

Re-imagining Global Fashion Recycling Value Chain System Through Extended Product Responsibility

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ABSTRACT

Fashion and textile waste management is a significant issue, particularly in developing countries such as Vietnam. This paper aims to propose a radical rethinking and revising the current practices in the global fashion recycling value chain. It seeks to advocate for more sustainable and accountable methods of managing textile waste. The study employs a case study approach based on cross-case analysis and recommends the adoption of Extended Producer Responsibility (EPR), which holds producers accountable for collection, recycling, and recirculation of their products at their end of life (EOL). The findings present a proposed system for a Global Fashion Recycling Value Chain System that incorporates sustainable designing of products, saving resources and waste management. This paper also identifies some challenges faced to implement EPR policies. Finally, it also establishes the SDGs (Such as SDG11, 12, 13, 14 and 15) that are achieved through the implementation of EPR.

Keywords: Extended producer responsibility, Developing country, Fashion sustainability, Waste management

INTRODUCTION

Fashion and textile manufacturing is resource intensive as they need huge amount of water, energy, raw materials and chemicals. Globally, 100 billion garments are produced each year (Gupta, Kushwaha, Dave, & Mahanta, 2022), with 92 million metric tonnes ending up in landfills (Papamichael et al., 2022) and only 14% being recycled into new products (Nayak & Patnaik, 2021). In the last decade or so, the clothing consumption has significantly increased due to rapid growth of fast fashion and change in consumers buying behaviour. This has in turn led to significant rise of fashion waste as the products are discarded much quicker to the landfills. In many manufacturing countries, especially the developed ones, the waste management is a major concern. The implementation of policies such as extended producer responsibility (EPR) can help to alleviate the waste management problem and save resources ending in the landfill (Hörner Bussolo, Bressanelli, Visintin, & Sacconi, 2024).

EPR is a policy approach that makes producers responsible for their products along the entire lifecycle, including at the post-consumer stage (Cai & Choi, 2019). By doing so, it helps achieve environmental goals such as recycling targets and save resources ending in the landfill. At the same time, EPR generates funding from producers that help to pay for the collection, sorting and recycling of waste products, as well as generates detailed information on production, products, waste generation and treatment. EPR policies thus generally shift the waste management cost or physical collection partially or fully from local governments to producers.

The EPR legislations are being strictly followed in many countries within the EU (Steenmans, 2019). The EU states has imposed the legal obligation of meeting recovery and recycling targets on Member States. For example, “the Packaging and Packaging Waste Directive” requires Member States to set up systems for the return and/or collection and reuse or recovery (including recycling) of used packaging from the consumer to meet the EU recycling targets. However, national governments may, and often delegate this legal obligation to producers/ importers through the setting of EPR schemes. EUROOPEN has long been a strong advocate of the EPR schemes as an essential component of waste management in Europe.

The recent trend in fashion and textile sector is that the labour intensive process are shifting to developing economies such as Vietnam, Bangladesh, Laos and Cambodia (Nayak, Nguyen, Panwar, George, & Ulhaq, 2020). Large amounts of wastes from industries and consumers are discarded into the landfill. Lack of policies such as EPR is a major factor contributing towards the rising industrial waste ending in the landfill. There is a dearth of literature on the implementation of EPR in developing countries such as Vietnam. Therefore, this research focuses on the status of implementing EPR in Vietnam’s fashion and textile sector. Through an in-depth interview with fashion stakeholders, we have tried to understand the benefits, and challenges of implementing EPR.

LITERATURE REVIEW

Lindhqvist (Lindhqvist, 2000) defined EPR as “A policy principle to promote total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially to the take-back, recycling and final disposal of the product”. EPR focuses on managing the environmental impacts of EOL products and the packaging materials supplied with the products. In the fashion value chain of many countries, the waste management has been the responsibility of public authorities, which have been proved to be insufficient (Rani & Saha, 2021). In a global scale the fashion manufacturers and brands should take the responsibility. EPR acknowledges the producer's responsibility to lessen the effects of their product over the course of its entire life cycle, including waste management or recovery at the EOL.

