeneous in nature and the data and information used to describe their characteristics is also evolving. How can a standard process or methodology be created when the focus of said process is continually changing?

In addition to the majority, 13%, or 5 out of 38 respondents, noted sustainable building features being incorporated in appraisals 8 to 12 years ago and 5% noted this happening even earlier at over 13 years ago. Further qualitative research into the specific features and their qualities noted within these time periods would be of interest to further research studies. It should be noted that the one respondent who had not noticed sustainable building features being incorporated yet in the appraisal process was consistent in their response for both Questions 5 and 6, adding a degree of validity to this section.

Question 6 revealed that appraisers first noticed sustainable building features being incorporated into the appraisal process in commercial and residential building categories (Table 4.7). The property category with the most responses was commercial with 50%, or 19 out of 38 total respondents. The residential category was a close second at 47%, or 18 out of 38 total respondents. As mentioned earlier, one respondent representing 3% had not noticed sustainable features being incorporated to date. The study assumes that this data could also be representative of the building categories that continue to see sustainable value integration.

### *Sustainable Building Features that Should be Included*

Examining the sustainable building attributes which appraisers feel should be included in the appraisal process, but are not currently used, identified respondent perceptions of the potential for

value implications in real estate markets and identify areas for improvement where information, tools or effective processes are lacking. To explore the degree of sustainable value integration and appraisers' perspectives on the sustainable building features they feel deserve inclusion, Question 13 asked survey participants, "In your opinion, what sustainable building attributes should be included in the appraisal process that are not currently used and why?" This question was only asked to Group 1 participants that reported having prior experience appraising properties with sustainable building features. The short answer categories are summarized in Figure 4.3.

First, 9 survey respondents noted that any and/or all building attributes, whether conventional or sustainable, should be considered in the appraisal process. This view validates that these appraisers are following the USPAP industry guidelines. When performing an appraisal assignment, an appraiser must identify the problem, determine the required scope of work, and collect data and describe the property (Ling et. al, 2013). Only after they have determined the approach and begun to analyze the collected data against the relevant market data, can the appraiser determine which characteristics of the subject property will require, if any, adjustments based on their market response. However, 8 responses indicate that there is uncertainty among some appraisers as to what should be included in the appraisal process concerning sustainable attributes. Fortunately, 10 respondents indicated that LEED, solar panels, performance ratings, air quality, and costs should impact the appraisal, while 4 respondents stated that the market determines which features will add value (Figure 4.3).

In summary, Figure 4.3 indicates that standard appraisal practice should include all building characteristics, including sustainable or green features, in the initial collection of data and information when conducting an appraisal assignment. In general, if the market includes supporting data, the appraiser can make an upward or downward value adjustment. If the market does not recognize a characteristic, that feature may be excluded from the final appraisal value.

Unfortunately, this Question 13 does not reveal to what extent the sustainable building features are considered in the standard process. This may result in two unanswered questions. First, were the sustainable features recognized by their respective markets and therefore had an effect on the final appraisal value? Second, were there adequate comparable properties and/or market data with similar sustainable features to ensure there was an impact on the appraised value? To determine value, appraisers must use data available on comparable properties and market recognition as inputs in the appraisal process that impact the output, or final appraisal value. Therefore, the method and approach appraisers take in determining value may impact consideration for sustainable features.

### *Nature of the Appraisal Approach and Necessary Inputs*

Typically, the type of property and its interests impacts the outcome of the appraisal and the appraisal is dependent on the quantity and quality of information available. Therefore, an appraisal approach focusing on and/or including sustainable features would embrace additional information relating to these features. Questions 13 (Figure 4.3) and 14 (Figure 4.4) elicited short responses to challenges identified by appraisers regarding the relevancy of sustainable building features in the appraisal process. These included the ability to calculate, measure, or quantify certain sustainable features, and the collection of data and information for appraisal assignments.

These qualitative responses also indicated that the nature of the chosen appraisal approach may have implications on sustainable value integration and which attributes are included. First, the Sales Comparison Approach (Figure 4.8), involves comparing the subject property to several other comparable properties that have recently sold in the same market as the subject property.

The theory is that the value of the subject property will be similar to the price that the typical buyer would pay for a property with the same utility and desirability (Ling et al., 2013, p. 168). However, since no two properties are ever exactly the same, the appraiser must go through an analysis to identify relevant adjustments to the subject property based on the comparable property data.

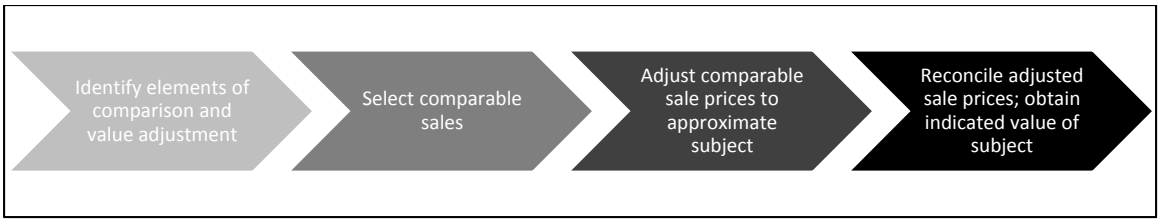


**Figure 4.8. The Sales Comparison Approach, Ling and Archer (2013)**

Respondents identified a lack of information about the features present in the subject and comparable properties, a lack of truly comparable properties and how to include those sustainable features that are not visible or quantifiable for comparison as challenges to this process.

Second, the Income Approach is based on the premise that a property's market value is a function of the income it is expected to produce (Figure 4.9). For example, one respondent noted that

