Sustainability and Conscious Consumerism Among IT Professionals: A Study in Tier 2 Cities

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ABSTRACT

The present paper explores the commonality between conscious consumerism and sustainability using artificial intelligence. This research paper studies how ethical purchasing behaviour can be encouraged through the study of consumer buying behaviour trends and the link between artificial intelligence-based solutions for improving manufacturing processes and increasing sustainability. The need to focus on sustainability is more than ever in the manufacturing sector. This can be addressed through the green manufacturing processes. This study incorporates the conceptual framework to gauge sentiments towards conscious consumerism, sustainable or green manufacturing and paper usage. A sentiment analysis using VADER was done of 67 IT professionals using an open ended set of questions. The majority of the IT professionals responded neutrally for paper usage versus digital copies. Similarly the majority of the IT professionals showed neutral sentiment towards sustainability while purchasing. The majority of the respondents showed positive sentiment towards sustainable manufacturing.

KEY WORDS

Conscious Consumerism, Sustainability, Artificial Intelligence, Green Manufacturing, Paper manufacturing, IT Professionals.

INTRODUCTION

Conscious consumerism is the practice of thoughtful and intentional purchasing decisions that prioritize sustainability and ethical standards. It also involves choosing companies that adhere to ethical

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practices, purchasing durable products, and opting for fair trade goods. Conscious consumerism is defined as a purchasing decision of any material or service aimed at minimizing the environmental impact and minimising ethical harm. This concept has emerged as an important parameter driving sustainability. On the other hand, green manufacturing focuses on various ways to produce materials in an eco-friendly way and reduce environmental harm. The use of resources is done in the most optimised way, ensuring that it aligns closely with the consumer behaviour insights.   Due to the advanced analytical capabilities, predictive capabilities, and various data-driven decision-making models artificial intelligence holds, and its immense potential to connect consumer values with sustainable manufacturing (Dornfeld, David, et al. 2012).

Conscious Consumerism: An overview

Whenever a purchasing decision is driven by social considerations, environmental considerations, and ethical considerations, it is referred to as conscious consumerism.   Conscious consumerism further states that consumers try to balance their personal preferences of both style and affordability with fair trading practices, environmentally friendly products, and ensure that it's sustainable in nature (Koh, L. P., & Lee, T. M.,2012). Thus, a more responsible global economy can be aimed for. In a way, individuals and their consumption pattern is related to sustainability [1].In a study that was done by Becerra L, on how the purchasing decisions are made keeping environmental repercussions in view, it was found that a large number of consumers, specifically those in the younger age group, do not have the adequate information about the impact on environment which is needed to make a sustainable purchasing decision [1]. Furthermore, the study states that there is a perception that eco-friendly products are usually expensive, making their adoption difficult[1]. There are several such cases where a conflict in the mind of the consumers is created when they compare the factors like cost, convenience, and individual style preferences with other factors such as ethical, environmental sustainability, and fair trade [2]. This often leads to individuals' cognitive dissonance, where an individual is unable to align their ethical values with the real world behaviours, causing inconsistencies in their purchasing behaviour[2]. Another study by Rita et al. describes consumer sustainability consciousness being a five-dimensional construct consisting of sense of retribution, access to information, labelling and peer influence, health considerations, and crisis situations [3].   The paper states that these five-dimensional constructs help in a detailed understanding of the factors that influence conscious consumption of sustainable products and services [3]. Bemporad, R., & Baranowski, M. (2007) studied the consumers in the US. It was found that conscious consumerism is increasingly shaping the markets, where the consumers are able to align their values with sustainability and social responsibility and the brands play a key role in this alignment [4]. The study further states that the consumers are expecting brands to be honest and have verifiable practices that avoid misleading eco-friendly claims, which might ultimately lead to a compromise in the trust [4] . The study later emphasizes that among the consumers' top priorities are socially relevant factors such as sourcing the product ethically and efficiency in energy, which are taking precedence over convenience. Health, honesty, convenience, relationships, and a commitment to doing good to society are influencing the purchasing decisions of conscious consumers and are considered as five core values [4]. In the study, it is seen that the consumers are deeply attracted towards "green messages" and many individuals identify themselves very strongly as having social and environmental responsibility. However, one cannot forget that the term "green" itself has lost some of its initial appeal [4]. Various information sources such as print media, word of mouth, and online platforms influence are being relied upon by consumers so that they are able to make informed purchasing decisions

Paper: Eco friendly or not?

