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GREEN E-COMMERCE WEBSITE MANAGEMENT MODEL (GEWMM) FROM DEVELOPER PERSPECTIVE

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ABSTRACT

CONTEXT*: The technique of creating, constructing, managing, and utilizing a website in a way that minimizes both direct and indirect energy usage over the course of the site's life cycle is known as green web engineering.*

OBJECTIVE:

The first objective of this study is to identify the success factors, risk factors and real-world green practices via Systematic Literature Review (SLR) to be considered by web developer that can contribute towards the development of green and sustainable e-commerce website. The second objective is to identify success factors, risk factors and real-world green practices via empirical methods to be considered by web developer that can contribute towards the development of green and sustainable e-commerce website. The third objective is to develop Green E-Commerce Website Management Model (GEWMM) From Developer's Perspective on the basis of above mentioned findings.

METHOD:

In order to identify factors and practices, we will conduct a systematic literature review (SLR) using specially tailored search strings that are derived from our research questions. We will also employ case studies and questionnaire surveys, to confirm and validate our findings.

EXPECTED OUTCOME:

The Green E-Commerce Website Management Model (GEWMM) from Developer's Perspective is the expected result of this research study. The model will assist web developer to gauge the green capabilities of an e-commerce website. The model will be produced as web based software tool to assist web developer to gauge the green capabilities of an e-commerce website.

Keywords: *Green website, systematic literature review, Green web engineering, Green E-Commerce Website Management Model (GEWMM).*

1. Introduction

The 21st century faces several significant issues on basis of environmental perspective, like Biodiversity loss, Deforestation, Water scarcity, Soil degradation, Ocean pollution, Climate change, Greenhouse gas (GHG) effects, Global warming, and Sustainable development (SD) (Dick et al., 2010). Information and communication technology, has two sides to these issues. On the one hand, ICT can minimize energy usage by optimizing material flows. ICT, on the other hand, is using more and more energy: IT, and particularly the Web, continue to use more energy. Because more people are using the internet, there are more clicks on the site every day. The server is forced to activate by the internet click, and when the server is activated, electricity consumption is initiated. As a result, every internet user query results in greenhouse gas emissions (Bhardwaj & Gajpal, 2016). Information and communication technology (ICT) tends to use more energy. Since there are a number of ideas for hardware solutions for green IT. Pilot research has been done on the role that software plays in this space (Dick et al., 2013). Software development is one of the engineering fields where environmental sustainability is only rarely taken into consideration (Järvinen & Kaivonen, 2024). One area of software engineering study that has shown promise is green in software engineering (Nurmivaara, 2023). Green software is software that produces the least amount of carbon emissions (Matthew et al., 2024). The technique of creating, constructing, managing, and utilizing a website in a way that minimizes both direct and indirect energy usage over the course of the site's life cycle is known as green web engineering (Dick et al., 2010).

On the other hand e-commerce platforms have recently embraced a number of technologies, including voice commerce, virtual reality, secure payment gateways, augmented reality, artificial intelligence, and mobile optimization (Singh & Vijay, 2024). Consequently, considering problems like creating green e-commerce website is need of the day. Our study discusses some green factors and practices while designing an e-commerce website from developer perspective. A green and sustainable website is a website that is developed, designed and hosted in such a way that minimizes its environmental impact (Kern et al., 2015). The Green E-Commerce Website Management Model (GEWMM) from Developer's Perspective is the expected result of this research study. The model will assist web developer to gauge the green capabilities of an e-commerce website. The model will be produced as a web based software tool to assist web developer to gauge the green capabilities of an e-commerce website.

BACKGROUND

The objective of this section is to enlighten the background concepts in order to put this research into the context of green e-commerce website development from developer‘s perposctive. We have also considered state-of-the-art research trends to summarize and discuss the results of each study in order to better understand the problem context.