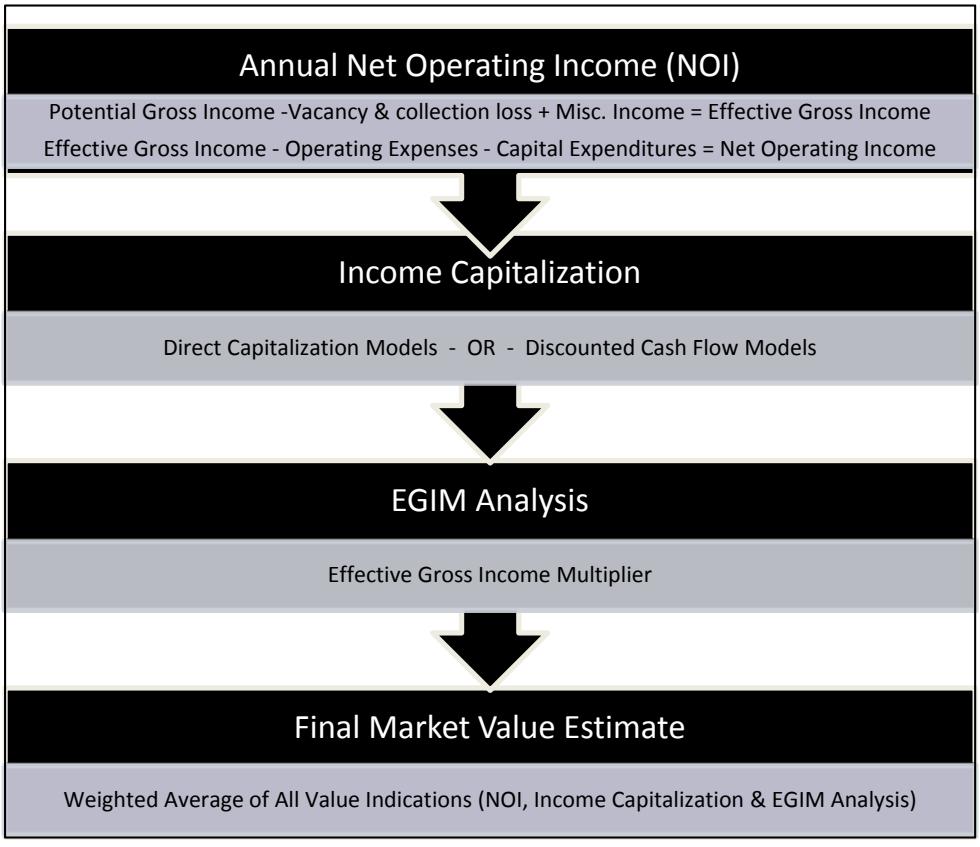


**Figure 4.9. The Income Approach, Ling and Archer (2013)**

because they primarily appraised income-generating commercial property, using the income approach, the economic costs are always considered when analyzing operating expenses before and after the sustainable features were implemented. Savings generated from operating and maintenance costs due to the sustainable features are capitalized into additional value that will accrue over the holding period for the owner or investor.

Third, according to Ling et al., the Cost Approach (Figure 4.10) "is based on the principle of substitution and assumes the market value of a new building is similar to the cost of constructing it today (2013, p.179)." Appraisers can decide to use reproduction cost, where the appraiser estimates the cost to reconstruct the building exactly as it is, or replacement cost, where the appraiser examines the cost needed to reconstruct the building with equal utility but including alterations to meet current codes, standards and using modern materials. In regards to sustainable building features, the appraisers are charged with the task of estimating their cost whether old or new.

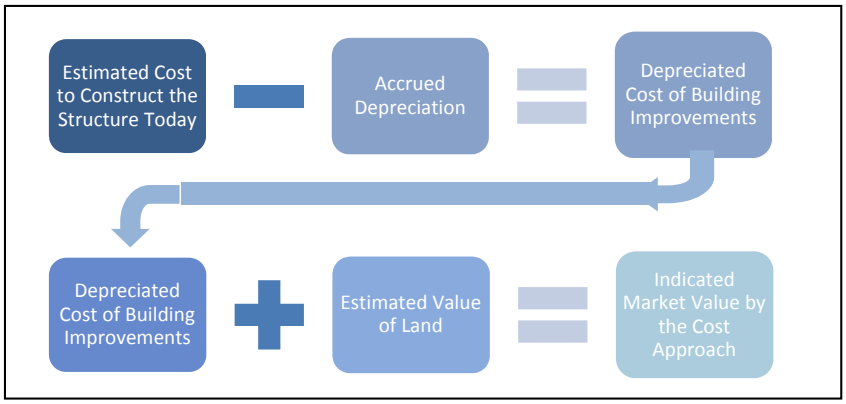


**Figure 4.10. The Cost Approach, Ling and Archer (2013)**

However, it is noted that markets requiring "new environmental or 'green' standards," eliminate the opportunity to use reproduction cost (Ling et al., 2013, p. 179). Also, when considering depreciation, appraisers must include physical deterioration and functional obsolescence. One survey respondent noted that if a home has solar panels that were installed 20 years ago, they probably are not functioning at the initial capacity, if at all. Therefore, it is a sustainable feature, but most likely the

market is not going to recognize non-functioning solar panels as adding value. This situation may provide a dilemma for the appraiser; what is the value related to the current level of function and how does the appraiser determine the level of function? Again, the building industry has been working on sustainable building methods and technologies for a long time, progressing toward efficiency and durability. Thus, it is suggested that instead of creating a standardized tool or measurement for individual features, each of the sustainable features should be incorporated into the appraisal process based on performance metrics. The ability to measure, quantify and calculate sustainable features and their impacts is the next topic of analysis.

### *Ability to Measure, Quantify and Calculate*

Both the quantitative and qualitative responses indicate that appraisers rely on various data that quantify the characteristics of a property either as a dollar amount or percentage. The results from Question 8 showed HVAC, Renewable Energies, and Utility Cost as those features that were considered by the most respondents in an appraisal (Table 4.9). Question 13 (Figure 4.3) revealed that Energy Efficiency, LEED Ratings, Economic Cost, and Air Quality Testing were all specific features that appraisers felt needed to be included in the appraisal process, but were not. Incidentally, all of these features provide some degree of measurement to the benefits of physical building characteristics or performance metrics.

It is also worth discussing the difficulty in defining sustainable building features due to the relationships that these features have with each other. Water efficiency depends on plumbing fixtures, equipment, and occupancy behavior. Energy efficiency is impacted by many factors including site orientation, building envelope quality, HVAC, building performance, insulation, renewable energies, lighting controls, appliances, utility cost, and daylighting. Building Performance Ratings are influenced by the building envelope quality, building design, daylighting, equipment and how the occupant is using and maintaining the property. The complexity of segregating building features into individual value

measurements is a daunting process which supports the appraiser's desire for more documented information. The breakdown and categorization of specific features within sustainability concepts and the methods to quantify them are worth exploration, but beyond the scope of this research.

Again, appraisers collect data and report on trends and behaviors of the market. So, if they do not have documented, accurate information in a measurable number, reliable conclusions of value cannot be made. Specifically in the Comparable Sales Approach, the ideal subject property analysis is one where no adjustments are needed to reach a definitive opinion of market value. However, no two properties are exactly the same in every aspect. So, with each adjustment an appraiser must make to the subject property the appraisers assumes risk. In order to minimize the risk the appraiser must be able to justify their calculations and steps taken to reach the conclusion for each adjustment. Therefore, an appraiser must balance their responsibility to accurately report on the subject property and the risk involved when integrating characteristics of features that are unique or specific to that property. If the appropriate amount of data and information is not present to support their calculations, the appraiser must make a decision to include or exclude value without definitive market numbers.

This concept of appraiser risk raises the question of how often will appraisers not include certain sustainable property characteristics (Figure 4.9) Three of the respondents in Question 13 (Figure 4.3) indicated no sustainable features should be included and eight out of the 39 respondents were unsure. Those responses that fell under the unsure category include answers where participants could not name a specific sustainable feature they knew would interact positively with the markets. They also suggested that they did not have enough data in their past experiences to make a conclusion, or they simply did not have enough experience or knowledge to respond with a feature.

The study then asked Group 1 survey participants, "From your perspective, what information and/or tools used to valuate sustainable building features are needed but not currently available to you?" (Figure 4.4). The analysis of Question 14 followed the same qualitative review process previously

described. The data in this section fell into two larger categories: (1) Data and Information and (2) Tools. In general, this data shows that appraisers want more information related to sustainable building features and technologies to be confident in the determination of market values. The results show that factors related to long-term cost benefits are an on-going concern for appraisers in their evaluations. Economic return, utility savings, rent premiums, and billing statements were mentioned 12 times in responses to this question.