Paper and packaging generally classified as a paper industry was selected for this study. Paper has a wide variety of uses in the areas of security, currency notes, education, uses in sanitation and also communication [10]. Its sustainable usage and also its production has been under discussion in many forums and also research has been done on various sources of raw materials, improvement in production processes and also ecological concerns [10]. As per Singh, A. K., Kumar, A., & Chandra, R. (2022) paper industry is one of the most

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polluting industries in the world [11]. In the paper manufacturing process, there are two major steps of pulping and bleaching [11]. Water consumption is generally very high, about $60m^3$/ton of paper produced and in spite of the most recent and advanced technologies available [11]. Paper as a consumer product offers undisputed benefits to human society, and it has been proven to be critical in driving the most sensitive needs of mankind—principally in areas of security, education, sanitation, and communication—and thus has been produced and consumed worldwide. Its sustainable production and usage is one topic that has featured prominently in many discussion fronts and more often than not ends with recommendations for an alternative source of raw material, improvement in production procedures, and ecological concerns. On the other hand K Mozina, S Pracek - Knjiznica, 2012 have observed that in the modern era digitization which is being seen as an alternative to paper has led to an increase in electrical consumption, as a consequence related to its production, usage and also when it is reprocessed in different devices[12]. Some similar studies as conducted by McDonnell P et al state in their study on submission of assignments by students on paper and electronically, it showed that global warming potential of paper was at 57.6 g CO_2, against a lower value of 32.6 g CO2 for electronic assignments[13].

Thus this study showed the need to study the consumer behaviour about paper and its usage. Mathur et al in their study also found that the majority of the 79% of participants had awareness about the recyclability of paper 84% were aware about the deforestation and was in line with 71% of the respondents who felt that they were in line with themselves considering themselves environmentally conscious[14] .
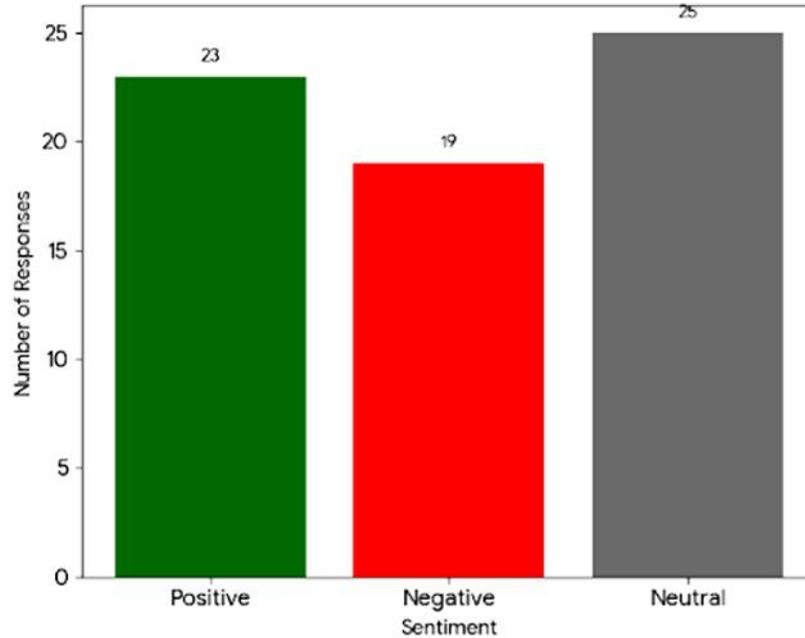
The Role of AI in Understanding Conscious Consumer Behaviour

These days with the exposure to the growing various applications of artificial intelligence, this technology can help provide important insights into consumer preferences and the patterns related to their purchasing. Some studies have shown that big data analytics can help in making strategic decisions and performance boosting [5]. AI has become a driver for green digital transformation these days [6].The following mentioned are few of the most used tools that help in understanding sentiments:

➤ Natural Language Processing (NLP): Nasukawa et al. study examines that if one is able to determine the sentiment polarity by classifying the text that is available online as positive, negative, or neutral, which helps in assessing the favourability of the textual content through natural language processing (NLP) [5]. These contents are mostly available on social media, customer reviews on e-commercial platforms, and other online media and product evaluations [5]. An important feature of this approach is its concentration on the factors that are more subjective and are contextual in nature as well, which helps in the improvement of the precision by which the sentiments are classified [5]. It further addresses the challenges that are faced during the sentiment analysis, which include domain-specific vocabulary, interpretation of ambiguity, and sarcasm [5]. Thus, there is an important need for an in-depth understanding of the context in which the text sentiment analysis is being done, which, however, will need the adoption of a more advanced NLP strategy [5]. The study underscores the importance of the combination of statistical methods and linguistic methods to improve the reliability and effectiveness in the detection of particular sentiment [5].

