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GREEN IS AND ORGANIZATIONAL PERFORMANCE: AN EMPIRICAL EXAMINATION

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Abstract
Using the natural resource - based perspective (NRBV) as our theoretical lens, green IS is conceptualized as comprising different dimensions of sustainability practices that can create competitive advantage for the organization. This study examine (i) the impact of adoption of green IS on organizational performance; (ii) the impact of the extent of adoption of green IS on organizational performance; and (iii) the impact of different dimensions of sustainability portfolio (pollution prevention, product stewardship, clean technologies and sustainability vision) on organizational performance. Data on green IS dimensions and performance measures of organizations are gathered from secondary sources. Results will indicate that if the adoption of green IS is positively associated with organizational performance. Further, we examine that among green IS organizations, do organizations with greater extent of adoption have better organizational performance. Finally, we examine the relationship between different sustainability dimensions and different measures of organizational performance. Findings from this study are expected to empirically demonstrate the business value of green IS.

Keywords: Green IS, Organizational Performance, Adoption, Dimensions, Sustainability
1 INTRODUCTION

With the growing concern about harmful ramifications of industrial development and urbanization and the challenges it poses for future generations in terms of climate change and depletion of natural resources, there is an increasing need to focus on the utilization of resources with minimal negative impact on our environment and their conservation for future generations. “Sustainability” is defined as “the way of utilizing resources, which meets the need of present generation without compromising the ability of future generations to meet their own needs” (WCED 1987). In earlier days, the concept of sustainability was primarily used with reference to society and its emphasis was on excessive consumption by society. However, an understanding of the fact that organizations are major consumers of natural resources led to the emphasis on organizations as drivers of sustainable society (Ekins 1993). This realization led to increased focus on corporate social responsibility (CSR) (Norman and MacDonald 2004), which is defined as an organization’s obligations to pursue decisions, to make decisions and to follow actions that are compatible with the objectives and values of society (McWilliams and Siegel 2001). Organizations started contributing to society by engaging in community development but soon realized that this approach emphasizes CSR as a voluntary engagement with weak linkages to organizational performance (McNamara 2006).

Compared to CSR, which is narrow in focus, sustainability in the enterprise context has been defined as the achievement of sustainable development by delivering economic, environmental and social benefits (Hart et al. 2003). This three-pronged benefits approach, termed as “triple bottomline”, is closely linked to organizational performance. It even extends the metrics of organizational performance beyond economic benefits to social and environmental benefits. The debate around sustainability has emphasized the exponential increase in societal and organizational needs with respect to finiteness of resources (Meadows et al. 1972). There are three key effects that can balance the mismatch between needs and resources, namely, changes in composition of outputs, substitution of inputs and technological development that facilitate more efficient utilization of limited resources (Lecomber 1975). Recent years have witnessed a proliferation of advanced technologies and their dominance in shaping organizations and society. The dominance of technology as a key influencer of modern society implies its salience in sustainability and hence an increased focus on its role in contributing to sustainability for organizations.

Information systems (IS) can play the role of facilitator in ensuring efficient utilization of resources and in reducing the adverse impact on environment emanating from various organizational processes through developments such as energy analytics (Watson et al. 2010). However, IS is also associated with negative impact on the environment in terms of carbon footprint. Computing technologies such as servers and data-centers contribute about 2% - 3% of global carbon footprint (Berns et al 2009). In addition, with the proliferation of IT, they are becoming major consumers of energy. This realization has led to the emergence of “green IT” which refers to computing technologies, which are energy-efficient as well as have minimal adverse impact on the environment. Such technologies are also termed as sustainable IT (Walsh 2007). While green IT directly influences an organization’s environment footprint by reducing energy consumption and better utilization of computing resources, green IS, which is referred to as development of systems to support practices aimed at managing environmental footprint, influences organizations indirectly (Boudreau et al. 2008).