Guidelines for green software development are offered in the first level of two-tiered green paradigm for sustainable software engineering. The software industry's strategies for providing subsidies for the development of green software include the second level. Additionally, the authors have categorized how each stage of software engineering could be environmentally sustainable through green practices and rules, resulting in a software product that is both green and sustainable. Lastly, the authors have proposed pertinent measures to assess each software development phase's greenness. The selected approaches/concepts have been divided into five categories by the writers. Finally, the authors have connected both layers enabling the creation of sustainable and green software (Mahmoud & Ahmad, 2013).

The study (Dick et al., 2010), put forth a set of 12 principles that, for example, aid in lowering the net load through compression or caching. The three primary roles in Web Engineering, developers, administrators, and website users

have been used by the study to categorize these suggestions. The study also suggests using data centers, which adhere to traditional Green IT principles and use renewable energy.

According to the study (Erdelyi, 2013), in order to promote ecological sustainability, the different activities should be reviewed at every stage of the software development life cycle. The study also suggested that environmental sustainability be supported in software and software development. On bias of the report suggested that more research be done on sustainable and green software development.

S. Naumann et al. (Naumann et al., 2011), proposed the GREENSOFT model for sustainable software, which helps software developers, administrators, and users create, maintain, and use software in a more sustainable manner. The entire software development life cycle has been covered by this model. The GREENSOFT model also encourages appropriate supervision, sustainable software design and development, and sustainable software engineering techniques. The model's last module includes suggestions and tools to help stakeholders (developers, administrators, and users) with varying levels of professional expertise implement green and sustainable practices generally.

Green hosting and sustainable front-end and back-end development techniques have been used by the web development industry in recent years to make websites more environmentally friendly.
Nevertheless, with an emphasis on sustainable image use solutions, future research could carry on testing and assessing current sustainable web design guidelines in contexts distinct from grocery e-commerce. Future research of this kind could add to the limited body of knowledge in sustainable web design by offering a framework for comparing the various contexts in which guidelines have been put into practice. Additionally, the study's prototype could be modified for a mobile design, which could indicate whether users prefer the sustainable features and applied guidelines on smaller screens (Bernataviciute & Balogh, 2022).

Although there has been much discussion about sustainability in various fields over the past few decades, web design sustainability is still a relatively new and developing field. In order for a website to have a less negative environmental impact, a number of factors related to website development, hosting, and design must be taken into account (Bernataviciute & Balogh, 2022).

AIMS AND OBJECTIVES

Our primary goals are to help web developers assess an e-commerce website's green capabilities by creating a Green E-Commerce Website Management Model (GEWMM) from the Developer's point of view as shown in Figure 1. We have scheduled the following milestones and deliverables to be met in order to carry out the research project's final purpose.

i. To identify the success factors, risk factors and real-world green practices via Systematic Literature Review (SLR) to be considered by web developer that can contribute towards the development of green and sustainable e-commerce website.
ii. To identify success factors, risk factors and real-world green practices via empirical methods to be considered by web developer that can contribute towards the development of green and sustainable e-commerce website.
iii. Development of GEWMM model on the basis of above mentioned findings to assist web developer to gauge the green capabilities of an e-commerce website.
iv. For the validation and applicability of GEWMM, case studies will be conducted in website development industries.
v. The model will be produced as a software tool to assist web developer to gauge the green capabilities of an e-commerce website.