The need for sustainable building information in commonly used databases (Multiple listing service, Comparable Sales Data, Property Transaction Data and Market Data) was mentioned by several respondents. Unfortunately, if the database is not updated with current information, some of which appraisers generate, on sustainable attributes and values this information does not find its way into these types of databases. A positive aspect to these two groups of data is that they are already used by appraisers in their valuation processes, so the issue becomes how to document the sustainable feature information in the databases. To help understand this issue the availability of property data, information and measurement tools was examined.

### *Availability of Data and Information*

Some of the information needed that respondents specifically identified include: billing statements, performance ratings, comparable sales data, property transaction data, specifications, and searchable databases developed by professional organizations. These are all forms of verifiable documentation that validate the data that is being considered in the appraisal process. This response was confirmed by the data seen in Table 4.9, in which appraisers identified Utility Cost, Renewable Energies, and HVAC as those features being considered in appraisals currently. These features also generate forms of documentation in which the performance and/or cost of the feature can be verified. Question 9 (Table 4.10) confirms that 74%, or 28 out of 38 respondents do require documentation on sustainable building features to support their analysis of market value.

It is important to discuss the validity of the information and data being collected by appraisers. Much of the data and information contained within MLS listings, comparable sales data and even energy performance ratings and utility costs are provided from a third party source. Does the appraiser need to verify the content and the source of the data they include in their appraisal? How can appraisers be sure that the information and data are accurate? The development of catalog and database systems relative to sustainable building features is beyond the scope of this paper, but merits further study.

This data also suggest that in addition to documentation, the performance based appraisal approach is the preferred method of analysis to appraise sustainable building features (Table 4.13). In this question 73%, or 27 out of 37 respondents prefer to use data that exhibits performance based outcomes, including the HERS rating, or actual cost information. Green Rating Tools like LEED and NGBS were chosen by 22% and Design Based Energy Modeling was preferred by only 5% of respondents. Energy-based modeling offers two limitations to its use in appraisal practice. First, this method of modeling the energy performance and costs of a property is typically used when initially designing a building. The outputs of the model are not a guarantee of a buildings future performance. Second, because energy-based modeling is done during design, it is meant for new construction or sometimes renovation projects. It is not typically used for buildings that are already built where actual data is available.

While 74% of survey respondents say they require documentation of sustainable building features to support appraisal value, 26% claimed they did not require documentation (Table 4.10). In current appraisal processes, appraisers must guide their analysis based on the type, quantity, and quality of information available to them. So, what happens to building characteristics when appraisers find that they do not have enough information to determine and/or support value assessments? Again, a greater degree of comparability to subject properties is critical to developing accurate estimates of value. Therefore, it is preferred that more definitive and verifiable sustainable feature information be

available to perform property appraisals. A greater degree of accuracy and confidence helps appraisers manage calculations and adjustments, which helps reduce the appraiser's exposure to risk.

Question 10 asked respondents to reveal which sustainable features require documentation to validate the appraisal value (Table 4.11). The data revealed that Renewable Energies (63%), Utility Cost (59%), and Building Performance Energy Ratings (56%) were chosen by the most respondents for needing documentation. Closely following are HVAC (41%), Insulation (26%), and Building Envelope Quality (15%). Again, consistency across data results can be seen through Question 8 (Table 4.9) exhibiting that HVAC, Renewable Energies, and Utility Cost were those most considered in the appraisal, Question 10 (Table 4.11) showing that Renewable Energies, Utility Cost and Building Performance Ratings were those needing documentation.

The appraisal related information gained from the top sustainable features outlined in Table 4.11 contributes to the same economic return and performance rating information that appraisers said they were currently lacking. The relationships between the features being considered in appraisal, the features requiring documentation and the features that are seen to add economic value to an appraisal were further examined (Figure 4.11) to better understand the relationships, if any.

Representing the data from these three features in a line graph allowed the researchers to see where these three topics varied in alignment. It is important to note that None was offered as an answer in Question 11, Features that Add Economic Value, only. Responses to Other were varied, therefore, a brief summary is provided for all three questions.

- Question 8 responses for Other include: (1) green rating scores, visible vs. invisible features (2) most of these correlate to utility cost, (3) Above factors are "considered" but limited comparable sales data to conclude value, and (4) Renewable materials.
- Question 10 responses for Other include: (1) All of the above. A HERS Rating is the best way to determine how efficient and sustainable a property is. Using EnergyStar or USGBC rating

systems are also very measurable systems, (2) I don't require any documentation because I typically don't give any value towards these items, and (3) Operating Financials, LEED certification.

- Question 11 responses for Other include: (1) what the tenant is willing to pay for, (2) Because of the lack of rating systems, this is impossible to determine, (3) the market is not yet recognizing energy efficiency, (4) It depends on if the neighborhood is giving value for these items, (5) none, because it is almost impossible to know if the comparable sale/rental had any of the features or not, (6) not sure you can combine quality and economic value in this way, and (7) I review reports, about 300 per year on commercial properties along seven states in the Front Range.