We consider these two practices together as both of them are highly interrelated. Hence, we use the term “green IT” and green IS” interchangeably. The growth of green IT establishes the role of technology in ensuring the sustainable use of our natural resources. Consequently, the role of technology is changing from a facilitator in business operations to a facilitator in sustainable business operations. Recent research has primarily focused on the institutional factors that facilitate the adoption of green IS. These research have emphasized the role of regulatory norms and policies in promoting organizational adoption of green IS (Chen et al. 2009). In addition, a framework, which laid down various dimensions of organizational readiness for the adoption of green IT, has been developed (Molla et al. 2009). This framework emphasized the role of dimensions such as attitude and policy in facilitating adoption of green IT by organizations.
Despite increasing interest in the field of green IS, empirical research in this area is still relatively sparse. A recent survey reveals that factors such as increasing awareness among consumers regarding sustainability and rapid depletion of natural resources are salient in organizations’ adoption of sustainability practices (Berns et al. 2009). Such factors impact organizational performance and hence raise the question - what is the impact of sustainability practices, specifically, green IS on various dimensions of organizational performance? Since organizations are primarily driven by profit motive and hence are concerned about the return on investment (ROI), there is a need to investigate whether organizations that adopt green IS are performing better. In addition to the distinction between the performance of those organizations that have adopted green IS and those who have not, there is also a need to examine differences in performance of organizations that have adopted green IS more comprehensively and those that have adopted it less comprehensively. In other words, is greater extent of adoption of green IS practices necessarily better?

A sustainability portfolio is conceptualized to compose of four key dimensions: pollution prevention, product stewardship, clean technologies and sustainability vision (Hart 1997). Organizations may adopt one or more dimensions of the sustainability portfolio. Further, different dimensions may have different impact on different measures of organizational performance. This raises another research question on the impact of adoption of various dimensions of sustainability portfolio on different measures of organizational performance. Hence, we examine three key research questions in this study:

**RQ1**: Do organizations that have adopted green IS perform better on different dimensions of organizational performance?

**RQ2**: Do organizations that have adopted green IS more comprehensively perform better compared to those organizations that have adopted it less comprehensively?

**RQ3**: What is the impact of different dimensions of sustainability portfolio on different dimensions of organizational performance?

## 2 CONCEPTUAL DEVELOPMENT

The interest in sustainability has grown in the last decade due to increasing concern about climate change. Prior research has examined the concept of sustainability (Hart 1997; Hart 2003) as well as the role of IS in facilitating environmental sustainability (Jokinen et al. 1998). The impact of technology on the environment and its implications for sustainability have also been discussed in prior literature (Roome and Park 2000; Sui and Rejeski 2002). In recent years, researchers have examined the environmental impact of specific technologies such as Web 2.0 (Kazlauskas and Hasan 2009), and specific IT processes like Business Process Management (BPM) (Ghose et al. 2009). Research has examined factors that influence the adoption of green IS (Molla et al. 2009). Hart (1997) proposed various sustainability practices as a portfolio of four different dimensions, each with a different focus. The prominence of IT and related policies in sustainability initiatives across the globe (Berns et al. 2009) suggest that general classification of sustainability practices will also be applicable in the context of green IS.

Hart’s Sustainability Portfolio comprises four dimensions: pollution prevention, product stewardship, clean technology, and sustainability vision. Pollution prevention refers to avoiding or controlling pollution using technology or policies. Product stewardship refers to the practice of enhancing the environmental friendliness of upstream and downstream supply chain management (Chen et al. 2009). It refers to practices that are aimed at reducing the overall life cycle cost of a product (Shrivastava and Hart 1995). While pollution prevention is solely focused on daily operations and its impact, product stewardship is focused on adverse environmental impact in the delivery of the product, its life cycle and its disposal. Clean technology refers to the development of technologies that reduces adverse environmental impact of products or services offered by organization (Hart and Dowell 2011). Sustainability vision refers to the roadmap, which guides organizations to develop products and services aimed at reducing adverse environmental impact (Hart 1997). Organizations
may have detailed roadmap to address the entire gamut of issues such as societal issues, environmental issues, and technological issues.

