Evaluating Driving Factors of Environmental Behavior of Red Brick Industry Actors During the COVID-19 Pandemic

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The number of COVID-19 cases in Indonesia, with a total death toll of 143 445 people as of November 1, 2021, ranked second highest in Asia, disturbing many livelihoods, including the red brick industry. This study aims to analyze the extent to which environmental behavior manifests and assess the capacity and incentive driving forces that affect the environmental behavior of actors in the red brick industry during the COVID-19 pandemic. This research was conducted through questionnaires, data processing, and analysis of descriptive and inferential data using the Statistical Package for the Social Sciences (SPSS). The results showed that the environmental behavior of actors in the red brick industry was *less good* (12.12%), *pretty good* (69.69%), and *good* (18.18%). This study utilized the capacity and incentive variables as driving forces. The variables that contribute to capacity can be categorized as environmental knowledge, social capital, financial capital, natural capital, and physical capital. On the other hand, the incentive variables specifically encompass market signals and government incentives. Neither of the variables have been effective in motivating environmental behavior toward a better or optimal direction. Moreover, their concurrent influence on environmental behavior was weak (8.2%). The study of human behavior focuses on the causal chain. It is, therefore, multi-dimensional, meaning that control or influence of certain factors over behavior is relatively difficult to achieve. The optimal contribution of society toward environmental protection and control has not been realized.

Keywords: industrial actors, environmental behavior, capacity and incentive factors, COVID-19 pandemic.

Introduction

Red brick production from clay has been widespread, not only in Indonesia but also globally, including Western Europe (France, Spain, and Belgium), Greece, Cyprus, Eastern Asia (China, India, and Southeast Asia), and Latin America and Brazil (Ramos Huarachi et al., 2020). The production of red bricks expands and develops in tandem with societal shifts toward urbanization, as evidenced by the increasing use of land resources for brick and roofing production (Utomo et al., 2016).

Red brick production primarily caters to profit-seeking activities aimed at increasing individual or household income and reducing unemployment. Industry management policies are primarily geared toward meeting market demand with little consideration for the concept of industrial ecology (Kristanto, 2013). Such practices result in serious environmental and community problems, including the undue excavation of lands leading to severe degradation and infertility of soils. Consequently, these lands become prone to inundation during the rainy season, experience changes in soil topography, and have reduced biological resources and topsoil layers. These issues also lead to decreased water quality, air pollution, and reduced road access quality (Deismasuci et al., 2016; Apriyanti and Mutia, 2018; Nursia and Haradudu, 2018; Supriyadi and Septinar, 2018; Muzakki and Utami, 2019; Rahman and Ramadhan, 2019).

Actors in the red brick industry should actively participate in environmental protection and management to reflect their environmental awareness and fulfill their duties as outlined in Article 70, Section 3, of Law Number 32 of (2009) concerning Environmental Protection and Management, and the Government Regulation of the Republic of Indonesia Number 22 of (2021) concerning the Implementation of Environmental Protection and Management. These duties include increasing awareness of environmental protection and management, fostering community empowerment and partnerships, enhancing the community's ability and innovations, developing community responsiveness for social supervision, and preserving local culture and wisdom to maintain environmental functions.

The intent-oriented perspective on environmental behavior seeks to promote environmentally beneficial behavior guided by goals and conscious processes, thereby explaining individual behavior in specific situations. According to the United Nations Commission on Sustainable Development (UNCSD) International Work Program, such conduct is considered environmentally friendly. Pro-environmental behavior, as defined by Nu'man (2020), involves using services and products to meet basic needs and improve the quality of life while minimizing the use of natural resources, toxic materials, and waste emissions throughout the product's life cycle to ensure the well-being of future generations.

Environmental behavior is influenced by various factors, including subjective norms, behavioral beliefs, and control over behavioral sources and opportunities (Hamzah, 2013). Environmental conditions present challenges and stimuli for humans in their pursuit of survival, encouraging them to develop their potential to make the most of available environmental resources. Kristensen (2004) has noted that pressure leading to behavior and the management of the environment results from driving factors, capacity, and incentives, each with varying degrees of influence on such conduct (Reardon and Vosti, 1997).