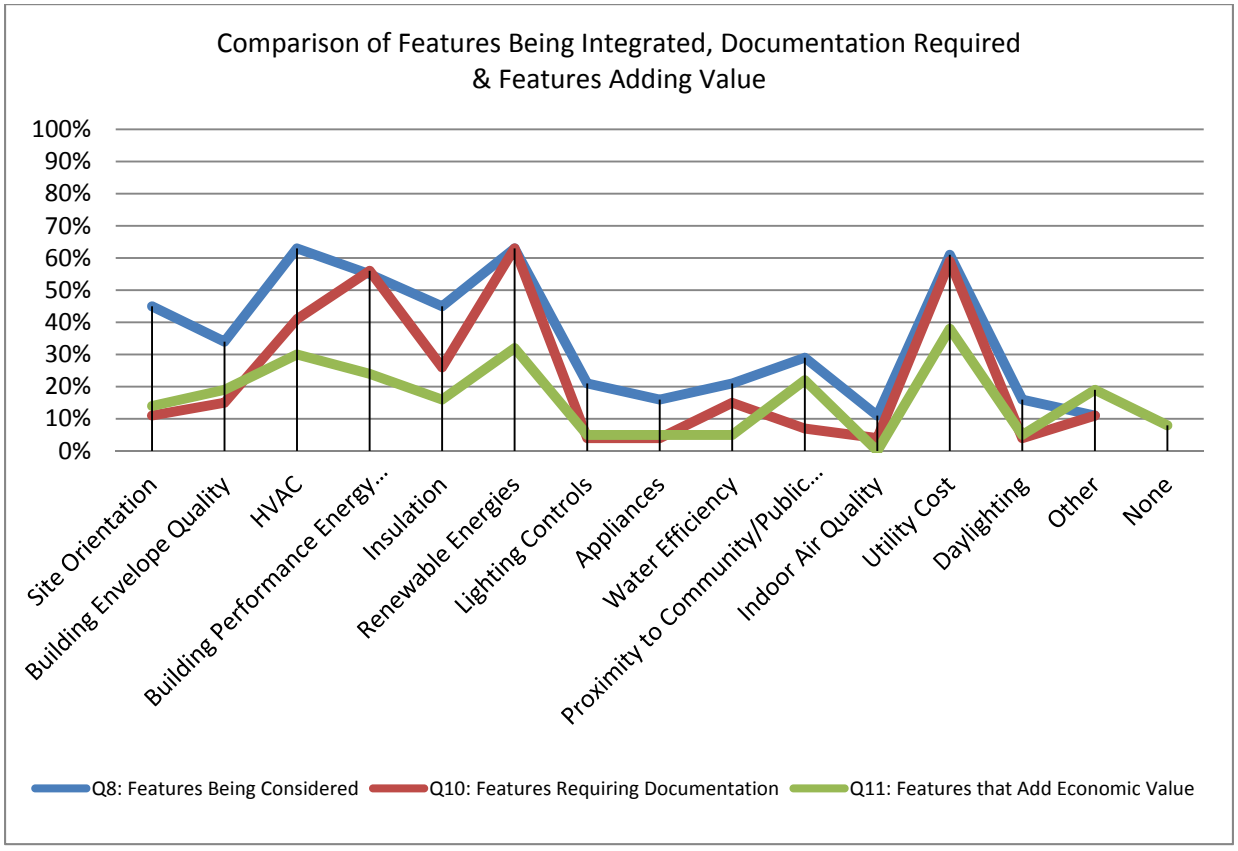


**Figure 4.11. Features Being Considered, Documentation Required & Features Adding Value**

First, points that align or are close to overlapping signify that survey participants are in agreement as to the degree in which those features are (1) being considered in appraisal process currently (Question

8, Table4.9), (2) require documentation in order for the appraiser to justify the valuation (Question 10, Table 4.11), and (3) features that are currently seen to have some degree of recognition in various markets (Question 11, Table 4.12). Appliances, Water Efficiency, Indoor Air Quality, Utility Cost, and Daylighting are all features that are within a 10% - 15% variance between each other. However, it should also be noted that in relation to all of the other features with the exception of utility cost, these had the lowest number of responses.

Second, those features that align in current consideration and required documentation include Building Performance Rating, Renewable Energies, and Utility Cost; all features that have readily available outside documentation which lessens risk. The recurring theme is that those features that are being considered in appraisal are those that can be measured and verified in some manner. Utility cost is a consideration of a property, and therefore, it is most likely included in sustainable features because a process is already established and appraisers have the knowledge and skills to create these calculations. The process for sustainable value integration related to utility cost is not that dissimilar to what appraisers are accustomed to with traditional building features.

Those features that are opposite the spectrum regarding current consideration and required documentation may represent a gap between the appraiser's ability to recognize sustainable features and the information that is available from the building industry. Appraisers collect and report on information and data relative to properties and their markets. However, if this information is not provided to them either through the owner, investor, builder, or current searchable databases, then appraisers are challenged with being able to incorporate sustainable features into the final appraisal value.

Third, the data lines representing features being considered and those that have been seen to add economic value are extremely similar to one another. If these lines had not shown the same corresponding upward and downward trends there could be concern over the validity of the survey

instrument. In order for building features to have an influence on appraised value, they must be recognized by the market. In order for them to be analyzed against the market, they must first be included for consideration by the appraiser. Therefore, wherever a feature is adding value, it also has to be included in the appraisal. If the line representing features that add value were placed over the line representing features considered, the lines should be extremely close to the same line, if not the same. This adds some degree of validity to the data collected. However, points of discrepancy between the two lines include Building Envelope Quality and Water Efficiency. These two points are relatively dissimilar and therefore may represent the uncertainty of appraisers as to the features' characteristics or their degree of market recognition. The esoteric nature of these concepts may also be difficult for the appraiser to quantify even with third party information.

Fourth, when examining the sustainable features requiring documentation line and the line for those adding value, the dominant observation is that the features requiring documentation line is far above the adding value line throughout most of the graph. It can be deduced that these sustainable features are recognized by the market and therefore influence value because their influences are not necessarily visible. The data and documentation is not available for appraisers to analyze, or for comparison in the market.

### Summary of Group 1 Analysis

The analysis of Group 1 data revealed telling information about the current status of appraisal practices in Colorado relative to sustainable building features and current challenges that appraisers are facing in fully integrating them. First, the survey found that 84% of respondents are aware of sustainable valuation methods and practices. Major features that are currently being considered were discovered, however, uncertainty as to the extent of appraiser knowledge about sustainable building features and technologies and the degree to which sustainable features are carried through the appraisal process remains.

Second, the survey discovered that 82% of respondents had appraised real property in which sustainable features were considered. The majority of appraisers began to notice sustainable building features being incorporated into appraisal processes within the past seven years which may signify that sustainable value integration is still relatively new in the industry.

Third, through qualitative and quantitative data analysis, it was discovered that the nature of the appraisal approach may inherently have an impact on sustainable value integration. Considering the different inputs of the Sales Comparison, Income, and Cost approaches, some approaches are more likely to include sustainable factors than others. However, appraisers are challenged in obtaining credible information to support input attributes used in the appraisal method chosen. There is risk in uncertainty for appraisers. Therefore, to avoid this risk, appraisers prefer to rely on verifiable, third party information to base their assumptions and conclusions for final appraisal value. Again, the appraiser needs to validate the content and source of information to be confident that it is factual, even though provided from a third party. This section also concluded that there are insufficient tools and information sources available to appraisers relating to sustainable features. The majority of these factors impact the appraiser's ability to measure and quantify features that impact a properties appraised value. This in turn may impact the appraiser's confidence to include unfamiliar value sources in the appraisal analysis.

Finally, 74% of survey respondents confirmed that they require verifiable documentation to support the appraisal of sustainable building features. When sufficient data fails to be documented, are building features simply excluded from the appraisal? If so, how does this exclusion translate to those stakeholders who are trying to promote sustainable building practices? Lastly, does his exclusion perpetuate the lack of information and data available to appraisers and the industry as a whole? The data analysis will now continue with Group 2 that focuses on those appraisers who were not aware of methods used to appraising real property with sustainable building features.

## Group 2: Data Analysis

### *Awareness of Appraisal Methods & Practices*

Group 2 includes the 7 survey respondents who stated that they were not aware of appraisal methods and practices to valuate sustainable building features that are implemented in real property. These 7 appraisers make up 16% of the total 45 survey participants. It was interesting to find that in Question 15, 4 out of 7 respondents appraised commercial properties most often, whereas 2 respondents appraised residential properties most often (Table 4.14). The single survey respondent that chose Other, specified multifamily as the building type they most often appraised. Multifamily could be viewed as commercial or residential. In this case, it would have been helpful to offer specific definitions or examples of building types, within the survey, that fit into each building category to avoid confusion or uncertainty to survey participants.

These results are interesting from a building type perspective since the common assumption is that more commercial properties are being recognized for their sustainable building efforts than residential properties. Commercial buildings were the initial focus of the LEED rating system and Energy STAR focused on appliance efficiency. These to attributes impact the economic returns typically used for analyzing income producing properties like many commercial buildings. So, it could be inferred that appraisers who focus largely on commercial properties would be exposed to sustainable building features and technologies more so than those appraisers focused in the residential realm. However, this data indicates that the opposite is true among this small survey group.

When comparing the Group 1 responses to the property type, residential and commercial, there was an approximate 50/50 split between the commercial and residential; group one respondents were aware of sustainable value integration methods. This appears to contradict the assumption that sustainable building efforts are more prominent in the commercial industry, however it could support another theory behind the economic value gained from sustainable building concepts. From a business

perspective, unless the cost of a sustainable building feature will pay for itself within the period that the investor has an interest in the property, the investor is typically not interested in that feature as a value proposition. In other words, the typical investor is not willing to spend more on a sustainable building feature unless they are going to see a profit from that feature.