Some of the motivating factors that supports the adoption of EPR as a legislative policy include, but are not limited to, problems with landfill space, negative impacts of hazardous waste, and products abandoned directly to the environment (Tran, Kieu, Herat, & Kaparaju, 2023). To reduce the ecological footprint of end-of-life from a systems perspective demands more than just a policy to effectively handle items when they are no longer in utilize. It necessitates the design of products and systems that consider consideration of EOL. EPR laws transfer some or all this obligation to producers from taxpayers, local government agencies, and traditional waste dealers. Good EPR programs can promote dematerialization, toxics removal, product and packaging reuse, as well as have an impact on the creation of more sustainable materials management systems.

Spicer and Johnson (2004) examined three methods for implementing EPR to deal with EOL products. They involved OEM (original equipment manufacturer) takeback, where producers assume direct responsibility; pooled takeback, where responsibility is collectively shared by a consortium of producers; and third-party takeback in which 'Product Responsibility Providers' are contracted to assume responsibility on behalf of producers. It was found that for many product categories, the last approach would be the most effective way to meet the objectives goals of EPR programs. Accordingly, this study aims to address the following two research questions:

RQ1: What are the benefits of implementing EPR among fashion businesses in Vietnam?

RQ2: What are the challenges that the fashion businesses are facing to follow the EPR guidelines?

METHODOLOGY

Vietnamese fashion enterprises were chosen as Vietnam is becoming a major destination for many brands to source their products. As of late, several fashion brands are changing their sourcing destination from other Asian nations to Vietnam due to price competitiveness, government support, quality consistency and political stability (Nayak, Akbari, & Far, 2019). We conducted qualitative in-depth interviews with six fashion business owners and managers in Vietnam. The selections of fashion businesses were based on matching their product lines and prices in comparison with the large fashion brands in the marketplace. Three large enterprises (LEs) and three small and medium enterprises (SMEs) were selected for this study.

The interviews were organized within the manufacturing facilities of the fashion brands to better understand the organizations and ensure the credibility of the findings (Eisenhardt, 1989). Each meeting lasted for about 60 minutes, and care was taken to precisely address the research questions. Information was collected as audio recordings, which were later transcribed for investigation. We took intensive notes to

guarantee the precise representation of the transcribed data.

The interviews were then coded by using the qualitative data analysis software, NVivo. Data were analysed by case study protocol (Yin, 2003) and cross-case analysis, which involved in-depth identification of the similarities and differences among the interviewees to support empirical generalizability and theoretical predictions. NVivo was also used for the first stage of within-case and cross-case analysis using a conceptually clustered matrix, followed by in-depth analysis. The important findings are discussed in the following section.

RESULTS AND DISCUSSION

The findings from secondary resources and the primary data collection through interviews from six fashion enterprises, which has been discussed in this section. We categorised the findings into- advantages of EPR, challenges faced, and SDGs addressed by implementing the EPR.

Advantages of implementing EPR

There are many advantages of implementing EPR in the developing countries such as Vietnam. Vietnam is becoming a major hub for fashion and textile sourcing for several global brands. The implementation of EPR in Vietnamese textile and garment sector can lead the fashion enterprises to focus on sustainable designing of products, save resource depletion, and support waste management.

Sustainable designing of products

It is found from the study that implementing EPR policies in developing countries such as Vietnam has positive impact on the environment. With the enforcement of EPR, global brands will focus on sustainable designing approaches such as durability, renewability and recyclability. Durability is a major aspect, which is often neglected due to designing of cheap and trendy fashion (Fletcher, 2012). Cheaper garments are produced from inferior raw materials and processes that are harmful to the planet. Hence, these garments are discarded by the consumers to landfill in a short time. Changing the focus towards durable products can lead to economic benefits and save resource depletion. It was found from this study that by designing durable products can reduce amount of EOL waste as the garments will last longer (Multala, Wagner, & Wang, 2022).

The renewability approach in fashion mainly focuses on the use of raw materials that are renewable (Pandey, Pandit, Pandey, & Mishra, 2020). Renewable raw materials are primarily obtained from natural resources (i.e., plants and animals), which are biodegradable at EOL. In this regard, some renewable raw materials such as mycelium leather, coffee fibre, bacterial cellulose, lotus fibre, oyster wool and pineapple leather are becoming increasingly popular among the fashion and textile brands in Vietnam

(Nayak, 2022). The interviewees expressed that the use of renewable raw materials can reduce the problems of EOL waste management.