Capacity refers to the ability to access the five capitals: financial, infrastructure, natural, human, and social. Incentives are external drivers institutionalized in society to ensure compliance with formal regulations by institutions within the social structure, such as market signals and governmental incentives (Bebbington, 1999; Bahamondes, 2003; Swinton, 2003; Field and Field, 2006; Karyanto, 2010).

Community environmental behaviors in response to the COVID-19 pandemic have emerged in Indonesia alongside government policies aimed at prevention and control. One such policy, the Community Activities Restrictions Enforcements, had a significant impact on daily activities, including industry and trade. Simultaneously, steps were taken to promote communication of health risks and community empowerment through health protocols. In July 2020, the Ministry of Health of the Republic of Indonesia used various communication, information, and educational media to address COVID-19 (Ministry of Health of the Republic of Indonesia, 2020).

Actors in the red brick industry, often reliant on this industry for income and family needs, had to adapt to

new habits and behaviors to comply with policies and protocols in effect. The narrative among them was often "adapt or perish in the midst of a pandemic." Adapting to new habits through the behavior of "making peace with COVID-19" was necessary for the pandemic to become endemic. Being part of the red brick industry actors during COVID-19 presented a psychological paradox. On the one hand, they had to adhere to health protocols that hindered their business activities, and on the other hand, they had to continue producing products to maintain environmentally sustainable production. Developing environmental behaviors among red brick industry actors was crucial for addressing environmental problems within the multi-dimensional and challenging causal chain. Hence, this study's fundamental construct was the evaluation of the driving force factors of capacity and incentive influencing the pro-environmental behavior of red brick industry actors (Karyanto, 2012). Capacity and incentive manifest through environmental degradation (Reardon and Vosti, 1997), and the pandemic, when examined through the Driving Force Pressure-State-Response framework from the European Environment Agency (EEA) (1999), revealed the relationship of variables in the conceptual framework of capacity-incentive (environmental degradation) toward environmentally intelligent behavior, as shown in *Fig. 1* (Karyanto, 2012).

Regarding COVID-19 and the policies implemented to restrict communal activities, this study addresses three questions concerning the management of the red brick industry: Do the environmental behaviors of red brick industry actors comply with the indicators outlined in government regulations? How do capacity and incentive variables, as driving forces, encourage environmental behaviors among red-brick industry actors? To what extent do these variables, either individually or combined, influence environmental behaviors? Therefore, this study aims to analyze the level of implementation of positive environmental behavior among red brick industry actors based on the standards outlined in regulations related to the community's role in environmental protection and management. It also seeks to measure the extent of influence of capacity and incentive variables on the environmental behavior of red brick industry actors during the COVID-19 pandemic.

Methods

Location of the study

In this study, questionnaires were distributed among business actors operating within the Red Brick Production Center located in Linggamukti Village, Sucinaraja District, Garut Regency, West Java Province, Republic