Typically it is assumed that sustainable building features like renewable energies and mechanical systems have a higher first cost than basic systems. That cost is then recouped through small incremental savings in utility costs over a long period of time. If an investor decides to sell that property before payback period has elapsed, a portion of the return on investment is reduced and potential profit is transferred to the subsequent investor. However, from the perspective of a homeowner who is personally invested, the initial cost of sustainable investments may be more acceptable if they are planning to live in their home for a long period of time or they receive some sort of financial credit, typically in the form of a tax credit. There are certain aspects of each real estate market that impact the strategies for sustainable value integration in building and appraisal industries. Understanding sustainable building concepts, methods, and technologies is just the first step.

After discovering how many respondents were unaware of sustainable value integration methods in appraisal practices, the researchers presented the same list of sustainable building features given to Group 1 to Group 2. The purpose behind this approach was to further investigate survey respondents' awareness of sustainability features and to see if this information had an impact on their response to the subsequent question concerning past appraisal experiences.

### Appraiser Experience with Incorporation

Question 16 (Table 4.15) asked the participants, "Have you been assigned to appraise real property in which any of the sustainable building features listed previously could be incorporated into the valuation process?" 4 of the participants responded yes, they had appraised real property in which

sustainable features could have been considered, and 3 of the respondents replied no, they had not appraised real property in which any of these features could have been incorporated.

It is logical for the 3 respondents who were unaware of sustainable value integration methods for appraisal and had not been assigned to any properties where sustainable features could have been considered. If an appraiser does not know how to value a property with sustainable features, they should not be assigned to or accept an assignment that does. In the case of respondents that answered no to the awareness question and then yes to this question the question is raised, why the varying answer?

One possible consideration is that, prior to reading the list of sustainable features provided in the survey, the appraiser was unaware that the features that were incorporated in their appraisal assignment could be considered sustainable. In Question 17, the survey respondents identified HVAC, Proximity to Community and Public Transportation, and Other, specified as Income performance income-producing properties, as factors they considered in their appraisal assignments (Table 4.16). These factors are not specific to sustainability and therefore, the features relevance could easily have been overlooked by the average appraiser.

It is also possible that the appraiser was aware of these features, but due to a lack of knowledge or information, was unsure of how to incorporate them in the appraisal process. Lastly, the appraiser could have considered them in the appraisal, but since they were not recognized by the market, they did not affect market value. Perhaps the survey question should have been stated differently to give insight into these further inquiries. Knowledge and Information are dominant themes here.

### *Implications to Lack of Knowledge and Experience*

To explore these themes, survey respondents were asked about their satisfaction in recognizing sustainable building features and their ability to assign a value to them. First, respondents were asked, "How satisfied are you in your ability to recognize the following sustainable features and their

elements?" (Table 4.17). Participants were given a slider scale of 0 – 100, beginning and ending with very dissatisfied and very satisfied, respectively (Figure 4.12). This range allowed respondents to be more specific to their individual responses. Proximity to Transportation stands out as the sustainable

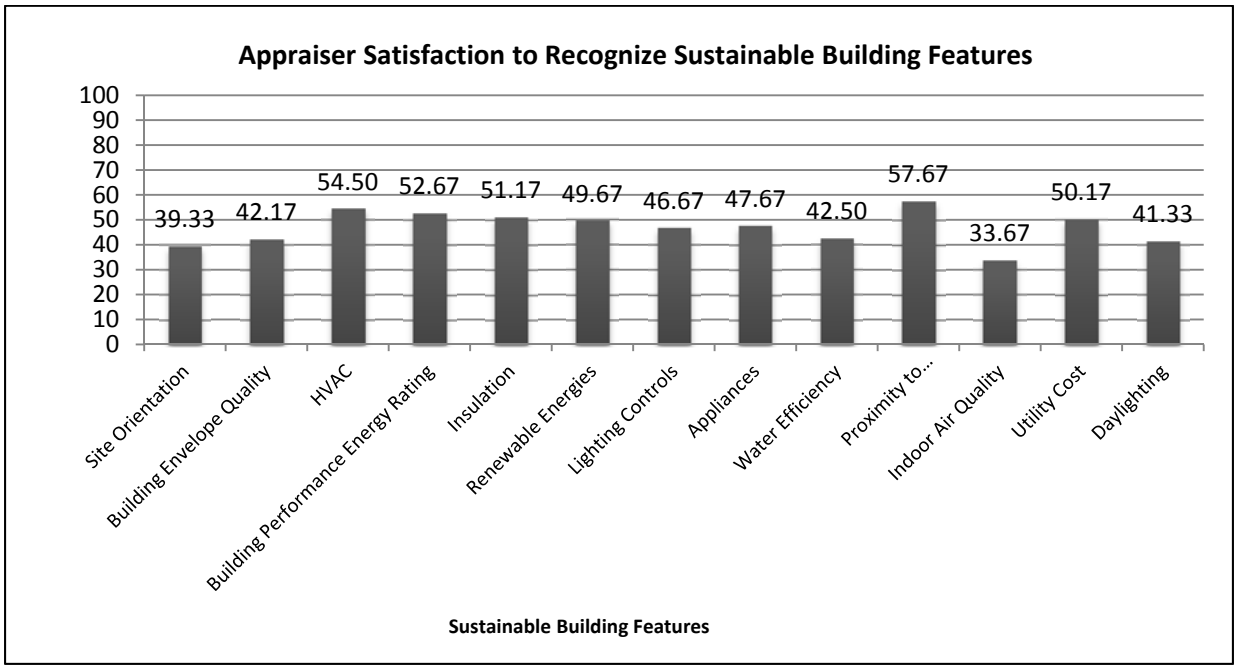


**Figure 4.12. Appraiser Satisfaction to Recognize Sustainable Building Features**

feature that appraisers are the most comfortable appraising with a 57.67 average rating. Indoor Air Quality was the sustainable feature that appraisers are the least comfortable in appraising with a 33.67 average rating. Overall, it can be surmised that this group of survey respondents are not completely satisfied in their ability to recognize the given sustainable building features. This outcome is expected as this group identified themselves as not being aware of methods to appraise sustainable building features.

