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Ecological transition and energy efficiency in Moroccan textile SMEs: an empirical evaluation of Law No. 47-09

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ABSTRACT

This study examines the role of energy efficiency in promoting the ecological transition and improving the economic and environmental performance of small and

medium-sized enterprises (SMEs) in Morocco's textile sector, with particular emphasis on the implementation of Law No. 47-09 on energy efficiency. The research aims to assess the effectiveness of the Moroccan legal framework in reducing energy costs and environmental footprints while identifying the main barriers to the adoption of sustainable energy

practices. A mixed-methods approach was adopted, combining quantitative data collected through structured questionnaires administered to 30 textile SMEs located in Fez, Salé, and Tangier with qualitative analysis of regulatory implementation and business practices. The findings reveal that all surveyed enterprises reported awareness of Law No. 47-09, although its practical implementation remains limited. While 68% of respondents perceived a moderate impact of energy efficiency on reducing energy costs, 56% reported a moderate contribution to reducing their ecological footprint. Only 32% had conducted an energy audit during the previous five years, and 40% possessed an energy performance certificate. Nevertheless, all surveyed enterprises had invested in LED lighting, reflecting growing awareness of energy-saving opportunities. The results also highlight the predominance of economic motivations over environmental considerations, as well as the influence of international market requirements on the adoption of energy efficiency measures. The study concludes that, despite the progress achieved through Law No. 47-09, significant regulatory and operational challenges persist. Strengthening financial incentives, expanding energy audit requirements, introducing appropriate environmental taxation, and promoting professional training are essential to accelerating the ecological transition, improving competitiveness, and supporting sustainable development among Moroccan textile SMEs.

Keywords: Energy Efficiency; Ecological Transition; Sustainable Development; Textile Industry; Small and Medium-Sized Enterprises (SMEs); Law No. 47-09; Energy Audits; Environmental Footprint; Energy Policy; Morocco.

1. Introduction

Energy efficiency is now recognised as a key driver in the fight against global warming and the rational management of energy demand. By reducing energy consumption without compromising the quality of services provided, it helps to significantly limit greenhouse gas emissions, whilst optimising the use of available resources. As such, it is an essential component of public policies geared towards sustainable development, in that it simultaneously addresses environmental, economic and social challenges.

This approach is of particular importance in the Moroccan context, which is characterised by a high level of energy dependence on external sources, given that over 90 per cent of the country's energy needs are met by imports (Official website of the Ministry of Energy Transition and Sustainable Development). Such a situation exposes Morocco to multiple risks, linked in particular to the volatility of international markets and security of supply. Consequently, energy

efficiency is not only a necessity but also a multidimensional solution. On the one hand, it helps to reduce greenhouse gas emissions by limiting the use of fossil fuels; on the other, it helps to manage energy demand through regulatory and incentive mechanisms. As such, it has emerged as a strategic pillar of the national energy transition and of mitigating the structural vulnerability of Morocco's energy system.

In line with this, the Moroccan legal framework has gradually incorporated the requirements of the ecological transition. Law No. 47-09 on energy efficiency, promulgated by Dahir No. 1-11-161 of 17 October 2011 (Official Gazette No. 5980), is thus a fundamental instrument for promoting energy efficiency in the building, industrial and transport sectors. Furthermore, Framework Law No. 69-19 on tax reform, promulgated by Dahir No. 1-21-86 of 15 Dhu al-Hijjah 1442 (26 July 2021) and published in the Official Gazette No. 7010, enshrines, notably in Article 7, the gradual integration of environmental considerations into the Moroccan tax system, paving the way for green taxation instruments, notably carbon pricing, in line with the objectives of energy transition and sustainable development. These measures reflect a commitment to aligning energy and tax policies with a focus on efficiency and sustainability.

In the face of the energy and environmental challenges facing Morocco, the involvement of small and medium-sized enterprises, which account for around 90 per cent of the national economy (High Commission for Planning), is a key driver for the success of public policies on sustainable development. Their active participation in the energy transition not only helps to disseminate best practice on a large scale, but also strengthens the impact of national strategies, notably the national energy efficiency strategy for 2030.