Fig. 1. *Relationship of variables in the conceptual framework of capacity-incentive / environmental degradation*
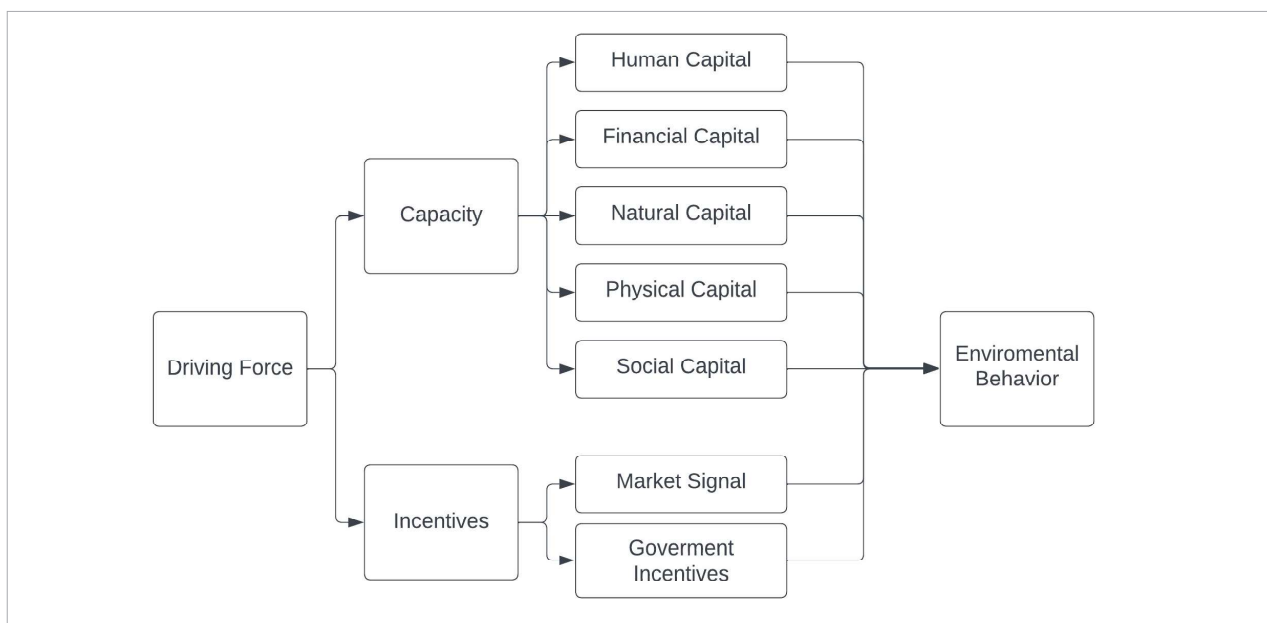
of Indonesia (*Fig. 2*). The data collection phase extended over one month, specifically in August 2021. During this period, Garut Regency experienced a relatively lower incidence of COVID-19 cases in comparison with other regions in West Java. Additionally, the production of red bricks continued uninterrupted despite the imposition of stringent restrictions on production activities.

The primary data for this study were gathered through the administration of questionnaires to business actors, with a particular focus on their environmental behavior. Secondary data for comparative analysis were obtained from the Accountability Statement Report (LKPJ) of Linggamukti Village, Sucinaraja District, Garut Regency, for the Fiscal Year 2020.

Context and method

To examine the impact of the COVID-19 pandemic on the driving forces behind variable capacity and incentives for environmental behavior in the management at the Red Brick Production Center in Linggamukti Village, a cross-sectional research methodology was employed by administering a questionnaire with a self-administered scale, following thorough assessments of validity and reliability.

Financial capital refers to the economic resources individuals or households possess, typically in the form of income or a combination of income and purchasing power. Natural capital encompasses the presence and accessibility of clay as a fundamental resource, as well as the availability of firewood. The provision of capital facilities and infrastructure is crucial for efficient production processes. This includes the availability of land for various stages of production, such as soil dough processing, as well as the presence of suitable buildings for storing production materials and burning products. Social capital encompasses various elements, including cultivating interpersonal connections, a disposition towards sharing and empathy, shared societal norms and values, and the capacity to establish networks. Additionally, social capital is influenced by governmental measures in the form of formal regulations implemented by institutions within the social framework and market indicators such as price information and demand, which aid managers in decision-making processes.