The sustainability portfolio provides a simple, yet elegant classification of various sustainability practices. The dimension(s) that organizations engage in depends on their sustainability focus. For example, logistics organizations are focused more on their supply chain and hence, their sustainability practice may revolve around reducing waste and pollution along the supply chain. Other organizations may invest in clean technologies without engaging in other dimensions of the sustainability portfolio.

The engagement of organizations in different sustainability practices represents a portfolio of resources that competitors cannot easily acquire, develop and use as there are institutional barriers (Molla et al. 2009), various organizational issues such as culture, strategy imperative (Chen et al. 2009) and also technological prowess of an organization (Berns et al. 2009). Hence, adoption of green IS may help organizations to acquire a competitive advantage. However, the resource-based view (RBV) does not take into account the constraints posed by the natural environment such as limited natural resources (Hart 1995). In order to address this missing link between organizations’ sustained competitive advantage and natural environment constraints, an adaptation of the RBV termed as natural – resource based view (NRBV) was proposed by Hart (1995). The NRBV initially argued for three specific capabilities namely pollution prevention, product stewardship and sustainable development. Pollution prevention and product stewardship were conceptualized as dimensions with distinct focus on eliminating sources of pollution and life-cycle management of products respectively. Sustainable development is not only restricted to environmental concern but also focuses on economic and social concerns (Hart 1995). In recent years, sustainable development strategies has been reconceptualized as being composed of two distinct areas namely clean technology and base of the pyramid (BoP) (Hart and Dowell 2011). Clean technology emphasizes the development of technologies that meet human needs without straining earth’s natural resources. BoP is focused on the creation of market in poverty-ridden parts of the world, and eradicating poverty by serving this market. Sustainability vision, which is the fourth dimension of sustainability portfolio, encompasses the BoP as BoP is restricted to creation of a market in poverty ridden part of the world, whereas sustainability vision comprises of not only vision for creation of new market but also new products, process, technologies and solutions to address various social, economic and environmental problems.

Prior research on IT value have examined the relationships between IT investments and different measures of organizational performance such as profitability (Bharadwaj 2000), operational performance (Zhu and Kraemer 2002), market valuation (Hitt and Brynjolfsson 1996), and innovation (Aral and Weill 2007). These performance measures are found to be distinct and trade off with each other (Aral and Weill 2007). Following them, we examine the relationships between green IS and different measures of organizational performance such as profitability, operational performance, market valuation, and innovation. The theoretical lens of NRBV enables us to examine the impact of green IS as a whole on the various dimensions of organizational performance, as well as the impact of specific dimensions of sustainability portfolio on different dimensions of organizational performance.

3 RESEARCH MODEL AND HYPOTHESES

Our research model combines the sustainability portfolio with organizational performance. There are three parts in this study. First, we compare differences in performance of organizations that have adopted green IS and those that have not. Second, we examine the relationship between the extent of green IS adoption and organizational performance. Third, we examine the relationship between different dimensions of sustainability portfolio and different measures of organizational performance.

3.1 Adoption/Extent of Green IS and Organizational Performance

Adoption of green IS also involves the successful use of IT, as organizations that are able to successfully imbibe it are able to integrate technology with people and processes (Lapointe and
Rivard 2007). At the organizational level, adoption of green IS can bring many advantages such as reduced energy consumption (Watson et al. 2010), overall cost reduction and revenue growth (Mithas et al. 2010). Organizations that have adopted green IS can improve organizational performance in different ways. First, by reducing cost of operations through reduction in energy expenditure, waste disposal costs and more efficient utilization of resources (Hedwig et al. 2009; Watson et al. 2010). Second, by increasing revenue by introducing green products that will allow organizations to differentiate from their competitors and even claim premium on their products (Ambec and Lanoie 2008). The adoption of green IS will also reduce organization’s compliance and liability cost (Rooney 1993). It will also facilitate cost-reduction for organizations because of the reuse of the products at the end of the product life cycle. Adoption of sustainability practices will result in positive impression in minds of consumers due to increasing awareness on global warming and climate change. This will result in enhanced revenue, as consumers will prefer products from such organizations. This leads to the following hypothesis:

**H1:** Adoption of green IS is positively associated with different measures of organizational performance.

We draw upon NRBV (an adaptation of RBV) to examine the relationship between green IS and organization performance. We examine whether the extent of adoption of green IS characterized by adoption of different dimensions of sustainability (pollution prevention, product stewardship, clean technology, and sustainability vision) has positive impact on different dimensions of organizational performance. An organization may be engaged in one or more dimensions of sustainability portfolio. An organization engaged in all dimensions of sustainability portfolio has imbibed green IS more comprehensively compared to those that have adopted just one dimension. An organization that has adopted green IS more comprehensively will positively influence different organization’s functions and different drivers of costs and revenue. Greater extent of adoption of green IS will demonstrate that the organization is sincerely committed towards the environment, thereby resulting in better corporate image and reputation. We therefore hypothesize:

**H2:** Extent of adoption of green IS is positively associated with different measures of organizational performance.

### 3.2 Sustainability Portfolio and Dimensions of Organizational Performance

Prior research with regards to IS/IT has examined the impact of different classes of IT on different dimensions of organizational performance. Prior research such as Aral and Weill (2007) classified IT into different categories such as Transactional IT, Informational IT and Strategic IT and empirically examined the impact of various categories on different dimensions of organizational performance. The research found support for the view that different categories of IT have different level of impact on different dimensions of organizational performance. In a similar vein, we also suggest that different dimensions of green IS portfolio (pollution prevention, product stewardship, clean technology, and sustainability vision) will have different level of impact on different dimensions of organizational performance. The rationale is that different dimensions have different orientations and hence they are appropriate for specific organizational objectives rather than serving all organizational objectives and influencing all dimensions of organizational performance in similar manner. Pollution prevention is aimed at reduction in pollution generated by organization’s operations (Chen et al. 2009). This will enable organizations avoid the cost of pollution treatment. Pollution prevention also encompasses practices that improve the energy efficiency of IT hardware and software as energy efficiency is inter-linked to pollution emissions (Worrell et al. 2009). This implies that pollution prevention has an impact on energy consumption as well. Hence, pollution prevention reduces the energy expenditure, thereby affecting the bottom-line of organizations. In addition, organizations that are engaged in pollution prevention may get various benefits due to various institutional practices. Many countries are imposing taxes on practices that are detrimental to the environment (Molla et al. 2009). By engaging in pollution prevention, organizations may avoid incurring such expenses. It will also help to enhance market valuation, as investors will view the firm favorably.
Organizations that are engaged in product stewardship will engage in practice of recycling and waste disposal. Such practices will involve application of IS to enhance the environmental friendliness of upstream and downstream supply chain (Chen et al. 2009). Hence, product stewardship enhances efficient utilization of resources by promoting use of recycled materials compared to new raw materials. In addition, it facilitates better utilization of resources due to management of entire life cycle of product. The launch of environmentally friendly initiatives by organizations creates positive corporate image and reputation for the organization. Investment in clean technologies facilitates development of greener products and greener processes by organizations (Hart 1997). Clean technologies help organizations to achieve reduction in material and energy consumption (Hart and Dowell 2011). Clean technologies enable organizations to differentiate their products from competitors and thus acquire sustained competitive advantage. It allows organizations to create a new market segment and improve their revenue. Sustainability vision provides a broad roadmap for the various sustainability initiatives. A comprehensive sustainability vision encompasses areas such as new markets, products and processes, and development of new technologies. Focus on these areas indicates the organizations’ willingness to seize new opportunities by assuming leadership roles in environmental, economical and social well-being. A comprehensive sustainability vision will support and provide directions in decision-making processes to improve organizational performance. A comprehensive vision will demonstrate more commitment from organizations on the sustainability front and will thus have a stronger impact on corporate reputation and image. We summarize our arguments in form of following hypothesis:

**H3:** Different sustainability dimensions are positively associated with different measures of organizational performance.