Finally, recyclability is another aspect that can be addressed by the EPR policies as found from our study (Sandvik & Stubbs, 2019). The brands need to ensure that the raw materials that goes into the product designing are easily collected from the consumers for recycling. The recycling of these materials should be easy to carry out on an industrial scale. Although majority of the EOL fashion and textiles have the potential to be recycled into new products, they are not done in real situations especially in developing countries (Nayak & Patnaik, 2021). The sustainable designing principle will ensure the brands are taking the responsibility for recycling the EOL products discarded by the consumers. This may increase the financial expenses of the manufacturers, retailers and distributors; however, this will lead to a cleaner environment and resource saving. The sustainable designing concepts were established by LE1, LE3 in addition to some comments received from SME1.

Extract from LE1: “As a global leading brand, we focus on product durability. We instruct our designers to keep the concept of durability in all the products as durability creates brand identity. The consumers may need to pay higher for durable products, however, the longevity of the products will pay the higher product price. Additionally, the durability of products means there will be less waste created every year, which leads to resource saving and reduce environmental burden.”

Extract from LE3: “[...] using raw materials from renewable sources is one of the priorities in our management policy. With the use of renewable raw materials, we not only reduce environmental pollution, but also solve the challenges of waste management. We are focusing to source some of the new fibres such as lotus, recycled polyester, and coffee fibres that are readily available in Vietnam. There is also a growing demand for global fashion brands to invest on sustainable raw materials [...]. [...] we are increasingly focusing on recyclability during our product designing to ensure the raw materials can be easily recovered from the EOL discarded product without spending substantial amount of money and by suitable commercial methods.”

Extract from SME1: “[...] our customers are quality oriented. Hence, we ensure that the fabrics and trims that goes into the garments are of good quality. We import many of our fabrics from Europe as the quality and durability of these fabrics are very good. The European suppliers provide us the test results for fabrics. For trims we also rely on the test results to ensure good quality. By ensuring quality and durability, we meet the customers’ expectations as well as sustainability. [...] although we know new renewable fabrics are coming to the fashion marketplace, we have not tried them due to the problems of fake

supplies in Vietnam. Also, we are not focuses on EPR and recyclability as it might increase the cost of our garments. May be in the future we will keep them in our strategic plan [...].”

From the above discussions it can be concluded that the LEs are more focused towards sustainable designing of fashion and textile products. For them following the EPA guidelines and the EPR regulations is more critical than the SMEs. The SMEs on the other hand are not that much concerned about the EPR regulations and environmental policies.

Save resource depletion

Fashion and textile manufacturing processes are highly resource intensive. Whether we consider raw material extraction or processing them to final products, extensive quantities of water, energy and chemicals are required. For example, the most widely used natural fibre, cotton, consumes huge amounts of fresh water (~10,000 L/kg), and chemicals (such as fertilisers, insecticides) during the farming process (Nayak, Jajpura, & Khandual, 2023). On the other hand, synthetic fibre production (like polyester and nylon) is highly energy intensive, which also is linked to coal, natural gas or petroleum resources. The processing stages from fibre to fabric are also resource intensive due to excessive use of water, energy and chemicals. Hence, it can be observed that the resources are being widely used for manufacturing fashion and textiles.

In addition to these resources, there are resource depletion due to over production of fashion and textiles than the market demand. Almost all the brands are producing excessive amount (15-20% higher) of products that cannot be consumed by the consumers (Gui & Long, 2024). The unsold items are generally discarded through shredding, landfilling and incinerations. The study found that the implementation of EPR regulations will enforce the companies to produce in lesser quantities to avoid the financial burden of recycling or repurposing the unsold items. EPR regulations won't allow them to landfill or incinerate these clothes. Hence, the resources will be saved from getting wasted.

Furthermore, the EPR will enforce the brands to adopt appropriate strategies such as product take back, recycling or remanufacturing at the EOL of a product. With the EPR policy, fashion manufacturers, retailers and distributors will take the responsibility of collecting the EOL products to recycle them. This will help the use of recycled materials that would have ended in the landfill and save the use of virgin materials. Hence, the recovery and reuse of materials will support the principles of circular economy as established by this study. This was supported by the statements of LE2 and SME2.