➤ VADER is a Lexicon-based tool which does sentiment analysis. This technique uses predefined meanings called lexicons of words associated with sentiment scores. These methods do not require training data and instead work by scanning text for known sentiment words and aggregating their scores to determine the overall sentiment of a sentence or document. Availability of recommendation systems has improved user preferences as they are based on user preferences [6]. These recommendation systems employ content-based filtering (CBF) and collaborative filtering (CF), which are used to provide customised solutions to their users that are based on user preferences and behaviours [6]. Certain hybrid models use both collaborative filtering and content-based filtering and are used to address the challenges of the cold start problem, and also enhance the precision of the suggestions that are given by these

recommendation systems [6]. New valuation metrics such as the Mean Absolute Error (MAE) and Root Mean Square Error (RMSE) are used to assess the functionality of the recommendation systems [6]. Kumar, in his paper, further provides examples on how synthetic data sets can be employed to test and train recommendation models [6]. One of the most popular tools used to generate synthetic data sets is the Faker library [6]. Recent breakthroughs in modern science and artificial intelligence have improved the efficacy of recommendation systems especially with the inclusion of deep learning and transformer models such as BERT [8].

Objectives of the Study

Objective of the study are as follows:

1. To gain insights into the use of paper among IT professionals who prima facie predominantly are tech savvy owing to their profession and use digital substitutes.
2. To gain insights into the thought process of IT professionals while making any purchase decision of paper products like paper bags, paper packaging, recycled paper etc.
3. To gain insights into the sentiments of IT professionals towards green or sustainable manufacturing.

Research Methodology of the Study

Qualitative data was collected through interview that was conducted of 67 IT professionals from 4 tier 2 cities of India i.e. Nagpur, Lucknow, Indore and Chandigarh. A structured interview was conducted where the respondents were encouraged to share their thoughts on the questions based on the three objectives. The age ranged from 25 to 50 years. The interview transcript's data was processed, cleaned, removed stop words, punctuations, and converted to lower case. Sentiment analysis was done using the VADER tool. Interpretation of sentiments were typically categorized as {polarity score (e.g., from -1 to +1)}:

➤ Positive   ➤ Negative   ➤ Neutral

Category	Tools and Technologies
Data Collection	Qualitative
No of respondents	67 IT professionals
Sentiment Analysis Tool	VADER
Visualisation	MS Excel

Analysis and Discussion

Sentiment analysis results from 67 IT professionals using questions around the three objectives. Bar chart shows how many responses were **Positive**, **Neutral**, or **Negative** for each objectives:

1. Digital vs. Paper
2. Sustainability in Purchasing
3. Sustainable Manufacturing

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Fig 1: Sentiment towards digital copies Vs paper usage

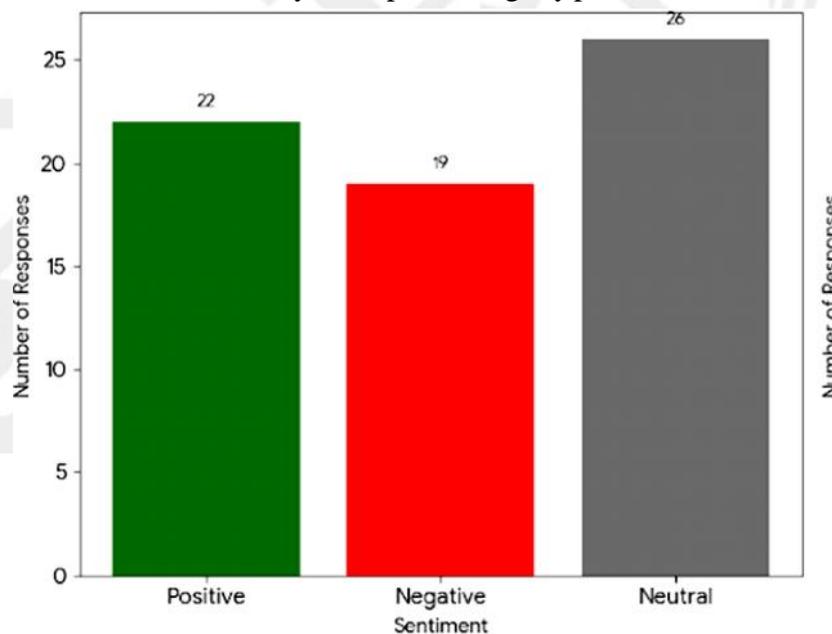Q1:   Are digital options better than paper use?