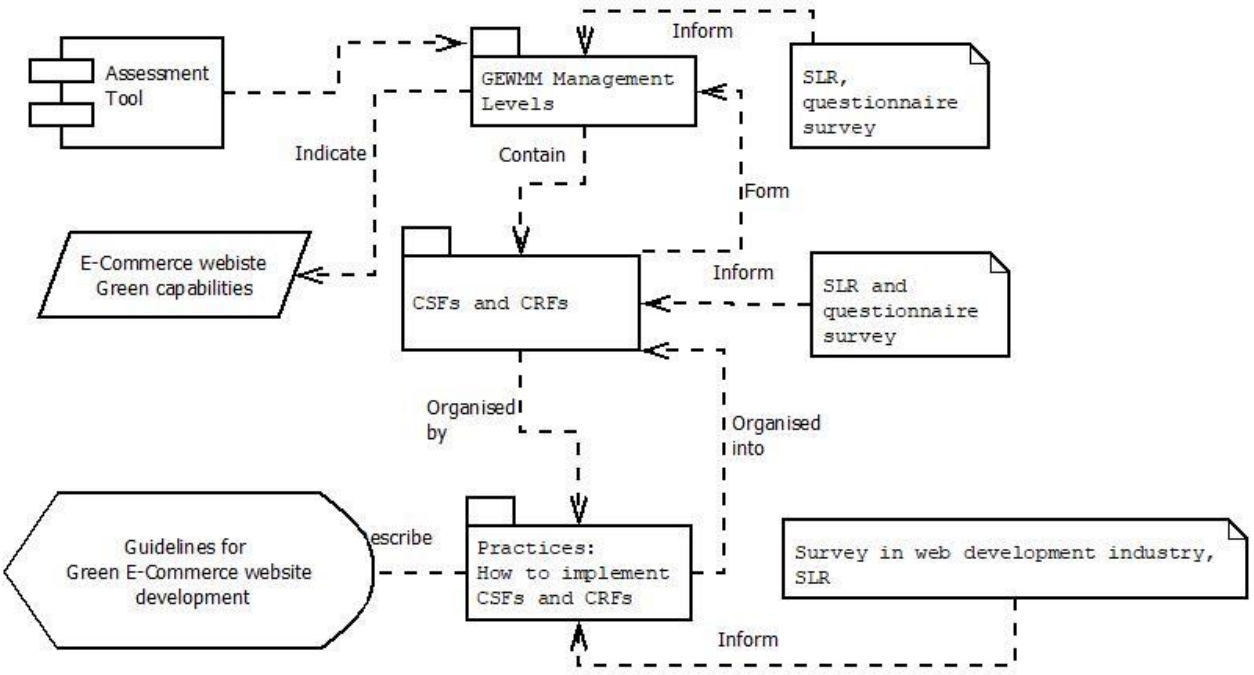

Figure 1 Structure of GEWMM Model

RESEARCH QUESTIONS (RQS)

RQ1: What are the success factors, as identified in the literature, to be addressed by web developer which can contribute towards the development of green e-commerce website?

RQ2: What are the risk factors, as identified in the literature, to be avoided by web developer which can contribute towards the development of green e-commerce website?

RQ3: What are the real-world practices, as identified in the literature, to be adopted by web developer which can contribute towards the development of green e-commerce website?

RQ4: What are the success factors, as identified in real-world practice, to be addressed by web developer which can contribute towards the development of green e-commerce website?

RQ5: What are the risk factors, as identified in in real-world practice, to be avoided by web developer which can contribute towards the development of green e-commerce website?

RQ6: What are the real-world practices, as identified in the real-world practice, to be adopted by web developer which can contribute towards the development of green e-commerce website?

1 RESEARCH METHODOLOGY

We will use three research methods i.e.

- Systematic Literature Review (SLR)
- Industrial Survey
- Case studies

In order to identify the success factors, risk factors, and practices for the development of a green e-commerce website, we will first carry out a systematic review procedure (Keele, 2007). To confirm the SLR findings and identify any other factors or practices beyond the SLR findings, an industrial survey will thereafter be carried out in the website development sector. Case studies in website development companies will be used to assess the suggested model, which will be developed based on recognized success characteristics, risk factors, and

practices/solutions. Figure 2 depicts several stages of the model development. To choose study methodologies, we have reviewed a number of studies [9, 10].

Figure 2 various phases of the proposed model

Development stages of GEWMM

The model will be built in six stages as shown in Figure 2. The first stage in the development of GEWMM is to set criteria for its success. The defined criteria setting comes from a review of the relevant literature (Khan & Khan, 2013; Khan & Niazi, 2010). The criteria for GEWMM are given below.

Web Developer satisfaction: web developer will be satisfied from the results of the GEWMM in order to assess the green capabilities of an e-commerce website.

Ease of use: The structure of the GEWMM should be flexible, easy to use and easy to understand.