Extract from LE2: “[...] as textile resources are limited, it is the responsibility

of fashion businesses to save resources for future generations. We are trying to source the quantities as per the forecasted values. We have reduced our order quantities and increased the order cycle to reduce the amount of waste going to landfill. Our company also has the policy of product take back from consumers and recycle them to new products. We have introduced the donation schemes, where consumers can bring their old clothes to our retail stores and exchange for getting some discount or voucher. These old clothes are then sent back to our recycling centres to make new products mainly by the route of mechanical recycling.”

Extract from SME 2: “As a small business, our focus is to produce in small quantities. We have seen how the consumer demand was decreased during Covid-19. Hence, we ensure not to produce in large batches and store them for long. We have our own designer and tailor, which helps us to produce the products within short timeframe [...]. Although we understand recycling and product tack back is good for our planet, we have not implemented these due to limited amount of budget.”

Support waste management

One of the major objectives of EPR is to reduce EOL waste generation through responsible waste disposal, reuse and recycling. The generation of waste is a major challenge to the municipality in Vietnamese cities as it costs a lot of money to manage the fashion and textile waste. The fashion and textile waste market in Vietnam was valued to be \$842.5 million USD in 2019, which is projected to reach a value of \$1,392.3 million USD by 2026 (6Wresearch, 2023). However, only 2% of the wastes are recycled and the remaining ends in the landfill (Nayak, Nguyen, Patnaik, & Khandual, 2021), which increases the recycling budget of the municipality in various cities. It was established through this study that with the introduction of EPR, the responsibility of municipality will be decreased as the brands will take the responsibility of managing the wastes at the EOL of their products. Hence, the amount of clothing wastes will start to decrease gradually with the implementation of EPR. Earlier research has shown that the implementation of EPR supports the waste generation at the manufacturing stage as well (Nayak et al., 2019). Many of the local producers of fashion and textiles in Vietnam produce a large amount of industrial waste that are being landfilled. The government initiatives have supported in the mass scale waste collection and recycling from industrial areas. However, several industries cannot avail this facility, and the waste are discarded into landfills. The study showed that the implementation of EPR can help these industries to reduce their waste generation and recycling the wastes. The extracts from LE2, LE3, and SME3 justifies the generation of waste and recycling.

Extract from LE2: “Apparel manufacturing is associated with a huge quantity of waste generated during the production process. In addition, the excessive

production and disposal of EOL clothing leads to problems of waste management. With the EPR policies in place, the brands will be responsible for taking care of waste going to landfill. Hence, the total amount of wastes, especially plastic wastes in Vietnam, will be substantially reduced [...].”

Extract from LE2: “[...] we have policies in place to manage our wastes generated during the manufacturing process. We collect various solid and packaging wastes to recycle them with our partner recycling facilities. For the waste generated at our consumers, we have also set product return policies. Consumers can donate their EOL clothes at designated collection points for recycling. However, the consumer awareness and limited number of collection centres has not helped us to significantly improve our recycling in Vietnam.”

Extract from SME3: “We operate with a very small budget and external support from agencies in waste management is minimum. Although we understand waste management is a major issue in Vietnam, lack of finance prevents us to recycle our waste or consumers’ waste. We also find that the consumers in Vietnam are not educated enough to participate in the waste management initiatives led by the brands [...].”

Challenges faced to implement EPR

Through this study we have identified three major challenges faced in developing countries such as Vietnam to implement EPR. These challenges are:

- a) Financial challenges to follow EPR guidelines
- b) Complexity of the EPR program
- c) Challenges to collect waste

Financial challenges to follow EPR guidelines

SMEs are not financially strong as they operate with limited budget. The EPR program needs administrative support as well as technologies to manage waste at various stages. If EPR enforces recycling of EOL clothing by the SMEs, it may lead to financial loss or even closure of the SMEs. This was clarified by the SME 1: “[...] as our budget is very limited, we can’t support the recycling policies if enforced by EPR. We need government support to facilitate recycling of clothing waste during production and consumption.” On the other hand, the LEs are well placed when financial constraints are considered as they include the expenses associated with EPR in their budget plan.