Fig. 2. *The study took place in Linggamukti Village, Sucinaraja District, Garut Regency, West Java Province, Republic of Indonesia*
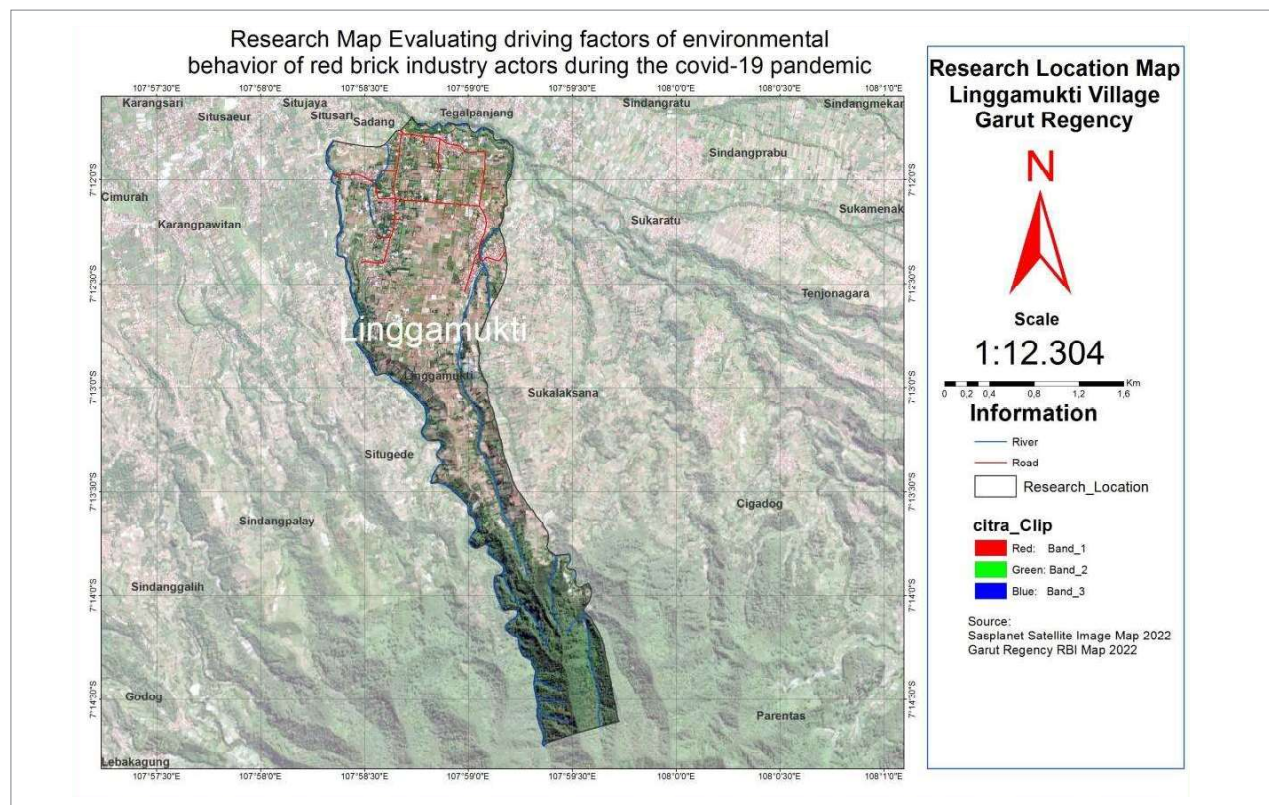
Sample and procedure

Questionnaires were distributed to managers of red brick businesses located in Linggamukti Village, Sucinaraja District, Garut Regency, West Java Province, aiming to obtain comprehensive responses. The questionnaire was conducted following the Joint Decree of 4 Ministers Number 01/KB/2020, issued on June 15, 2020, which provides guidelines for organizing learning activities during the 2020/2021 academic year, taking into consideration the ongoing COVID-19 pandemic. This decree also outlines action steps for risk communication, community empowerment, health protocols, communication media, information, and education in managing the COVID-19 situation (Kemenkes RI, 2020).

The study population comprised 45 registered red brick business operators in Linggamukti Village, Sucinaraja District, Garut Regency. A sample of 33 individuals who had temporarily halted their red brick production due to the COVID-19 pandemic was selected from this population.