Legal mechanisms for energy efficiency, such as mandatory energy audits and energy performance certificates, offer businesses the opportunity to identify and rectify sources of energy wastage. This approach enables them to significantly reduce their energy bills whilst improving their competitiveness. Furthermore, by optimising their energy consumption, they help to reduce their ecological footprint, in line with national environmental objectives. As the right to a healthy environment is recognised as a fundamental right (Articles 19, 31 and 71 of the Constitution), it applies to all economic actors, including SMEs (B. Nadir, 2013).

In this context, it is essential to examine the following question: to what extent does energy efficiency contribute to reducing the energy bills and ecological footprint of small and medium-sized enterprises in Morocco?

This study aims to analyse the legal frameworks governing energy efficiency, with a focus on assessing their impact on reducing energy costs and the ecological footprint of SMEs in Morocco. To achieve these objectives, it will adopt a methodological approach combining the distribution of questionnaires to SMEs operating in energy-intensive sectors, notably the textile and manufacturing industries, supplemented by field studies to gather accurate and actionable empirical data.

2. Article maps

In this article, we began by presenting an introductory framework, before providing a detailed analysis of the main areas of research. We then explained the methodology employed, followed by a presentation of the results obtained. On this basis, specific recommendations and concrete courses of action were formulated. The article concluded with a general summary, highlighting the key contributions of the study, and a comprehensive list of the books, scientific articles and studies we drew upon as references was provided to reinforce the scientific value of our research.

3. Methodology

This study adopts a hybrid methodology, combining positivism and interpretivism.

Positivism guides our deductive approach, which focuses on the rigorous analysis of theories (phenomena, concepts, laws) to understand an objective and measurable reality.

Conversely, interpretivism underpins our comprehensive approach, centred on the examination of the perceptions, opinions and discourses of the actors in order to interpret social reality within its empirical context.

Data collection

Data collection is based on an empirical survey conducted amongst a sample of thirty (30) small and medium-sized enterprises in the textile sector, located in the cities of Fez, Salé and Tangier. These locations were selected due to their industrial significance and their representativeness of the various dynamics of textile production in Morocco, ranging from traditional units to export-oriented industrial zones.

The study relies primarily on a structured questionnaire designed to analyse energy management practices, the level of awareness of energy efficiency mechanisms (energy audits, energy performance certificates), and the obstacles encountered in their implementation.

This approach is supplemented by a qualitative analysis, which allows the data collected to be compared with the realities on the ground and highlights the discrepancies between the legal framework and its actual application.

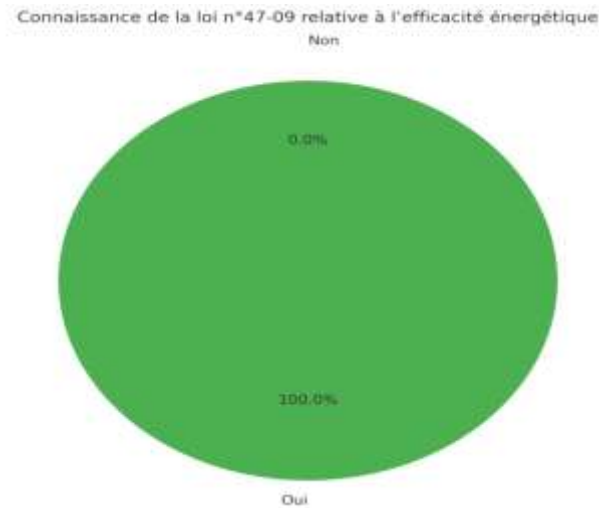


Figure 1. Level of awareness of Law No. 47-09 on energy efficiency.

As shown in the figure above, all the companies that responded to the questionnaire stated that they were aware of Law No. 47-09 on energy efficiency, thus showing an awareness rate of 100 per cent.