Inference from the sentiment Towards Paper Usage (Fig 1):

➢   It is inferred that the majority of the respondents had either a neutral or a positive sentiment towards the use of digital copies as paper might have an environmental impact as the main source of raw material is wood.

➢   A smaller tough significant segment however thus hold a negative sentiment on the use of digital copies over paper usage.

Fig 2: Sentiment towards considering sustainability while purchase decisions.

Q2:   How do you feel about sustainablility while purchasing any product

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Inference from conscious consumerism i.e. sustainable purchase (Fig 2):

➢ A large chunk of respondents have neutral sentiments towards sustainable purchase. That means they do not put thoughts on sustainability while purchasing paper products.

➢ A small portion remains opposed which shows that they ignore environmental impact before making a purchase.

Fig 3: Sentiment towards sustainable manufacturing

Q3: How do you feel about sustainable munufacturing?
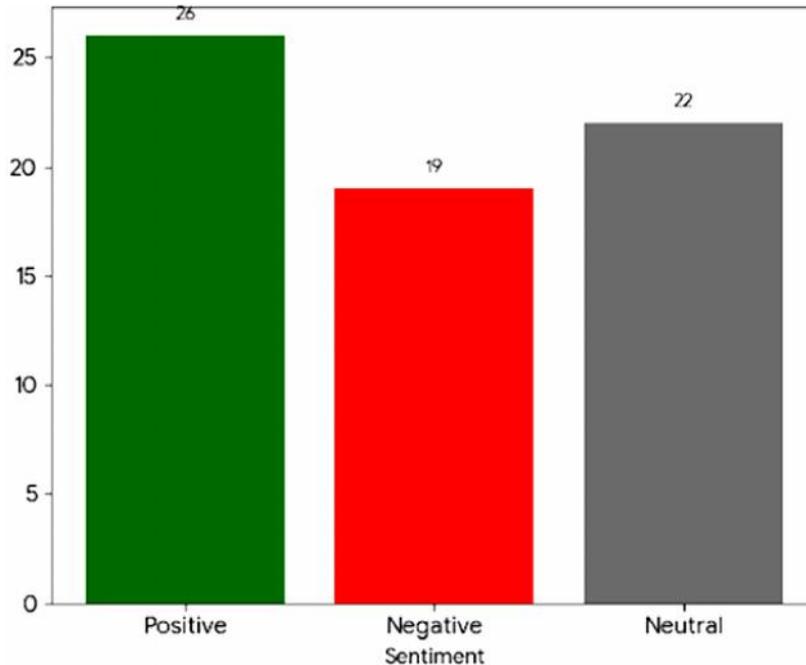
Inference from Support for Sustainable Manufacturing (Fig 3):

➢ A large chunk of respondents have strongly supported sustainable manufacturing efforts.

➢ A small portion remains neutral or opposed which shows that more awareness and incentives may be needed to boost the acceptance of sustainable manufacturing.

Inference from sentiment distribution across age groups about paper usage, conscious consumerism and sustainable manufacturing:

➢ Younger age groups (25-35 years) in the analysis show a higher proportion of positive sentiment, indicating a positive growing eco-consciousness among millennials and Gen Z.

➢ Older age groups (35-45 years) exhibiting a more stable and neutral sentiment distribution, with some of them having a negative perception, possibly due to longstanding habits or disbelief.

Practical implication: Green Manufacturing

By incorporating consumer-driven insights, AI enhances several aspects of green manufacturing. In some areas AI is also used to monitor pollution hot spots and respond immediately to the crisis related to environment[6]:

1. **Resource Efficiency:** Artificial intelligence based models help in proper allocation and optimise raw material usage.