Complexity of the EPR program

EPR programs are challenging to implement due to several complexities associated with the product and management. Firstly, there is a range of fashion and textile products that are manufactured by companies often located in different countries. Further, various tiers of suppliers are associated with the supply chain process and often their identity is unknown. The products are manufactured in developing

countries such as Vietnam and consumed in developed nations (Europe or USA). Hence, it is hard to allocate responsibility either to the producers or to the retailers. If the destination is considered, retailers should be responsible for managing the waste. This approach is not fair as the profit was also made by the other tiers of suppliers and manufacturers in the supply chain process.

There are several wastes that cannot be identified when they are collected from consumers. These wastes can be called orphans, and it is not clear who can take the responsibility of managing them. Some studies argue to charge the consumers for managing the waste that is discarded by them. This can burden the consumers with additional costs and consumers may not be willing to pay (Tran et al., 2023). Finally, there will be several supply chain partners that won't want to take responsibility for managing the EOL clothing wastes. Enforcing EPR policies may be unsuccessful without the involvement of various tiers of suppliers.

Challenges to collect waste

This study also found that there are challenges associated with the product take back policy or recycling process. The consumers in developing countries are not well educated to follow the guidelines of EPR. They will discard the unusable clothes into landfill or incinerate them in open air. Fashion brands need to educate them through workshops and seminars about the EPR policies. Further, the recycling centres may be located far from the urban areas. Hence, transporting waste over a long distance may increase the transportation cost and contribute to carbon emissions. Hence, the waste management problem needs to be resolved before EPR can be successfully implemented.

SDGs addressed by EPR

This study found that the implementation of EPR in Vietnam can address multiple SDGs, which are discussed here.

- SDG 11 (Sustainable cities and communities): Implementing EPR can facilitate clean environment and reduce waste, which is covered under SDG 11.
- SDG 12 (Responsible consumption and production): Sustainable production and consumption will be promoted through EPR. Brands will be encouraged to produce less and take responsibility for managing EOL clothing waste.
- SDG 13 (Climate action): With the EPR in place, brands will use more sustainable materials and processes, which can reduce greenhouse gas emissions and help mitigate climate change.
- SDGs 14 and 15 (Protection of life on land and below water): EPR will support minimizing waste generation and promote proper management of hazardous substances. This in turn can lead to protect ecosystems, biodiversity, and heal planetary health.

CONCLUSIONS

This study was carried out to understand the scope of implementing EPR policies in developing countries like Vietnam. A total of six fashion enterprises, three large and three SMEs, were involved in the study. Several important findings are contributed by this study, which are discussed in the advantages, and challenges section. Further the SDG benefits of EPR and existing policies are also discussed in this study. This will be helpful to the industries and policy makers to understand the benefits and challenges for EPR implementation in Vietnam.

The study established that the implementation of EPR will lead to sustainable designing of fashion and textile products. Under this category, the concepts of durability, renewability, and recyclability were prominent as mentioned by the interviewees. Durable product design concepts, use of renewable resources and recycling the wastes at the EOL can help to achieve the objectives of EPR. Furthermore, the EPR policies can support in saving resources from depletion as they are being used in a wasteful manner. The EPR can also support in fashion and textile waste management, which is at a mere rate of 2% in the global value chain.

There are several challenges associated with running the EPR regulations in developing countries such as Vietnam. Three major challenges were identified from the interviewees, which are: a) financial challenges to follow EPR guidelines, b) complexity of the EPR program, and c) challenges to collect waste. It was found that the financial challenges are associated with SMEs rather than LEs. There were several complexities associated with the EPR, and challenges associated with collecting the wastes. The EPR will benefit to achieve multiple SDGs (such as 11, 12, 13, 14 and 15).

This study was limited to only six fashion brands in Vietnam. Constraints such as limited funding and lack of time prevented us to collect data from a range of industries. Hence, future studies can focus on a greater number of industries located in various locations of Vietnam. The other limitation of this study is that it is based on qualitative methods of data collection and analysis. Hence, future studies should focus on quantitative methods or mixed of data collection and analysis to address the EPR issues.

REFERENCES

6Wresearch. (2023). Vietnam Textile Waste Market (2020-2026).

Cai, Y.-J., & Choi, T.-M. (2019). Extended producer responsibility: A systematic review and innovative proposals for improving sustainability. *IEEE transactions on engineering management*, 68(1), 272-288.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review*, 14(4), 532-550.