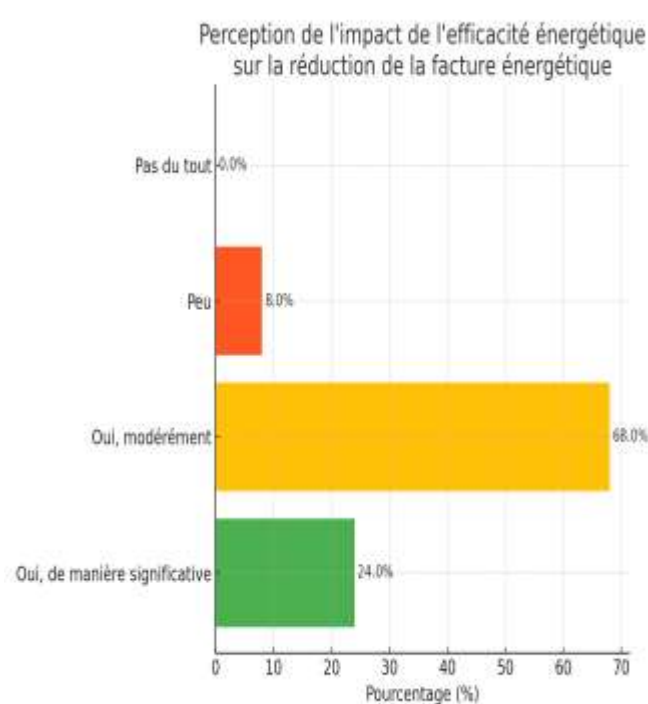


Figure 2. Impact of energy efficiency on reducing energy bills.

Figure 2 reveals that the majority of companies surveyed recognise the impact of energy efficiency on reducing their energy bills. Indeed, 68 per cent consider this impact to be moderate, 24 per cent consider it significant, whilst 8 per cent consider it low. No respondent stated that it had no impact

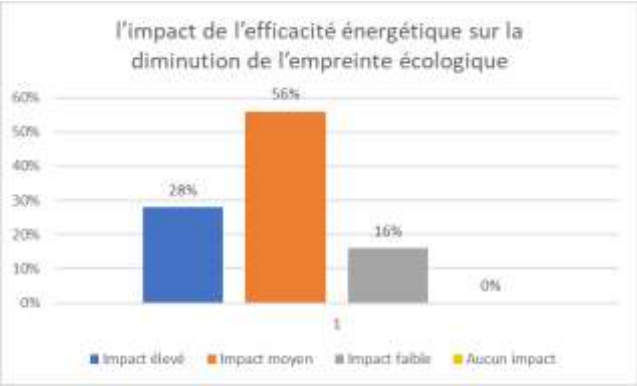


Figure 3. The impact of energy efficiency on reducing the ecological footprint.

This figure shows that the majority of companies recognise that energy efficiency reduces the ecological footprint, with 56 per cent assessing this impact as moderate, 28 per cent as high, and 16 per cent as low. None denied this effect.



Figure 4. Conducting an energy audit.

According to this figure, only 32 per cent of companies have carried out an energy audit in the last five years, whilst 68 per cent have not.

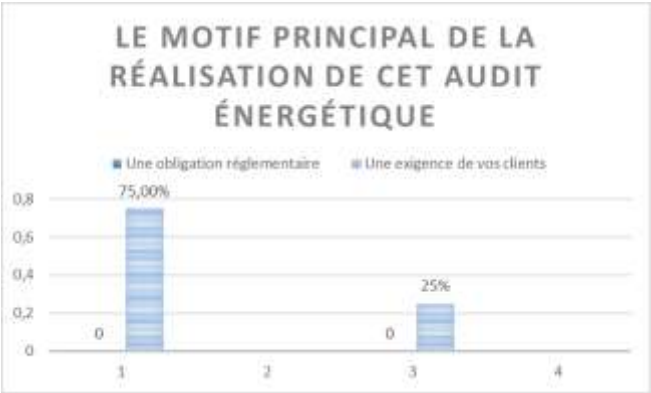


Figure 5. Main reason for carrying out an energy audit.

According to this figure, it appears that amongst the companies that have carried out an energy audit, 75 per cent did so to comply with a regulatory requirement, whilst 25 per cent did so in response to a request from their customers.

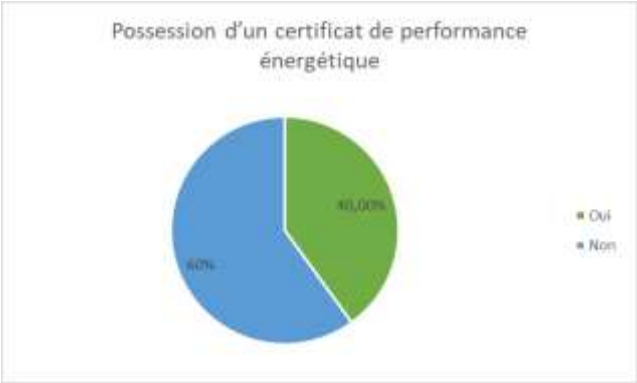


Figure 6. Possession of an energy performance certificate.