We have hypothesized distinct relationships between different sustainability dimensions and different measures of organizational performance. However, due to page limit, we could not discuss our research model in detail. Please refer to appendix A and B for the detailed model and hypotheses.

**4 METHOD**

**4.1 Sample Preparation**

We intend to use secondary data for testing our hypotheses. We have compiled a list of organizations from four sources: BusinessWeek Green Ranking (BW500) in 2009 and 2010, Dow Jones Sustainability Index (DJSI), and Corporate Register Magazine. The Corporate Register’s black list provided us the names of thirty organizations that are the least transparent about their sustainability initiatives. Such organizations are also members of Russell 1000, which is “a stock market index measuring the performance of large-cap segment of US equity index” (www.Russell.com 2011). We use this list as representative of organizations that are the laggards in the adoption of green IS or any sustainability practices. We call them “black” organizations. The BW500 (2009, 2010), the DJSI index provided the list of organizations that had adopted sustainability practices. From these lists, we extract organizations that have adopted sustainability practices for past 6-7 years. We further intend to classify organizations as green IS and non-green IS organizations based on the presence of IT artifacts such as IT infrastructure and IT policies as the criteria for distinguishing between green IS organizations and non-green IS organizations. We have developed a list of IT artifacts based on literature review of research focused on green IS and the list includes IT technical infrastructure (hardware and software) (Molla et al. 2009), IT policy (e.g., procedures regarding deployment and utilization of IT infrastructure) (Goasduff and Forsling 2007), deployment of IT in the environment management (Watson et al. 2010), IT to provide information to support decision making, IT tools for collaboration and IT for delivery of sustainable products and services (Corbett 2010).

We intend to examine the sustainability reports of various organizations to categorize their sustainability practices. The sustainability reports of various organizations are publicly available on organizations’ website. In some cases, we also intend to refer to organization’s website as such organizations do not publish their sustainability reports but they discuss their various initiatives on their website that is dedicated to sustainability practices. Pollution Prevention (PP) can be measured...
by two categories as proposed by Hart (1997): (i) organizations do not engage in pollution prevention. The focus is to control pollution by reducing its adverse impact through pollution treatment; and (ii) organizations engage in pollution prevention. Product Stewardship (PS) can be measured by two categories: (1) where there is absence of product stewardship as organizations are focusing on environmental friendliness of only one direction in supply chain (either upstream or downstream) or not at all focusing on the environmental friendliness of supply chain; and (2) presence of product stewardship as organizations are engaged in initiatives aimed at enhancing the environmental friendliness of both upstream and downstream supply chain management. Clean Technology (CT) can be measured by two categories: (1) organizations that develop and introduce clean technologies; and (2) organizations that do not develop and introduce clean technologies. Sustainability Vision (SV) can be measured based on Hart’s (1997) framework that encompasses six areas: vision toward the solution of social problem, vision toward the solution of environmental problem, vision toward the development of new technologies, vision toward the development of new market, vision toward the development of new processes and vision toward the development of new products. An organization can have vision towards one or more area. We can classify organization’s sustainability vision into two categories: (1) Presence of comprehensive sustainability vision that indicates that the organization has a comprehensive sustainability vision in five or six areas; and (2) Absence of comprehensive sustainability vision”, which implies that organization is lacking in two or more areas. The number of practices, which organizations engage in, is measure of the extent of adoption of green IS by organizations.