Fletcher, K. (2012). Durability, fashion, sustainability: The processes and practices of use. *Fashion practice*, 4(2), 221-238.

Gui, L., & Long, X. (2024). Curbing Fashion Waste and Overproduction: A Supply Chain Perspective. In *Responsible and Sustainable Operations: The New Frontier* (pp. 51-72): Springer.

Gupta, R., Kushwaha, A., Dave, D., & Mahanta, N. R. (2022). Waste management in fashion and textile industry: Recent advances and trends, life-cycle assessment, and circular economy. *Emerging trends to approaching zero waste*, 215-242.

Hörner Bussolo, G., Bressanelli, G., Visintin, F., & Sacconi, N. (2024). *Toward the European Union 2030 Strategy for Textiles: A Review*. Paper presented at the IFIP International Conference on Advances in Production Management Systems.

Lindhqvist, T. (2000). *Extended producer responsibility in cleaner production: Policy principle to promote environmental improvements of product systems*. (PhD). Lund University,

Multala, B., Wagner, J., & Wang, Y. (2022). Durability standards and clothing libraries for strengthening sustainable clothing markets. *Ecological Economics*, 194, 1-7. doi:10.1016/j.ecolecon.2022.107358

Nayak, R. (2022). *Sustainable Fibres for Fashion and Textile Manufacturing*. London, UK: Elsevier

Nayak, R., Akbari, M., & Far, S. M. (2019). Recent sustainable trends in Vietnam's fashion supply chain. *Journal of Cleaner Production*, 225, 291-303.

Nayak, R., Jajpura, L., & Khandual, A. (2023). Traditional fibres for fashion and textiles: Associated problems and future sustainable fibres. In *Sustainable Fibres for Fashion and Textile Manufacturing* (pp. 3-25): Elsevier.

Nayak, R., Nguyen, L., Patnaik, A., & Khandual, A. (2021). Fashion waste management problem and sustainability: A developing country perspective. In *Waste Management in the Fashion and Textile Industries* (pp. 3-29). Netherlands: Elsevier.

Nayak, R., Nguyen, L. T., Panwar, T., George, M., & Ulhaq, I. (2020). Sustainable supply chain management: : challenges from a fashion perspective. In *Supply chain*

management and logistics in the global fashion sector: The sustainability challenge (Vol. 1, pp. 355). Singapore Taylor & Francis

Nayak, R., & Patnaik, A. (2021). *Waste Management in the Fashion and Textile Industries*. London, UK: Woodhead Publishing.

Pandey, R., Pandit, P., Pandey, S., & Mishra, S. (2020). Solutions for sustainable fashion and textile industry. In *Recycling from waste in fashion and textiles: a sustainable and circular economic approach* (pp. 33-72): Wiley.

Papamichael, I., Chatziparaskeva, G., Pedreno, J. N., Voukkali, I., Candel, M. B. A., & Zorpas, A. A. (2022). Building a new mind set in tomorrow fashion development through circular strategy models in the framework of waste management. *Current Opinion in Green and Sustainable Chemistry*, 36, 1-10.

Rani, H., & Saha, G. (2021). Organizations and standards related to textile and fashion waste management and sustainability. In *Waste Management in the Fashion and Textile Industries* (pp. 173-196). London, UK: Elsevier.

Sandvik, I. M., & Stubbs, W. (2019). Circular fashion supply chain through textile-to-textile recycling. *Journal of Fashion Marketing and Management: An International Journal*, 23(3), 366-381.

Spicer, A., & Johnson, M. (2004). Third-party demanufacturing as a solution for extended producer responsibility. *Journal of Cleaner Production*, 12(1), 37-45.

Steenmans, K. (2019). Extended producer responsibility: An assessment of recent amendments to the European Union Waste Frameworks directive. *Designing Law and Policy towards Managing Plastics in a Circular Economy*, 15, 108-110.

Tran, T. Y. A., Kieu, K. T., Herat, S., & Kaparaju, P. (2023). Implementing EPR as a Tool for Addressing Environmental Issues in Vietnam. *Environmental Science & Sustainable Development*, 8(2), 73-92.

Yin, R. K. (2003). *Case study research: Design and methods*. Newsbury Park: Sage publications.