Second stage is the development of research questions. Stage 3,4 and 5 are the stages where data will be collected and analysed. In the final stage an evaluation of the GEWMM model will be performed through case studies

GEWMM Assessment

The suggested GEWMM model, will be evaluated and reviewed using the case study methodology (Runeson & Höst, 2009).Four case studies in the website development sector will be carried out for this aim. Focus groups will be held at the conclusion of these case studies to gather participant input regarding GEWMM model.

2 CONCLUSION

Green and sustainable e-commerce website development is the cry of the day and web developers are constantly striving to develop website that has a less hazardous impact on environment, economy, and humanity. To achieve this goal, we have proposed GEWMM model. In order to achieve the ultimate goal of this study we will identify success factors, risk factors and practices via SLR and empirical research methods. Research in this area will assist web developer to deliver green e-commerce website. We have made the following progress, so far, towards the development of Green E-Commerce Website Management Model (GEWMM): knowledge about the background of green e-commerce website, identification of research questions, selection of research methodology and identification of activities involved in building the said model. The proposed model will be produced as a web-based software tool, to assist web developer to gauge the green capabilities of an e-commerce website.

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4 REFERENCES

Bernataviciute, V., & Balogh, R. A. (2022). Sustainable web design in the e-commerce sector: Evaluation and proposed improvement of existing guidelines. In.

Bhardwaj, A. K., & Gajpal, Y. (2016). Green Information System Framework: A Step towards Sustainable Information Technology. *Academy of Taiwan Business Management Review*.

Dick, M., Drangmeister, J., Kern, E., & Naumann, S. (2013). Green software engineering with agile methods. 2013 2nd international workshop on green and sustainable software (GREENS),

Dick, M., Naumann, S., & Held, A. (2010). Green web engineering. *A set of principles to support the development and operation of "Green" websites and their utilization during a website's life cycle. Filipe, Joaquim*, 7-10.

Erdelyi, K. (2013). Special factors of development of green software supporting eco sustainability. 2013 IEEE 11th International Symposium on Intelligent Systems and Informatics (SISY),

Järvinen, H.-M., & Kaivonen, C. L. S. (2024). GUIDELINES FOR SUSTAINABLE SOFTWARE.

Keele, S. (2007). *Guidelines for performing systematic literature reviews in software engineering*.

Kern, E., Dick, M., Naumann, S., & Filler, A. (2015). Labelling sustainable software products and websites: ideas, approaches, and challenges. *EnviroInfo and ICT for Sustainability 2015*, 82-91.

Khan, R. U., & Khan, S. U. (2013). Green IT-outsourcing assurance model. 2013 IEEE 8th International Conference on Global Software Engineering Workshops,

Khan, S. U., & Niazi, M. (2010). A preliminary structure of software outsourcing vendors' readiness model. Proceedings of the 11th International Conference on Product Focused Software,

Mahmoud, S. S., & Ahmad, I. (2013). A green model for sustainable software engineering. *International Journal of Software Engineering and Its Applications*, *7*(4), 55-74.

Matthew, U. O., Asuni, O., & Fatai, L. O. (2024). Green Software Engineering Development Paradigm: An Approach to a Sustainable Renewable Energy Future. In *Advancing Software Engineering Through AI, Federated Learning, and Large Language Models* (pp. 281-294). IGI Global.

Naumann, S., Dick, M., Kern, E., & Johann, T. (2011). The GREENSOFT Model: A reference model for green and sustainable software and its engineering. *Sustainable Computing: Informatics and Systems*, *1*(4), 294-304.

Nurmivaara, S. (2023). *Green in Software Engineering: A Systematic Literature Review*. University of Helsinki.

Runeson, P., & Höst, M. (2009). Guidelines for conducting and reporting case study research in software engineering. *Empirical software engineering*, *14*, 131-164.

Singh, S., & Vijay, T. S. (2024). Technology roadmapping for the e-commerce sector: A text-mining approach. *Journal of Retailing and Consumer Services*, *81*, 103977.