Table 1 presents data on the demographic characteristics of red-brick business managers. The majority of sampled individuals fell within the 50–60 age group, representing 11 individuals (33.33%). The next largest age group was 40–50, with 9 individuals (27.27%), followed by 30–40, which accounted for 8 individuals (24.24%). A smaller proportion was aged 60–70, consisting of 3 individuals (9.09%), while the age categories of over 70 and 20–30 each included only 1 person (3.03%).

Educational levels were determined following Republic of Indonesia legislation, specifically Law Number 20 of 2003, about national education. The data indicated that the majority of respondents, constituting 72.72% or 24 individuals, had completed primary education (Elementary School) as their highest level of education. The next most common level of education was the middle level (High School), accounting for 27.27% or 9 individuals. None of the sampled individuals had pursued higher education (University), resulting in a 0% rate.

Regarding the duration of experience in red brick production, the largest proportion of individuals, making up 30.30% of the total, had 5–10 years of experience. This was followed by 15.15% of individuals with over 10 years of experience and 12.12% with less than 5 years of experience.

Table 1. *Characteristics of red brick industry managers*

Characteristics	Amount[a]	Percentage (%)[a]
AGE		
> 70 years	1	3.03
60–70 years	3	9.09
50–60 years	11	33.33
40–50 years	9	27.27
30–40 years	8	24.24
20–30 years	1	3.03
LEVEL OF EDUCATION		
Basic (Elementary School)	24	72.72
Middle (High School)	9	27.27
High (University)	0	0
EXPERIENCE		
> 10 years	5	15.15
5–10 years	24	72.72
< 5 years	4	12.12

[a]*Accountability Statement Report (LKPJ) for Linggamukti Village, Sucinaraja District, Garut Regency for the 2020 Fiscal Year and the results of the August 2021 preliminary questionnaire from the authors*

Calculation methodology

The research instruments used in this study were derived from previous scholarly investigations, especially those on environmental sustainability. The questionnaire consisted of two sections and underwent rigorous testing and evaluation to ensure the validity and reliability of the scales and items. The first section included 30 questions related to managers' environmental conduct in the red brick industry. The second section of the questionnaire introduced inquiries about capacity and incentives. Inquiries about capacity encompassed the assessment of environmental knowledge among managers in the red brick industry through a set of 30 questions. The questions were designed to evaluate the level of understanding and awareness of environmental issues among these managers, thereby assessing their human capital in environmental management. The content was structured to encompass

three distinct knowledge dimensions: factual, conceptual, and procedural. It was also categorized into seven environmental knowledge descriptors: ecosystems, environmental resources, concern, local wisdom, environmental ethics, and disaster. Each of these descriptors comprised various items, ranging from two to seven. There were five inquiries regarding the ownership and sufficiency of clay as a material, as well as firewood as a means of production support (Natural Capital). There were five questions concerning income, purchasing power, and financial capital, and five questions regarding the accessibility of production land, machine tools for dough processing, and storage areas for production and baking (Facilities and Infrastructure Capital). There were ten questions about cultivating relationships, fostering a sense of sharing and caring, the presence of shared norms and values within society, and the capacity to establish networks (Social Capital). There were five questions regarding incentives and the presence of formal regulations within social structures, commonly referred to as incentive government. There were five inquiries concerning price information and market needs aid in making production decisions, commonly known as market signals.

The assessment of environmental behavior was demonstrated by evaluating responses related to the execution of roles in safeguarding and overseeing the environment. Similarly, environmental knowledge was assessed by accumulating accurate responses to questions about environmental understanding. The evaluation of capacity and incentives was conducted through the examination of responses provided by managers in the red brick industry, with indicators associated with capacity and incentives.

To establish the internal consistency of the research instruments, an assessment of their soundness and dependability was performed. According to the validity criterion, the r_{count} should exceed the count of r_{table}. Additionally, following the Cronbach Alpha reliability guideline, the r_{count} should exceed 0.60. Of the 35 formulated questions, 30 questions related to environmental knowledge were determined to be valid. The validity scores ranged from a minimum of 0.343 to a maximum of 0.960, resulting in an overall validity coefficient of 0.320.

