CHAPTER IV
CONCEPTUAL MODEL AND RESEARCH HYPOTHESES
FORMULATION

4.1 INTRODUCTION
As explained in chapter 3, the framework conceptualised for green IT consumers’ purchasing behaviour consists of linking and independent variables. As stated earlier the impact of all these enablers were considered in past green IT studies. To study the holistic approach of all these enablers on consumers’ purchasing behaviour of green IT products, this chapter attempts in formulating the hypothesised relationships among the enablers of the proposed framework developed by ISM methodology with the support of theoretical justification from the literature. Fifteen factors involved in the proposed model, which studies the direct impact of six factors on green purchasing behaviour. However, some other identified variables are involved in the model to study their mediating and casual effect on other variables and also to understand the interrelationships among them. Therefore, this chapter discusses how the research hypotheses are formulated which are aimed to be tested after successful validation of the model are discussed in detail. In this chapter, the objectives are laid as follows:

- To propose a conceptual model and examine the impact of green IT enabling factors on green purchasing behaviour.
- To establish interrelationships among green IT enablers as shown in the hypothesised paths.
- To gain in-depth insight of the green IT enabling factors.

4.2 CONCEPTUAL MODEL
The conceptual model developed for this study is presented in Figure 4.1. Here the green purchasing behaviour is considered to be a dependent variable, whereas environmental consciousness, Kyoto protocol, global warming, corporate social responsibility, power
consumption, e-wastage disposal, financial benefits, eco-labeling and certifications, psychological factors, corporate perception, product performance, consumer demand and preferences, market players and sustainable strategy are independent variables. The ISM based conceptual model postulates some of these enabling factors have direct and some other have indirect relationship on green purchasing behaviour as shown in the path from Figure 4.1.
Figure 4.1 Model of Consumers’ Purchasing Behaviour for Green IT Products Showing Hypothesised Relations
4.3 FORMULATION OF HYPOTHESISED RELATIONSHIPS
Above Figure 4.1 represents the model of consumers’ purchasing behaviour for green IT products with hypothesised relations. The role of each enabler and the possible hypotheses formulated are discussed as below.

4.3.1 Role of Environmental Consciousness
The relation between green purchasing behaviour, ecological conscious consumer behaviour and green purchase intention empirically showed that ecological consciousness has high impact on green purchasing behaviour than the consumer’s intention, however psychographic variables are much relevant to green purchasing behaviour than the social-demographic variables (Gary Akehurst et al., 2012). Environmental consciousness moderates in explaining green purchasing behaviour from low to high in different studies (Tahir et al., 2011). It is therefore expected that consumers who are environmentally conscious are more likely to purchase products and services which they perceive to have a positive impact on the environment in attaining sustainability (Roberts, 1996). As there is no evidence of empirical association between environmental consciousness and sustainable strategy, in this study it is intended to test their relationship and therefore hypothesised that:

HI: Environmental consciousness will have a positive and direct effect on sustainable strategy in improving green purchasing behaviour.

4.3.2 Role of Kyoto Protocol
In understanding concerns for environmental issues and consumer purchase preferences, some inferences are provided with empirical evidence to the public policy makers and marketers (T.S. Chan, 1996). An empirical study on green purchasing practices supports the hypothesis “the buying firm’s involvement in green purchasing is positively related to their perceived importance of environmental regulatory compliance” (Hokey and William, 2001). The Hewlett Packard company now is focusing on manufacturing and promoting extensively green IT products with the introduction of new regulations by the European Union in terms of reducing power consumption, electronic disposals, eco-labeled products (Prijat and Genady,
Further these regulations are driving corporate sectors to go for green procurement. It is found that there is a significant positive relationship between government regulations and green purchasing by involvement of corporate social responsibility (Tarig et al., 2010; Min and Galle, 2001; Preuss, 2001). While some studies showed there is no significant relationship between these two (Zhu et al., 2007a, b). Hence it is necessary to understand the role of Kyoto protocol (European Union regulations) on corporate social responsibility which was not studies so far. Hence it is hypothesised that:

\[ H2: \text{Kyoto Protocol will have a positive and direct effect on corporate social responsibility.} \]