Figure 6 shows that only 40 per cent of businesses hold an energy performance certificate, whilst the majority – 60 per cent – have not yet obtained one.

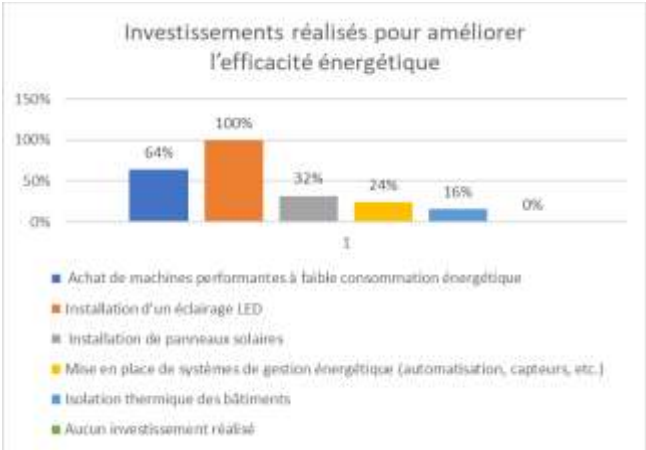


Figure 7. Investments made to improve energy efficiency.

This figure shows that all businesses have invested in LED lighting, and 64 per cent in high-efficiency machinery, whilst investment in solar panels, energy management and insulation remains marginal. No respondent stated that they had not invested.

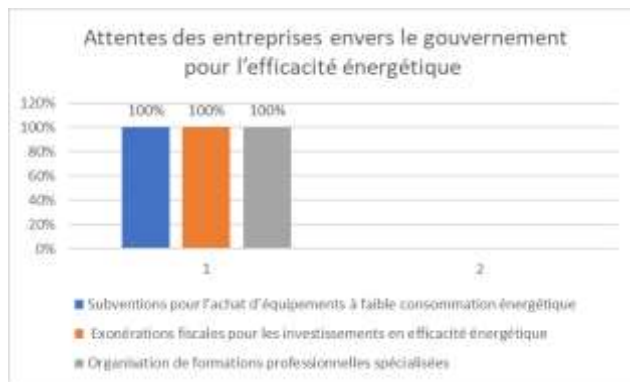


Figure 8. Companies' expectations of the government regarding energy efficiency.

This figure shows that all respondents (100 per cent) believe the government should support the integration of energy efficiency through grants, tax exemptions and specialised vocational training.

4. Results

The textile sector, which is heavily dependent on energy at every stage of production, can derive significant benefits from energy efficiency. This enables the optimisation of processes, the reduction of costs and losses, and the minimisation of environmental impact, whilst enhancing the sector's competitiveness and sustainability.

The companies consulted as part of this study demonstrated a strong awareness of the importance of energy efficiency and its regulatory framework, in particular Law No. 47-09. This awareness is notable, even though several of them are not directly subject to the obligation to carry out an energy audit. Furthermore, the analysis shows that the implementation of energy efficiency measures within companies is primarily driven by the desire to reduce energy consumption costs. This economic objective appears to take precedence, relegating environmental concerns – notably the reduction of the ecological footprint – to second place.

Analysis of the data collected reveals that the scope of the legal mechanisms established by Law No. 47-09 on energy efficiency does not effectively extend to small and medium-sized enterprises (SMEs), due in particular to the energy consumption thresholds required for the application of obligations such as energy audits. However, although these

enterprises consume less energy individually, collectively they account for the majority of the national productive sector. This discrepancy between the regulations in force and the actual structure of the Moroccan economy limits the law's impact on a large section of economic actors potentially affected by energy efficiency issues.

Nevertheless, in the absence of an explicit legal obligation, some SMEs have voluntarily adopted energy efficiency measures. These are primarily aimed at reducing energy costs, but also at obtaining the energy performance certificates required by certain international partners, particularly in the context of exports. In this context, the environmental requirements imposed by foreign markets act as an indirect regulatory force, encouraging these businesses to anticipate and incorporate stricter energy standards. Thus, international regulations go some way towards compensating for the limitations of the national framework, steering SMEs towards energy-efficient practices aligned with global trade standards.