The reliability of the questions was evaluated using the Cronbach Alpha coefficient, which yielded a value of 0.907, surpassing the recommended threshold of 0.60. Of the initial set of 35 questions, 30 questions concerning

environmental behavior were considered valid. The validity scores for these questions ranged from a minimum of 0.511 to a maximum of 0.990. The reliability of these questions was also assessed using the Cronbach Alpha coefficient, resulting in a reliability score of 0.602, exceeding the acceptable threshold of 0.600.

Following Arikunto's categorization (2005), the data were classified into three levels: *good, pretty good,* and *less good.* The analysis was conducted using the mean and standard deviation, as outlined by Sudijono (2004) and Fermandes et al. (2023). The study findings evaluated each measurement category by considering mean and standard deviation values. According to Sudijono (2004) and Arikunto (2005), a category is considered *good* if the value is greater than or equal to the mean plus one standard deviation. It is categorized as *pretty good* if the value falls within the range of the mean minus one standard deviation to the mean plus one standard deviation. Conversely, a category is considered *less good* when the value is less than or equal to the mean minus one standard deviation. The data obtained underwent descriptive and inferential statistical processing and analysis using SPSS software (Siregar, 2013; Riadi, 2016; Kadir, 2015).

Results and Discussion

Environmental behavior

The environmental behavior of the majority of the respondents was *pretty good,* with 23 individuals (69.69%) in that category, followed by 6 individuals (18.18%) exhibiting *good* environmental behavior, and 4 individuals (12.12%) demonstrating behavior categorized as *less good* (*Table 2*). A significant proportion (81.82%) of respondents did not meet the criteria for a *good* classification. This can be attributed to certain predisposing factors, as discussed by Green (1980), including levels of environmental comprehension and education.

Table 2. *Environment behavior*

Behavior category	Amount[a]	Percentage (%)[a]
Less good	4	12.12
Pretty good	23	69.69
Good	6	18.18

[a]*Results of research data analysis in 2021 from the authors*

The onset of the COVID-19 pandemic came to govern the behavior of the public across various facets of life, notably within economic sectors, such as the environmental behavior of actors in the traditional red brick industry. It is of scholarly interest to examine how they adapted to changing circumstances, which manifested as a consequence, along with the driving factors influencing them. Human behaviors are intricately interwoven within a complex ecosystem. Humans, and by extension, their actions, are inseparable from their environmental context. A mutualistic relationship exists between humans and the environment, with dynamic interactions occurring at varying degrees depending on the nature and function of this relationship, necessitating coherent observation (Fatorochman and Himan, 1995). Accordingly, Dartnell and Kish (2021) reported a positive correlation between the COVID-19 pandemic and behavioral patterns that promote the establishment of new production modes aligned with eco-economics.

Table 3 presents the assessment of capacity as a driving force of environmental behavior, revealing that none of the respondents reached a *good* classification in environmental knowledge. *Table 1* highlights that a significant portion (72.72%) attained only primary-level education. The correlation between the level of education and the environmental awareness of managers in the red brick industry is statistically significant, with a substantial majority (78.78%) falling into the *pretty good* category. Among managers in the red brick industry possessing basic educational qualifications, *pretty good* environmental behavior was observed in 69.69% of cases. Managers in the red brick industry often prioritize their involvement in other life matters considered economically essential for sustaining their livelihoods. Consequently, they may perceive environmental disruptions that do not impede economic activities as acceptable. These research findings align with Notoatmodjo's (2010) theoretical framework on the determinants of human behavior, which posits that predisposing factors encompass values, customs, knowledge, attitudes, and beliefs, alongside enabling and reinforcing factors. The Theory of Planned Behavior is widely recognized as a robust social psychological framework for elucidating individual behavioral intentions (Sen et al., 2022). According to Sen et al. (2022), behavioral intentions determine human actions, which are, in turn, influenced by perceived attitudes and social pressures (Ajzen, 2015). Ajzen (1991) and

Ajzen (2015) assert that the theory of planned behavior identifies three primary factors: attitude, reflecting an individual's evaluation of behavior as positive or negative; subjective norms, representing social pressure or normative expectations from one's social group; and perceived behavioral control, signifying the individual's perception of the ease or difficulty in executing specific behaviors. Nevertheless, to engage in environmentally friendly behavior, prioritizing environmental concerns, is imperative, as this contributes to addressing ecological issues (Bamberg, 2003).