4.3.3 Role of Global Warming
The IT industry worldwide is responsible for 2% of global warming with 820 million tons of emission per year (Simon Mingay, 2007; Castro, 2009; Paul Budde, 2010; A.O’Flynn, 2010). Also the global emissions of carbon dioxide increased by 3% in 2009, reaching a record high of 34 billion tons in 2011 and expected to reach 6% by 2020 (Luis Neves, 2008). Most industrialised countries like China, United States, European Union, India and Russia followed by Japan are among the top 5 in releasing carbon emissions. From the market research studies, it is understood that the consumers who really bother for environmental pollution due to the products consumption emitting greenhouse gases and thereby leading to ozone depletion are showing interest to buy eco-friendly and recyclable products (Ishaswini and Saroj, 2011). Hence it is hypothesised that:

\[ H3: \text{Global warming will have a positive, direct effect on green purchasing behaviour.} \]

4.3.4 Role of Corporate Social Responsibility
Past researchers have found that consumers increasingly make purchases based on the firm’s contribution to the society which is commonly called as corporate social responsibility (Forte and Lamont, 1998). McDonald company cited an example,
stating there is a need for all public firms to behave ethically so that there is full transparency for the public assuring that companies act ethically being the corporate citizen and if an organisation acts honestly with the intention of gaining a good reputation then this is not a genuinely moral act (Daniel Feng, 2010). Preuss, 2001 and Ravi et al., 2005 found that CSR has a significant effect on green initiatives. While the empirical study has provided evidence that there is no significant effect between corporate social responsibility and green purchasing (Tarig et al., 2010). With the alternating statements it is necessary to test H4 in the context of Saudi Arabia and hence assumed to be positively hypothesised to examine

\textit{H4: Corporate social responsibility will have a positive effect on green purchasing behaviour.}

4.3.5 \textbf{Role of Power Consumption}

While green IT products support and grants triple bottom line (social, economical and environmental) benefits, on the other side from the IT corporate research and literature it is understood that historically companies have deployed one server per application resulting in data center growth and IT infrastructure complexity, operating cost and power demands. It was found 40% of total data center costs are energy related as much power used not only to run IT equipment but also to cool them and slightly low power consumption can result in substantial cost to the companies (nlyte software, 2011). Also it is investigated that power consumption and consequent environmental impact of ICT is much greater than what it is generally realised (Alex Andrew, 2010). While the green criteria for eco-friendly IT products explain the green IT products are with greater energy efficiency, durability and energy rating reducing power usage up to 75% and improved performance up to 55% (William et al., 2010; Murugesan, 2008). Hence it is hypothesised that

\textit{H5: Power consumption by green IT products will have a positive direct effect on product performance enabling green purchasing behaviour.}
4.3.6 Role of E-Wastage Disposals

Most of the IT e-waste disposal without proper recycling has been resulted because of lack of awareness and ignorance of government ICT policy in imposing strict regulations (Noushin Laila Ansari et al., 2010; Ruth, 2009). An empirical study in relation between eco-label and green purchasing behaviour found to be significant and people showed importance to ecological information available on labels and the eco-labeled products are less inclined towards e-waste (Elham and Abdul, 2011). The computers and office electronics account for 40% of lead and 70% of heavy metals including mercury and cadmium in landfills (Hobby et al., 2009) creating pollution problem and even harms mankind at their disposal stage. The recent study on the climate change and sustainable development through carbon dioxide in industries shows an evidence that the land disposals of unwanted products will increase the global warming on the planet (Sunil et al., 2013). Similarly the green IT products which found to be more efficient and recyclable will generate carbon emissions from the recycling process but comparatively less than the emissions that are generated by dumping e-waste as landfills. The environmental protection agency (EPA) in United States from their research analysis stated the core recycling process will make up 7% to 10% of disposed waste by weight and are responsible for 33% to 55% of all emissions (Bill Smith et al., 2011). This clearly explains that e-waste disposals will still have some reduced positive affect on global warming but cannot be completely minimised to zero. Therefore it is hypothesised that:

\[ H6: \text{E-wastage disposals will have a positive effect on global warming.} \]

4.3.7 Role of Financial Benefits

It is well understood that making profit and financial returns are the most important objectives of a business organisation. In this sense, every decision is evaluated based on cost-benefit criteria. “The price consciousness and quality consciousness are not important”, this statement matches with results of few research studies and contradicting with the findings of other research studies as provided in literature (D’Souza et al., 2006) which says that price and quality has a significant affect on the consumer’s green purchasing decision. However, environmental initiatives are expected to confirm to this general rule, i.e., business benefits must be generated from
green initiatives before it engage itself in these initiatives (Ann et al., 2006). Previous studies found that expected business benefits have a significant affect on green purchasing (Min and Galle, 2001; Preuss, 2001; Rao, 2006; Ravi et al., 2005, Tarig et al., 2010). Most corporate IT consumers perceive that green IT products deliver indirect financial benefits by low operating costs, low power consumption, maximum optimisation in the long run for both producers and consumers of green IT (Clifford, 2009; Dubie, 2009; Nagata and Shoji, 2005 and Castro, 2009). Research studies conducted in Malaysia shows that expected benefits, such as cost savings, marketing opportunities and financial returns from the sale of green products represent the important drivers for green initiatives. Therefore, it is hypothesised that:

**H7: Financial benefits from green IT products will have a positive effect on consumer’s green purchasing behaviour.**

4.3.8 **Role of Eco-Labeling and Certifications**

To develop a good demand for green technology products, consumers need benefits beyond altruism. Even though more widespread of regulation is not forthcoming, consumers and IT vendors should be more proactive in practicing sustainable behaviour. Labeling or certification programs such as TCO, Energy Star, Blue Angel and EPEAT are one of the modest methods for consumers and corporate buyers to accurately determine the environmental features of ICT products. De-materialisation like electronic invoicing can reduce carbon footprint and offers additional financial benefits such as operational efficiency and cost reduction (Christopher et al., 2008). In an article, on the Government Green Procurement (GGP) policies and programmes there exists a close relationship between eco-labeling and green purchasing behaviour (Tan Mustafa, 2010). Therefore it is hypothesised that:

**H8: Eco-labeling and certifications will have a positive and direct effect on green purchasing behaviour.**

Noushin Laila Ansari et al., 2010 in his research study stated in using computers, mobile phones and other electronic devices there found to be a significant lack of awareness among the IT professionals on eco-friendly IT products and thereby
increasing the volume of e-waste. Similarly many research studies on eco-labeling, states that consumers are confused because of inappropriate labeling and may not always understand environmental friendly labels on the products (Kangun and Polonsky, 1995). Even if they identify the label, it does not mean they understand the meaning of those labels (Morris, Hastak and Mazis 1995). From these stated findings it is understood that even eco-labeled product enter into e-waste disposal. Hence it is hypothesised:

\[ H9: \text{Eco-labeling and certifications will have a positive and direct relation with e-wastage disposals.} \]

### 4.3.9 Role of Psychological Factors

With the constant growing of adverse conditions on the global climate, consumers are aware and looking for green products and are psychologically intended and ready to pay more for green products as they are eco-friendly (Robert Harmon et al., 2010). Research provides evidence on the environmental features influencing the consumers psychological factors (desire, attitude and intention) stating there is a significant relation between consumer demands and buying green products (Tim Flannery, 2010; Roberts, 1996; Balderjahn, I., 1988, Hugh Wareham, 2009). Hence it is hypothesised

\[ H10: \text{Psychological factors will have a positive and direct effect on consumer demand and preferences to undertake green purchases.} \]

### 4.3.10 Role of Corporate Perception

A better understanding is required to educate consumers to have an improved environment on the planet, so that to raise the knowledge and levels of concern which leads to environmental friendly behaviour. The empirical results of research study showed that the green perceived value would positively affect green trust and green purchase intentions increasing the corporate image (Yu-Shan Chen and Ching, 2012; Hokey and William, 2001). An attempt made to understand consumer study in knowing if consumers’ purchasing activities equally match and reflect their perceptions of the unfavourable impact of products on the environment stated that
being aware of environmental consequences of actions alone may not cause people to display more favourable environmental behaviour however, the consumer’s perception also takes part in that which disclosed high correlation between consumer perception and green purchasing behaviour (Ricky and Yam, 1998; Tahir et al., 2011). At the same time corporate consumers have positive perception based on their past experience with green products and because of greenwash they had an overall negative perception and other factors like product labels, packaging and product ingredients did not appear to influence customers’ perception of green products (D’Souza et al., 2006). Based on the specified fluctuating influence of environmental consciousness and perception of green purchase behaviour documented differently in available literature, so it is needed to confirm the statement and hence it is hypothesised that:

**H11: Corporate perception on green IT products will have a positive and direct effect on the consumer’s demand and preferences to undertake green purchasing behaviour.**