We operationalize profitability using net margin, and return on assets (ROA), operational performance using cost of goods sold, market valuation using Tobin’s Q, and innovation using number of patents applied for by an organization. These measures are widely used in prior research such as Hitt and Brynjolfsson (1996), Bharadwaj et al. (1999), Bharadwaj (2000), Zhu and Kraemer (2002), and Joshi et al. (2010). In this study, we intend to use organization size and industry as control variables. We can measure size as the log of number of employees and industry type can be captured using 2 digit standard industry classification (SIC) code. Prior research have used 2 digit SIC codes as control variables (Takeuchi et al. 2009; Lenox et al. 2010). The inclusion of 2-digit SIC code as control variable has been found to improve explanatory power of the model by accounting for variance unexplained by other variables (Lenox et al. 2010). By controlling for industry, we also control for industry specific characteristics such as industry concentrations, and regulations and industry specific variations in organizational performance. Previous research related to IS value has argued for the greater impact of IS on organizational performance in recent time periods as compared to older time periods (Dewan and Ren 2009). In order to control for the effect of time on various organizational performance measures, prior research has often included time as a control variable. In this study, we intend to follow a similar approach as other time related factors such as impact of macro-economic variables on measures of organizational performance are also controlled when we control for temporal effects. The inclusion of time controls for potential sources of unobserved heterogeneity (Lenox et al. 2010). To control for endogeneity due to reverse causality, we will use lagged measures of organizational performance. We will use two year lagged measure of organizational performance as our dependent variables as prior studies (e.g., Brynjolfsson 1993) have found that IT has the strongest organizational impact two to three year after adoption. We intend to gather organizational performance-related data from COMPUSTAT database, which is a widely used data source in research involving organizational performance measures.

### 4.2 Empirical Specification

Our empirical specifications are as follows:

**Model 1**

\[
\text{(Organizational Performance)}_{i,t+2} = \alpha_i + \beta_1 \text{(Adoption of Green IS)}_{i,t} + \chi_1 \text{(Size)}_{i,t} + \delta_1 \text{(Industry Classification)}_{i,t} + \text{(year)} + \epsilon_{i,t}
\]

**Model 2**

\[
\text{(Organizational Performance)}_{i,t+2} = \alpha_i + \beta_1 \text{(Extent of Green IS)}_{i,t} + \chi_1 \text{(Size)}_{i,t} + \delta_1 \text{(Industry Classification)}_{i,t} + \text{(year)} + \epsilon_{i,t}
\]
Model 3

\[(\text{Organizational Performance})_{i,t+2} = \alpha_1 + \beta_1 (\text{PP})_{i,t} + \beta_2 (\text{CT}) + \beta_3 (\text{SV}) + \chi_1 (\text{Size})_{i,t} + \delta_1 (\text{Industry Classification})_{i,t} + \text{(year)} + \varepsilon_{i,t}\]

4.3 Future Analysis Plan

We have successfully identified the reliable sources of data that meets our research objectives. We intend to use panel data analysis as we have longitudinal data set. We intend to use both fixed-effect and random-effect model to ensure that our estimates are robust. In addition to these models, we also intend to use panel data models for endogenous covariates to test the robustness of our model.

5 EXPECTED CONTRIBUTIONS

Our study is expected to make the following contributions. First, while the business value of green IS has been theoretically recognized in prior literature (Watson et al. 2010), no prior empirical studies have compared the organizational performance of green IS organizations and organizations that have not adopted sustainability practices at all. We intend to fill this gap by comparing adopters of green IS and non-adopters of sustainability practices (black organizations) in terms of various dimensions of organizational performance. In doing so, we intend to provide empirical evidence of the performance impact of green IS. Second, we plan to do a detailed analysis of various sustainability initiatives of organization based on archival data such as their sustainability reports, and information on their website. This will allow us to go beyond the case study and survey approaches adopted in some recent empirical work on green IS such as Mithas et al. (2010), and Thambusamy and Salam (2010). These works are based on perceptual data (survey) or lack generalizability (case study). In contrast, our analysis is based on objective measures of organizational performance and the various sustainability initiatives reported by organizations. In addition, our analysis spans more than a single point of time and thus our results will indicate the impact of green IS on organization performance over a longer time period. We intend to empirically examine if the adoption of more dimensions of sustainability portfolio will have positive or negative influence on different dimensions of organizational performance. Prior research such as Aral and Weill (2007) has found support for the dissimilar impact of different IT classes on different measures of organizational performance. We investigate the relationships between different sustainability dimensions and different measures of organizational performance. The findings will provide important insights on the differential impact of different dimensions of sustainability portfolio on different dimensions of organizational performance. From a methodological standpoint, our study contributes to IS research by proposing a fairly novel but useful approach of utilizing the sustainability reports of organizations. This approach can be utilized extensively in future research as it overcomes the issue of relative scarcity of sustainability data. By providing literature-driven characterization of various sustainability dimensions, which are grounded in Hart’s sustainability portfolio (1997), we offer a useful approach to measure sustainability dimensions using archival data.