All companies have made significant investments to improve their energy efficiency, although these efforts vary depending on the scale of the costs and the budgets allocated. Among the most common measures are the replacement of production systems with high-, high-efficiency machinery that consumes less energy, as well as the widespread adoption of LED lighting, a solution that is both effective and economically accessible. These initiatives reflect a growing awareness of energy challenges and a genuine desire to optimise consumption whilst keeping costs under control.

In light of these initiatives, businesses have specific expectations of the public authorities. In particular, they are calling for targeted grants, tax incentives and the introduction of specialised vocational training programmes. These measures are seen as essential to supporting their energy transition, facilitating the integration of innovative technologies and strengthening their in-house expertise, so as to combine economic performance with compliance with sustainable development objectives.

5. Discussion

In light of the results obtained, Law No. 47-09 on energy efficiency appears to be a legislative instrument aimed at reorienting the national economic model towards a sustainable approach. Nevertheless, an analysis of its practical implementation – particularly through the study of a sample from the textile sector – highlights a number of limitations and shortcomings, both at the regulatory and operational levels. Despite the cross-cutting nature of energy efficiency – recognised as a key driver for the rational management of

energy demand and the fight against global warming – economic actors continue to prioritise short-term economic gains at the expense of environmental benefits. This approach highlights the need for incentive-based reforms, particularly fiscal ones, to encourage investment in high-performance energy systems within businesses, whilst emphasising the central role of the State as a regulator ensuring the primacy of the public interest and the promotion of practices compatible with the requirements of sustainable development (H. Majdoubi, 2016).

In this context, the study's findings also highlight the indirect influence of European legal standards on the behaviour of Moroccan small and medium-sized enterprises, particularly those focused on exports. Although these enterprises are not always subject to national obligations such as mandatory energy audits, they are encouraged to adopt international energy and environmental standards in order to preserve their access to foreign markets and maintain their competitiveness. This dynamic reflects a regulatory spillover effect exerted by European requirements regarding energy performance and certification, transforming energy efficiency into a genuine strategic lever for economic adaptation and the maintenance of market share.

In the same vein, the carbon tax also serves as a fiscal incentive designed to internalise environmental costs and steer the behaviour of economic actors towards more sustainable practices. It forms part of an energy governance framework, which is essential for optimising resources and achieving decarbonisation targets. Furthermore, smart infrastructure (smart grids and digital energy management systems) reinforces this momentum by improving network efficiency, reducing losses and promoting better control of energy demand, in line with the requirements of the low-carbon transition.

Furthermore, businesses are now encouraged to reduce their environmental footprint and to integrate the principles of sustainable development into their production processes. This trend forms part of the energy transition, which is essential for achieving the objectives of the national energy efficiency strategy, which aims for a 20 per cent reduction in energy bills by 2030. However, to ensure the effectiveness of this transition, the current legal framework requires in-depth reform, notably by broadening the scope of mandatory energy audits and strengthening the enforcement mechanism. The latter, currently limited to financial penalties, remains insufficient to guarantee that economic actors are held genuinely accountable. It therefore appears necessary to strengthen the practical implementation of the 'polluter pays'

principle through legal mechanisms that are more dissuasive and better suited to contemporary environmental challenges.

Conclusion

This study has examined the energy costs and ecological footprint of SMEs in Morocco's textile sector, in the light of Law No. 47-09 on energy efficiency. Whilst this law represents a significant step forward in terms of the energy transition, more than a decade after its enactment, its implementation remains below expectations. The limitations observed on the ground highlight the need for far-reaching reform capable of addressing the Kingdom's current energy and environmental challenges.

It is imperative that Morocco aligns itself with international energy efficiency standards in order to strengthen the competitiveness of its small and medium-sized enterprises (SMEs). By adopting globally recognised energy standards, these enterprises can improve the efficiency of their processes, reduce their production costs and enhance their image as environmentally responsible organisations. Such an approach serves as a strategic lever to strengthen their position in foreign markets, where compliance with environmental requirements is becoming a key differentiating factor.

Furthermore, this alignment with international standards would enable Moroccan SMEs to contribute actively to the circulation of environmentally friendly products, thereby promoting a more sustainable economy. By embracing this trend, Morocco is not only meeting global commitments regarding the energy transition but is also creating a favourable climate for innovation, investment and the expansion of its businesses into international markets.

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