### 4.3.11 Role of Performance

Green purchasing is a practice of public authorities and private firms by taking supplier’s environmental product and process performance into account when purchasing products and services (Mulder. L, 1998). Most common green criteria for electronic product purchasing found to be product environmental performance with greater energy efficiency, durability, water consumption while manufacturing and energy rating (William et al., 2010). Also the new technologies are increasing IT operational performance (Hobby et al., 2009). Literature states, by using green IT products can reduce power usage up to 75%, operational cost by 73%, lower greenhouse gases (CO₂) by 56% and improve performance by 55%, office space saving by 47% and it is proved practically that a thin client uses only one fifth of the power of a desktop (Murugesan, 2008). Data center efficiency is achieved by measure of power, productivity and server performance (Tugrul Daim et al., 2009). Research study conducted by Tim Flannery, 2010 on consumer electronic goods states incorporated green features shown 89.3% of respondents had a positive perception on product performance. Despite excellent efficiency and performance of green IT products that were inferred from literature will also offer many benefits to the
corporate companies. Hence it is expected these products no sooner lead to e-waste when compared to other conventional IT products. Despite all these evidences and low impact of eco-friendly products towards e-waste disposals, it is unknown at what cost it can be minimised or to which extent it is likely to attain zero percent of e-waste which may not be possible to achieve that state. Hence it is understood that even any eco-friendly product has to become as wastage at the end of its lifecycle but may be at less intensity. Therefore it is positively hypothesised that:

\textit{H12: Performance of eco-friendly IT products will have a positive relationship with e-wastage disposals.}

4.3.12 Role of Consumer Demand and Preferences

Consumers do keep environmental aspects in mind while making their purchasing decisions for products and services. The literature states, consumers have a positive attitude towards eco-friendly technology products. The result shows consumer demands for green products based on their attitude and intention, where the demographic details (age, gender, education, occupation) do not seem to be significant. This allows product marketers to understand the mindset of consumers and engage themself in some type of ‘greening’ activities (Molla et al., 2009; Paul Schwarz, 2008; Mulder L., 1998). As customers being the major financial investors, they can put considerable pressure on suppliers and manufacturers in demanding for eco-friendly products for environmental sustainability (Doonan et al., 2005; Lin, 2007; Peng and Lin, 2008). While this statement is hypothetically proved that there is a significant relation between consumers and buying firms stressing on their suppliers (market players) in developing environmentally friendly goods and packages, in fact this statement was supported empirically in context to corporate firms (Hokey and William, 2001; Tarig et al., 2010). Therefore it is needed to confirm in the green IT product area also, hence assumed positively and hypothesised that:

\textit{H13: Consumer demand and preferences will have a positive and direct effect on the market players in undertaking green purchasing behaviour.}
4.3.13 Role of Market Players

Sustainable IT guides a clear relation between energy usage and carbon generation and the desire to reduce both has escalated to green IT product label, guiding consumers for better choice of eco IT equipment without entering them into the waste stream prematurely. While a report by the Massachusetts Department of Environmental Protection (2002) also proposes difficulty in identifying green products as one of the barriers to green product purchases. Eco-labeling, TCO, Blue Angel and EPEAT programs found to overcome this issue for environmental ICT products (Hobby et al., 2009). Therefore clear guidance through eco-label and certifications will help consumers to demand more for green products and develops their intention in making informed purchasing decision, which was also supported by a research study that out of 252 IT decision makers, 32% considers green certifications like EPEAT (Electronic Product Environmental Assessment Tool) are very important and 60% trusts neutral and 8% says not important (Paul Schwarz, 2008; Jerome et al., 2011). So it is the role of manufacturers and IT product vendors to promote the eco-labeled products with accurate information and deliver products which are of green criteria, further guiding and providing an informed purchasing decision to the consumers by reinforcing them towards green purchasing behaviour. Hence it is hypothesised that:

\[ H14: \text{Market players will have a positive and direct effect on consumer’s green purchasing behaviour.} \]

4.3.14 Role of Sustainable Strategy

So far implemented legislative actions alerted the industries to consider the effect of their operations on the environment or else they need to pay carbon tax and penalties. Therefore the organisations are now acting with clear drive of green purchasing by developing sustainable strategy that has an impact on their day-to-day operations (Hugh Wareham, 2009). With these ever changing and pressurising regulations from government and competing firms, most of the industries are incorporating sustainability into their operations through corporate social responsibility in order to survive and withstand the business at least for the next near future (nlyte software, 2011). Seeing policies positioned into action will help executives understand how
sustainable investments made today will have positive results over the time. Hence it is hypothesised that:

\[ H15: \text{Sustainable strategy will have a positive and direct effect on green purchasing behaviour.} \]

4.4 CHAPTER SUMMARY

Conceptual framework of consumers’ purchasing behaviour for green IT products was proposed in this chapter. A number of hypotheses were subsequently outlined to investigate the role of each construct in the conceptualised model and to understand the interrelationships between them. The proposed structural model and the set of hypotheses will be empirically tested and analysed in the subsequent chapters.