6 CONCLUSION

In conclusion, despite an extensive recognition on the importance of green IS in improving performance of organizations, there is little empirical research on business value of green IS. This study intends to address this gap by empirically establishing the link between adoption of green IS and measures of organizational performance. Our study is not restricted to examining the impact of adoption of green IS, but also intends to examine the impact of extent of adoption of green IS and different dimensions of green IS practices on organizational performance. This will indicate whether comprehensive adoption of green IS is better for organizations, and demonstrate the business value of distinct green IS practices. Although this study provides an initial step, the notion of sustainability portfolio and NRBV offers a rich theoretical framework with considerable potential for further enhancing our understanding of the performance impact of green IS in organizations.
References


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APPENDIX A

Figure 1. The Research Model

APPENDIX B

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Proposed relationship*</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a</td>
<td>Adoption of green IS---&gt; Profitability</td>
<td>Reduction in cost of operations and more efficient utilization of resources.</td>
</tr>
<tr>
<td>H1b</td>
<td>Adoption of green IS---&gt; Operational performance</td>
<td>Efficient utilization of resources.</td>
</tr>
<tr>
<td>H1c</td>
<td>Adoption of green IS---&gt; Market valuation</td>
<td>Positive impression in minds of consumers</td>
</tr>
<tr>
<td>H1d</td>
<td>Adoption of green IS---&gt; Innovativeness</td>
<td>Creation of new knowledge to facilitate green IS effective utilization</td>
</tr>
<tr>
<td>H2a</td>
<td>Extent of green IS---&gt; Profitability</td>
<td>Greater extent of adoption of IS enables organizations to develop enhanced capabilities owing to greater acquisition and assimilation of knowledge.</td>
</tr>
<tr>
<td>H2b</td>
<td>Extent of green IS---&gt; Operational performance</td>
<td></td>
</tr>
<tr>
<td>H2c</td>
<td>Extent of green IS---&gt; Market valuation</td>
<td></td>
</tr>
<tr>
<td>H2d</td>
<td>Extent of green IS---&gt; Innovativeness</td>
<td></td>
</tr>
<tr>
<td>H3a</td>
<td>PP, CT, SV ---&gt; Profitability</td>
<td>PP: Organization’s net profit will increase due to reduction in cost. CT: Enable organizations to differentiate their products from competitors. SV: A broad road map supports other dimensions and hence will result in enhanced profitability.</td>
</tr>
<tr>
<td>H3b</td>
<td>PS, SV---&gt; Operational performance</td>
<td>PS: Efficient utilization of resources associated with product life cycle. SV: A broad road map supports other dimensions and hence will result in improved operational performance.</td>
</tr>
<tr>
<td>H3c</td>
<td>PP, CT, SV ---&gt; Market valuation</td>
<td>PP: Enhance market valuation, as investors will view the organizations favorably. CT: Create positive corporate image and reputation for the organization. SV: Demonstrate more commitment from organizations on sustainability front and thus have a stronger impact on corporate reputation and image.</td>
</tr>
<tr>
<td>H3d</td>
<td>CT, SV ---&gt; Innovativeness</td>
<td>CT: Development of CT requires assimilation of new knowledge within organizations. SV: A clear vision for new technology, product or process will positively support organization’s initiatives aimed at development of new technology, product or process.</td>
</tr>
</tbody>
</table>

Table 2. Hypotheses (All hypothesized relationships are positive relationships)