Next, the survey respondents were asked, "How would you rate your ability to appropriately valuate the following sustainable features and their elements?" (Table 4.18). Participants were given the same list of sustainable building features on a slider scale of 0 - 10, corresponding to Poor, Fair, Good, Very Good, and Excellent (Figure 4.13). Here again, Proximity to Community and Public

Transportation as well as Utility Cost and HVAC were rated as the features survey respondents were the most confident in their ability to appraise. Still, these respondents ranked their ability to appraise these features between Fair and Good. Interestingly, the information needed to valuate these elements and

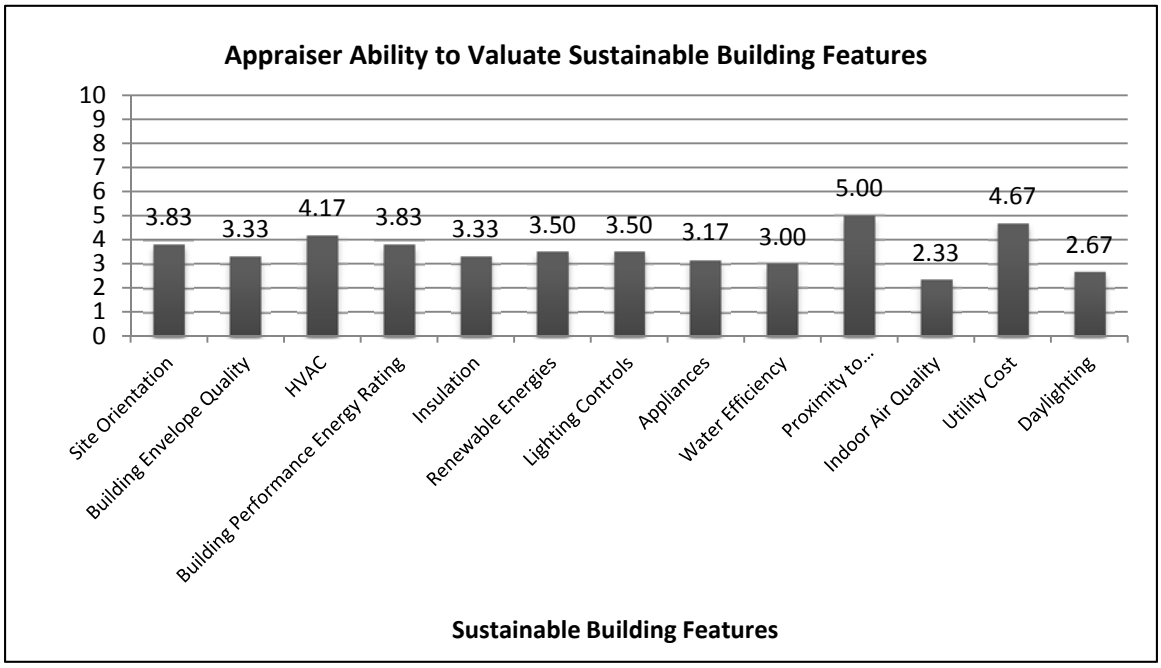


**Figure 4.13. Appraiser Ability to Valuate Sustainable Building Features**

their integration in appraisal methods is very similar to that of traditional building features. The ability to appraise all other features was rated between Fair and Poor, with Indoor Air Quality as the least confident element with a 2.33 average rating (Figure 4.13). These results were expected from this group.

There are several important implications behind the data presented in the last two questions. First, this information, though from a small survey population, verifies that there are active appraisers in the industry who do not have the knowledge, training or experience to be able to recognize and appraise sustainable building features. This should be a concern to the building and real estate industries as stakeholders continue to promote and implement sustainable and green building concepts in real estate property. The challenges to developing efficient and effective means to achieve

sustainable value integration are not avoidable as the market will become more saturated with properties containing new and innovative features. It can be reasonably said that eventually sustainable value integration may become an everyday practice for all appraisers.

### *Ability to Measure, Quantify and Calculate*

It can be inferred from these responses that one possible explanation for the confusion and lack of knowledge is lack of standard definitions for sustainable building features. The concept of sustainability is broad and the addition of sustainable building materials and technologies add to its complexity. Bamboo is an example of a sustainable material while high quality windows, building envelope quality and efficient operating equipment are components of the whole building concept. The building and real estate industries need to be able to understand this delineation and define these situations in the field. Only after the sustainable elements of buildings are defined can they be analyzed.

In addition to this hurdle, respondents posed another challenge to incorporating these features in property appraisals. As previously discussed, the building materials and technologies are what make the concept of sustainable building possible. And the concept of sustainability appears to be what stakeholders take note of the most in investment decisions. Investors are not concerned with the whole building concept; they value tangible savings in areas including a noticeable decrease in annual heating and cooling costs. It is the measurable impacts that appraisers need to include in their analysis of real estate property. But how do you measure the value impact of concepts' and features'?

### *Availability of Data and Information*

This deficiency is supported by the need for more data and information expressed by survey respondents in Question 22 (Figure 4.7). This group of participants was asked the same question regarding information and tools they feel are needed to valuate sustainable building features, but are

not currently available to them. Similar to the first group, all of the respondents included their desire to have more information regarding economic costs and benefits, and specific property characteristic information. In regards to searchable databases, adequate market data, comparable sales data and updated MLS listings are desired.

Opportunities for appraisers to gain additional experience and education on appraising green building features outside of the mandated curriculum are available in the industry. Examples of these opportunities were previously presented in the research implementation section of this paper. When asked if they had participated in any of the listed opportunities, 4 respondents indicated that they had participated in continuing education courses, 1 indicated they had participated in the AI Designation Programs, and 1 indicated they had not participated in any of these opportunities due to cost and travel distance (Table 4.19). No respondents had participated in professional development programs.

### Summary of Group Two Data Analysis

The analysis of Group 2 data discovered perspectives from those survey participants that were not aware of appraisal methods and practices relative to sustainable building features. First, these respondents confirmed that there are appraisers practicing in the industry currently that lack the knowledge and experience of how to consider sustainable features in property appraisal. However, after being given a list of examples of sustainable building features within the survey, it was discovered that some of the appraisers were able to say that several of these features were considered in appraisal assignments. The idea that insufficient definition of sustainability concepts and elements coupled with educational deficiencies challenges stakeholders in progressing toward sustainable value integration as a standard is supported by further data analysis.

Second, overall the respondents were not satisfied in their ability to recognize sustainable features. Those features rated with higher satisfaction were those features that were similar to elements in traditional buildings. The challenge here lies in how to measure and quantify the impacts of

the sustainable features. The respondents also rated their ability to valuate same sustainable features between Good and Poor. Again, without information to quantify their impacts, appraisers cannot apply these measurements and data to appraisal methods.

Finally, the availability of accurate information and data was a need expressed by all the respondents in this group, specifically, data related to economic costs and benefits as well as comparable sales, property transaction, and MLS databases. In general the participants are aware of additional opportunities for continuing education and professional development; however, these opportunities are not mandatory and not always available to those who face financial and/or location related challenges.

Several dominant themes were discovered in the data analysis process to help explain current appraisal practices and the challenges appraisers face when trying to integrate sustainable features into the process. These overarching themes of information collected from both Group One and Two present an understanding of the barriers to achieving sustainable value integration facing the real estate and building industries. The study will close with a summary of the conclusions reached through this data analysis, a discussion of the goals that were achieved within the research, and a brief presentation of direction for future research and development.

# Chapter 5: Data Analysis & Conclusions

## Summary of Research Results

The study confirmed the current status of sustainable value integration in Colorado as progressing with sustainable building features being recognized and considered in appraisal assignments by 82% of survey participants (Table 4.4). Appraisers confirmed that all building attributes, sustainable and otherwise, should be included in the appraisal process; however some remain unsure and inconclusive of market interaction due to limited information and data, or their lack of experience or knowledge (Figure 4.3). While the majority of appraisers that have experience appraising sustainable features noted seeing sustainable value integration within the last 7 years (Table 4.5), there remain several dominant challenges facing appraisers and stakeholders within the sustainable value integration process. These challenges are summarized below.

