Chapter 14
Can Digitalization Prevent Pollution-Related Employment Loss?
An Empirical Approach

María del Mar Martínez-Bravo
https://orcid.org/0000-0002-4236-6444
University of Almería, Spain

ABSTRACT

Cities face major challenges due to pollution issues such as significant employment losses as the workforce is becoming more concerned with environmental issues. In this context, digitalization literature is gaining momentum as it has been signaled as a potential game-changer for addressing urban challenges. However, the impact that urban digitalization might have on reversing the negative effects of urban pollution on the job loss is unexplored. This chapter analyzes the relationship between urban pollution and urban employment rates, and the moderating effect of urban digitalization on this relationship, using a sample of 404 OECD cities. The results confirm both hypotheses. When urban pollution increases, the employment rate decreases. Moreover, urban digitalization has the potential to revert this relationship. This chapter contributes to the literature on urban management and to the understanding of urban dynamics as a guide for the necessary evolution of cities.

INTRODUCTION

Cities management is becoming more and more challenging for governments due to the growing problems that urban contexts are continuously facing (Vardoulakis & Kinney, 2019). Cities experience huge population expansion and great resources consumption (Sodiq et al., 2019) which lead them to face, for instance, relevant issues such as environment degradation or citizens or place health menaces (Gupta et al., 2019; Martínez-Bravo & Martínez-del-Río, 2019; Paiva-Vianna et al., 2015). Indeed, these challenges

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have been signaled as entailing trade-offs in the urban contexts which might be translated into worse livability perceptions from the citizens' points of view (e.g., Martínez-Bravo et al., 2019).

Research and governments are focusing their attention and efforts on pollution-related problems that might concern urban population because of the potential consequences on dwellers' health (e.g., Paiva-Vianna et al., 2015). Specifically, the World Health Organization **(WHO)** estimates the pollution-related deaths in approximately seven million per year[1] and even short-term exposure to urban pollution has been related to an important number of premature deaths (Sicard et al., 2020). Urban pollution aggressively affects not only human health, but also the health of urban vegetation (Agathokleous et al., 2020) which, in turn, might affect vegetation related advantages. For instance, vegetation has been highlighted to be capable of cleaning the air, improving temperature, and reducing noise pollution (Bolund & Hunhammar, 1999; Vu et al., 1998) resulting in shelter for citizens. However, pollution related outcomes such as dust or polluting gases might inhibit the normal respiration and photosynthesis mechanisms within the leaf (Gheorghe & Ion, 2011) which might, in turn, reduce the scope of vegetation related advantages in terms of facing urban pollution. Overall, urban pollution harms people's and places' health and quality of life.

Besides, research has pointed out that urban pollution might likely imply employment issues such as the labor force moving from highly polluted places when possible or people choosing less polluted places when looking for job due to work location. For instance, Yue et al. (2024) elaborated a study on air pollution and labor mobility pointing out that small decreases in a city's pollution might significantly rise people's possibilities of moving to that city. Indeed, research defends that economic compensations are no longer enough to make the workforce endure pollution related negative circumstances (Xue et al., 2021) while environmental quality is more and more important in terms of labor force's job location choice (Yue et al., 2024).

In this context, researchers defend that digitalization has the potential to address pollution issues and positively enhance sustainability (Helbing, 2012; Heemsbergen, 2016; Seele & Lock, 2017) for different reasons. For instance, digitalization has the capacity of rising savings and efficiency (Sodiq et al., 2019), which are indispensable conditions when looking for urban sustainability enhancement and urban pollution minimization. Digitalization has also been associated with wealthy contexts due to the relevant economic costs related to technology implementation (Ashrafi & Murtaza, 2008; Billon et al., 2010; Harindranath et al., 2008) and the complex infrastructure needed (Myovella et al., 2020). These wealthy cities will more likely invest in sustainability issues. Besides, digitalized contexts are more likely to shelter highly educated people (Billon et al., 2010) and research pointed out highly educated people as critical to achieve sustainability because they are more likely to carry out specific initiatives such as participating in politics (e.g., Sodiq et al., 2019).

In a challenging scenario where cities are struggling to offer citizens opportunities to thrive with quality jobs and healthy environments, digitalization has the potential to generate endless solutions (e.g., Lyons et al., 2018). However, empirical research on digitalization initiatives impacts has scarcely been developed to date for several causes. First, empirical research analyzing interrelationships and trade-offs among urban dynamics, and specifically including digitalization approaches is scant (Lyons et al., 2018, Seele & Lock, 2012, Stuermer et al., 2017). Second, most existing works addressing urban digitalization are theoretical (e.g., Stuermer et al., 2017) or entail empirical studies of cities in a single country (Yue et al., 2024), which may involve limited generalization. In this vein, this study aims to develop a theoretical framework with empirical support at the city-level and to analyze if urban pollution negatively affects the city's employment rates and to analyze if urban digitalization moderates and reverts that negative