2. **Process Optimization:** Smart manufacturing systems enable manufacturers to become flexible in production which can be based on futuristic consumer demand on sustainable products.

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3. **Supply Chain Transparency:** Recent advances in block chain-integrated AI solutions can also trace the origin of the product which gains users trust that the companies are sourcing materials ethically.

4. **Energy Management:** AI can optimize and reduce the use of energy during manufacturing which might lead to reduction of emissions and also reduce the operational costs.

Challenges and Ethical Considerations

Despite its potential, integrating conscious consumerism into AI-driven green manufacturing poses challenges.:

➢ **Data Privacy:** Concerns regarding the collection and usage of consumer data are still being considered. The users are not aware what data is being collected and what it is being used for.

➢ **Data Bias:** Sentiment analysis models may inherit biases because of the inherent nature of the training data, leading to inaccurate conclusions. There are even reported cases of algorithmic bias [5].

➢ **Bias in AI Models:** The risk of reinforcing existing biases in consumer data, especially, this becomes more important as it is also based on the individual and their ethical values when developing these models

➢ **Interpretation Challenges:** Environmental related sentiments can be more complex and highly dependent on the context which would be requiring advanced AI models.

➢ **Resource Intensiveness:** High computational power required for AI systems may impact energy efficiency. Technical and organisational challenges have also been highlighted[5]

Some of the proactive measures such as ethical AI guidelines regulated by Government or even self-regulation by developers, transparent data usage policies, and energy-efficient computing can mitigate these challenges which would lead to more sustainable and trust worthy business practices.

Future Directions and Research Opportunities

Bemporad et al states that building trust through communication which is kept transparent fosters consumer loyalty[4]. It also helps cut through the market noise[4]. Aligning the efforts of a brand with those of the values of conscious consumers, reduces cognitive dissonance and enhances both sales and customer loyalty[4]. Transparency, accountability, authenticity remain important aspects as consumer preferences continue to evolve[4]. Businesses are increasingly seeing sustainability as a strategic market opportunity, moving beyond the traditional view as a moral obligation, and are more focusing towards delivering quality, affordability and sustainable solutions[4]. To attract conscious buyers, establishment of deeper relationships with the consumers is allowing brands to empower them to turn them as brand ambassadors and create mutual value for the eco-friendly initiatives being undertaken by various corporation [4]. The emerging landscape in marketing shows a shift from a transactional interaction to a more meaningful connection in collaboration where trust and purpose act as a foundational element of corporate reputation[4] .

Some Recommended

Business strategies using AI in Sustainable Manufacturing**:**

1. **Proactive Sustainability Strategies:**

➢ Use AI to identify eco-trends and align production with future market demands.

➢ Example: Implementing circular economy models based on consumer sentiment about waste reduction.

2. **Customized Marketing Approaches:**

➢ AI can help segment customers based on their sustainability preferences and tailor green marketing campaigns to maximize engagement.

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3. Eco-Friendly Innovations:

➢ Using sentiment insights to develop new, sustainable materials and packaging solutions based on consumer demand.

4. Risk Mitigation:

➢ Monitoring sentiment for potential public relation crises related to unsustainable practices and addressing them before they escalate.

Additional Recommendations for Sustainable Manufacturing Initiatives:

1. Targeted Awareness Campaigns:

➢ Focus on educating groups with lower awareness levels (e.g., older generations, certain regions).

➢ Leverage social media and educational programs to promote sustainability benefits.

2. Incentives for Adoption:

➢ Offering financial incentives, discounts, or loyalty programs for sustainable product choices.

➢ Partnering with Governments and NGOs to support green initiatives.

3. Region-Specific Strategies:

➢ Customizing marketing efforts based on regional preferences and economic conditions.

➢ Encouraging localized production of sustainable materials to improve accessibility and reduce costs.

4. Leveraging AI Insights:

➢ Continuously monitor sentiment trends through AI-powered analytics.

➢ Adjust product offerings and marketing messages based on changing consumer sentiments and preferences.

CONCLUSION

Conscious consumerism, when mapped effectively using AI, can significantly accelerate the transition to sustainable or green manufacturing. By aligning production practices with ethical consumption patterns, manufacturers can achieve resource efficiency, reduce environmental impact, and enhance brand reputation. This study underscores the need for continued investment in AI research and policy development to harness the full potential of conscious consumerism for a sustainable future.

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