First, sustainable feature recognition remains a challenge for a portion of the appraiser population. It was discovered that not all appraisers are able to recognize and therefore, consider sustainable building features for the final appraisal value (Table 4.2). While the definition of sustainability remains ambiguous and broad, appraisers must decipher the impacts of individual sustainable features as well as those features that create systems within a building to achieve broader sustainability concepts. However, unless appraisers are given specific information about a property's features, they are more likely to incorporate those that are visible over those that are not. Despite these challenges, sustainable building features cannot be ignored.

Within the standard property appraisal process established by USPAP, an appraiser must examine the subject property and gather all information on the property's market area, physical characteristics, and market data on comparable properties. Therefore, it will be important to the future

success of sustainable value integration in the industry to include sustainability as a topic in the standard curriculum of appraiser education.

Second, the study discovered that even though appraisers are able to recognize sustainable building features, they are continually challenged by the inability to measure and quantify their economic impacts. Property is a heterogeneous product that lives in constantly evolving real estate markets. Because of this, respondents revealed in the study that they were unsure of how to develop a standardized system to measure sustainable building features. The research showed that the data inputs relative to the sustainable features being recognized by appraisers now (Table 4.3), fit into the current appraisal process described for conventional building attributes. Currently, economic cost and benefits such as return on investment, rent premiums and utility savings are the primary focus of appraisers' investigation of sustainable building features.

Appraisers rely on measureable, verifiable data to create an accurate opinion of market value. Information obtained from energy modeling, performance ratings, and utility bills for those buildings with sustainable features are recommended sources to provide this documented data for appraisers. If this information is not available, the appraiser must find other methods of calculating or obtaining this information, but these processes are not yet standardized. Also, the industry has not yet defined a process to recognize those intangible benefits of sustainable building features, like healthier indoor air quality and higher occupant satisfaction. The standard appraisal process dictates that appraisers collect the property data and then perform their analysis according to an appraisal approach. Therefore, in order to consider the impact that sustainable building features have on property value, the benefits of the features first need to be measured and quantified. Without this data, appraisers cannot conduct a comparative analysis.

Third, the study found that appraisers are challenged with a lack of information and data related to sustainable building features. When examining the subject property, appraisers have noted that they

do not get enough information from the builder or owner up front regarding any sustainable features that have been implemented in the property. Product specifications provided to the appraiser by the builder or owner would provide relevant information to conduct research on the products' performance capabilities and thus to estimate an economic value. It was discovered that 74% of respondents that have appraised property with sustainable features require documentation to validate the appraisal (Table 4.7). Research confirms that uncertainty creates risk for the appraiser. Therefore, reliable, documented information is preferred to reach an accurate estimation of value. Appraisers expressed a need for updated, searchable databases including MLS Listings, comparable sales, property transaction, and market data to determine if these features are recognized by the market. This information is crucial to reaching a conclusive opinion of property value.

After the data analysis has been conducted on property features, the appraiser must report on the results, according to the USPAP standards. Sufficient information and data need to be available for appraisers to use as comparison to other values in real estate markets. Using this information, the appraiser will determine which property features the market has recognized. Their report will include the property and market data and adjustments made to value along with justification for those adjustments. These appraisal reports build on existing property and market data and support future property transactions.

To achieve sustainable value integration in all appraisal practices in Colorado, these three major challenges need to be addressed and mitigated. It will be important for appraisal professionals to gain a fluent understanding of sustainable building methods, materials and technologies through standardized curriculum to be able to recognize and incorporate into their appraisal assignments. The continuing education of appraisers will also play a role as building practices continue to evolve. The development of processes and methods to measure and quantify impacts will be crucial to incorporating value associated with sustainable building features in the appraisal process. Thorough documentation and

communication among stakeholders related to the information needed to achieve sustainable value integration will help to solidify the foundation of sustainable building practices and provide a platform to further promote the overall value of sustainable building.

## Research Aims Revisited

The purpose of this research was to discover the current status of sustainable value integration and form an understanding of the processes and challenges facing appraisers today in Colorado real estate markets. The four research objectives of the study were:

- Investigate the nature of sustainable value integration with current market practices in Colorado
- Discover the degree of alignment between state mandated criteria for appraiser licensure and their knowledge of sustainable building techniques, materials and technologies among the current appraiser population
- Analyze the transparency of construction industry knowledge in relation to sustainable building techniques, materials and technologies to the appraisal industry.
- Explore perceptions of real estate appraisers on the economic implications of sustainable value integration.

First, the research study was successful in investigating the nature of sustainable value integration within current appraisal practices in Colorado real estate markets. The study summarized pertinent terms and provided their definitions to create parameters for the readers and the research. Next, qualification criteria and the process to obtain appraisal licensure were discussed. Then, research on the governing authority for appraisal standards and practices, laws and regulations, and the typical, step-by-step appraisal process was explained. This information provided much of the demographic information for the study pertaining to the survey participants. We were able to determine that all active appraisers in the state of Colorado had to have a valid appraisal license. This section also created

the baseline for comparison of sustainable value integration practices and regulations against the information collected in Objective Two.

Second, the research study discovered the degree of alignment between state mandated criteria for appraiser licensure and their knowledge of sustainable building techniques, materials and technologies among the current appraiser population in Colorado. Mandated curriculum for initial licensure and continuing education requirements were summarized for the General Property Appraiser certification as stipulated by USPAP and the state of Colorado. Education opportunities targeting sustainability topics specifically were not present in the initial curriculum, but were offered in continuing education opportunities. Then, the researchers investigated primary resources for sustainable building information and data provided by professional organizations to be utilized by appraisers. Here, the study achieved an understanding of the information that was readily available to the industry, even though it was not mandated in appraiser education. Finally, by comparing the mandated appraisal processes to the education and resources available on sustainable building features, the study determined that there is a deficiency in the expectations of the appraisal process and the qualification and education requirements of those who are able to appraise. In other words, USPAP requires that appraisers are competent to assess all features of a property; however, those seeking licensure are not required to learn about sustainable building features.

Third, the research study aimed to analyze the transparency of construction industry knowledge in relation to sustainable building techniques, materials and technologies compared to the appraisal industry. The researcher's utilized information discovered in previous objectives to develop a survey targeting two groups of appraisers: (1) those with experience appraising properties with sustainable building features, and (2) those without experience appraising sustainable building features. Questions for Group One were developed to discover which sustainable features were being integrated, challenges to their integration, and those that were seen to add value. Questions for Group Two were created to

examine the appraiser's knowledge of sustainable features, their ability to recognize and valuate these features, and their experience with continuing education opportunities. The researchers were successful in pulling together contact information for 322 active, licensed appraisers in Colorado using the National Appraiser Registry and the AI Member Registry. Then, using Qualtrics to build and distribute the survey, data was successfully collected from 50 survey respondents. Due to the small survey population size, the conclusions drawn from the data collected may not be generalizable to the entire appraiser population, but they do represent a beginning to understanding the challenges behind the nature of sustainable value integration practices.

One limitation to the study lies in the survey questions. The researchers wanted the survey to be short and easy to understand so that it would attract more participants. Overall, it was successful in getting a high response rate; however, both groups could have been asked more of the same questions in order to get more information and data on each question. For example, it would have been interesting to see how the Group One survey participants would have responded to their ability to recognize and valuate sustainable building features. Although this question was only asked of Group Two, those appraisers who had not had sustainable value integration experience, this question is also relevant to this Group One.

Fourth, the research study aimed to explore perceptions of real estate appraisers on the economic implications of sustainable value integration. The study was successful in discovering and reporting on the quantity of the survey population that was aware and unaware of sustainable value integration methods and practices. Those sustainable building features that were being considered and those that appraisers felt should be considered were included in the study. Appraiser perceptions on those features that add value to a property and the challenges to realizing their potential for impact were also revealed. Through the analysis of the data, the study was able to draw conclusions on three challenges to achieving sustainable value integration in property markets in Colorado: (1) sustainable

feature recognition, (2) ability to measure and quantify economic impacts, and (3) the availability of related information and data. The data analysis also confirmed several research needs that were expressed in previous literature.

## Contribution to Existing Knowledge

The literature review proposed several needs for further investigation into the opportunities to mitigate challenges facing stakeholders investing in sustainable building practices/systems. Previous research expressed a need for further research to provide clarification on several fronts in order to achieve sustainable value integration in real estate appraisal.

First, education and continuing education requirements need to adopt sustainability into their curriculum. The research conducted in this study confirmed this need. It was found that all appraisers are not able to recognize and valuate sustainable building features despite their presence in various markets. Mandated education does not have a specific focus on sustainable building concepts and features. Continuing education opportunities related to sustainability are currently available, but not mandatory. The incorporation of education specifically focused on issues related to understanding, integrating and reporting on sustainable building features needs to be seriously considered by governing authorities in order to mitigate this deficiency in appraiser knowledge and experience.

Second, the need for a standardized measurement system to assess qualitative and quantitative benefits of sustainable building features and their economic impacts to real estate property was expressed by previous studies. This need was also confirmed by this research. Appraisal approaches are based on quantitative inputs and mathematical formulas. Survey respondents were found to be unsure of how to measure certain tangible and intangible benefits resulting from both visible and not visible building features. These respondents expressed a need for a method to measure and quantify the various economic impacts of sustainable building features and a standardized method to input these figures into an analysis. It is suggested that certain sustainable building features could be considered for

their individual impacts as well as their impacts when working as a component of an entire system. Measurement tools and assessment methods need to be created based on the outcome measurement that will be included as the input to the appraisal approach. For example, appraisers could utilize performance ratings on electricity uses or heating and cooling needs of a building to derive possible return on investment based on initial costs of equipment versus operation costs, or annual energy savings from operation and maintenance. These would provide number and dollar figures that can be compared against market data. Case studies examining the economic impacts of specific types of sustainable building features would also contribute to the body of knowledge on methods of effective integration.

Third, previous literature requested that property transaction databases be created and/or re-furbished to enable comparative studies of properties with sustainable building features. Again, this research study has confirmed that this type of information is necessary and crucial to the success of appraisers in being able to collect data and report on market value. Appraisers within this study specifically expressed a need for a new type of searchable database or MLS Listings to be updated and inclusive of sustainable building features. However, in order to do so, it is left to the appraisers and other real estate professionals to investigate each property and include this information in these databases. Even if these features have no recognition in the market, it may be useful to include that narrative with the transaction and property databases. It is also suggested that appraisers should ask owners and/or builders for product specification information to be used to validate the appraisal value.

Finally, this research study aimed to contribute to the limited empirical data available on what 'is' occurring in the property appraisal industry relative to sustainability, rather than proposing additional suppositions as previous literature had done. This study was able to discover, from a small but representative population sample, how many appraisers were considering sustainable building features in their appraisal assignments. The sustainable building features being recognized by

appraisers were discovered, but the impact these features had on final appraisal value was not. In general, the features that are being considered are those that are currently quantifiable. From those features, it was revealed that they are not being recognized by all markets, and therefore not impacting the final appraisal value. The study concludes that it will be necessary to mitigate all of the existing challenges and research and development needs in order for the building and real estate industry stakeholders to realize the full potential of sustainability to impact property value.

## What this Means for the Construction Industry

As real estate professionals and appraisers begin to dissect these challenges and develop means of mitigating them, the real estate industry will be looking to construction industry professionals for knowledge and guidance. Designers and builders have a wealth of knowledge to share about sustainable building methods, materials and technologies. Providing the real estate professionals with an understanding of how sustainable building concepts work, their reasons and goals for implementation, and methods to evaluate their performance will help appraisers progress into sustainable value integration on a strong educational foundation.

Construction professionals can also help appraisers by preparing owners for the appraisal process. Equipping owners with the right information to pass along to the appraiser will be essential. Also, taking action to inventory, catalog and record all the information and data on sustainable products and their performances as soon as they are operational will be crucial to be able to provide appraisers with this data. Owners must also understand the importance of an operation and maintenance schedule so that the performance metrics are measured annually and corrective action for operation efficiency can be taken, if necessary.

Making this type of information available as a habitual practice, the construction industry will also help to develop the body of information available in searchable databases for appraisers to utilize. This information can be used to create more accurate assessments of value as well as communicate

actual sustainable building trends to markets, stakeholders, and industry professionals. All professionals related to the construction and real estate industries will benefit from this collaboration and meeting of the minds. As these industries continue to promote sustainable building practices, it is important that the investor behind these decisions be able to reap the benefits of implementing sustainable strategies in their real estate investment. The appraisal process has shown that sustainable value integration can be achieved and realized once all stakeholders in the vicious circle of blame understand their contributions and impacts to the concept of value.

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APPENDIX I

SURVEY QUESTIONS

1. I have read and understood the above consent form and desire of my own free will to participate in this study.

2. What format do you follow in the appraisal process? Please check all answers that apply.

3. Are you aware of appraisal methods and practices to valuate sustainable building features that are implemented in real property today?

4. Have you appraised real property in which sustainable/green building features are incorporated into the valuation process?

5. When did you first notice sustainable features being incorporated into the appraisal process? Please check only one answer

6. In which building category did you first notice sustainable features being incorporated into the appraisal process? Please check only one answer

7. What building category do you most often appraise? Please check only one answer.

8. Based on the building category, you most often appraise, which sustainable features are considered in the appraisal process? Please check all answers that apply.

9. Do you require documentation of any of those sustainable features to support the appraised value?

10. Which sustainable feature areas do you require documentation for validation of the appraisal? Please check all answers that apply.

11. Based on your experience, which sustainable features add the3 most quality and economic value to a building appraisal? Please check all answers that apply.

12. What would be your preferred method of analysis to appraise the value of sustainable features in residential property?

13. In your opinion, what sustainable building attributes should be included in the appraisal process that are not currently used and why?

14. From your perspective, what information and/or tools used to valuate sustainable building features are needed but no currently available to you?

15. What building category do you most often appraise? Please check only one answer.

16. Have you been assigned to appraise real property in which any of the sustainable features listed above could be incorporated into the valuation process?

17. Which sustainable features were factors considered for appraisal in those assignments? Please check all answers that apply.

18. How satisfied are you in your ability to recognize the following sustainable features and their elements?

19. How would you rate your ability to appropriately valuate the following sustainable features and their elements?

20. There are opportunities for appraisers to gain additional experience and education on green building related to appraisal practice outside the mandated curriculum for appraiser licensure. Have you participated in any of the following?

21. Please describe the barriers that prevent you from participating in these opportunities.

22. From your perspective, what information and/or tools used to valuate sustainable building features are needed but no currently available to you?