Capacity driving forces

As *Table 3* illustrates, the majority of respondents displayed a *pretty good* level of environmental knowledge, comprising 26 individuals, constituting 78.78% of the sample. In contrast, a smaller proportion exhibited a *less good* level, encompassing 7 individuals, accounting for 21.21% of the respondents. Notably, none of the participants fell into the *good* category, representing 0% of the sample.

In terms of social capital, *middle* was the predominant category, comprising 22 individuals, equivalent to 66.66% of the total respondents. A smaller segment of the participants belonged to the *low* category, encompassing 6 individuals, constituting 18.18% of the sample. Finally, the *high* category included 5 individuals, making up 15.15% of the participants.

In terms of physical capital, all 33 red brick industry managers (100%) were dependent on the availability of facilities and infrastructure (land and buildings) – including soil dough processing equipment – for red brick production. Financially, the majority were in the *low* category, with 26 individuals (78.78%), then the *middle* category with 6 individuals (18.18%), and, lastly, the *high* category with 1 individual (3.03%). All 33 participants in the red brick industry rely entirely on the physical resources of the manufacturing site, such as clay and firewood, for the production of red bricks. This, too, was presumed upon the physical capital, i.e., facilities, infrastructure (land and buildings), and processing machines and tools were available and adequate.

The interaction between human resources and the environment, which includes both natural and physical capital, is a critical factor in determining the success or failure of industries in their pursuit of scientific and technological excellence. This is because humans influence their environment, and in turn, the

Table 3. *Capacity as a driving force of environmental behavior*

Driving Force (capacity)	Amount[a]	Percentage (%)[a]
ENVIRONMENTAL KNOWLEDGE		
Less good	7	21.21
Pretty good	26	78.78
Good	0	0
SOCIAL STATUS		
Low	6	18.18
Medium	22	66.66
High	5	15.15
FINANCIAL		
Low	26	78.78
Medium	6	18.18
High	1	3.03
NATURAL CAPITAL		
Always use natural availability	33	100
Sometimes using natural availability	0	0
Does not use natural availability	0	0
PHYSICAL CAPITAL (LAND AND BUILDINGS)		
Always use physical availability	33	100
Sometimes using physical availability	0	0
Does not use physical availability	0	0

[a]*Results of research data analysis in 2021 from the authors*

environment affects human activities. A study conducted by Larincova et al. (2018) revealed significant differences among employee categories, emphasizing the need for employers to prioritize the development of personalized motivation programs instead of adopting a one-size-fits-all approach. Recognizing and accommodating the diverse needs of individuals within the workforce are essential. Furthermore, the evaluation and assessment of human resources play a pivotal role in improving economic performance, as highlighted by Nikoloski (2018). Moreover, the strategic importance of knowledge transfer cannot be overstated in terms of ensuring overall business sustainability, as it provides valuable insights that are specific to different regions,

as demonstrated by Poor et al. (2018). Effective management of knowledge workers is also of utmost importance for 21st century companies, as discussed by Sato et al. (2019).

In the red brick industry, the managerial potential of human resources is characterized by a *pretty good* level of knowledge (78.78%). The social capital category, which measures the sufficiency of relationships and networks, is considered *medium*, with a rating of 66.66%. However, the industry's financial capital is categorized as *low* (78.78%), indicating a lack of substantial financial resources. Natural resources are consistently utilized at 100%, and infrastructure is consistently available (100%). In contrast, financing falls into the *low* category (78.78%), suggesting a weakened driving force for capacity. These factors collectively suggest an inadequate capacity to sustainably carry out the production process in the red brick industry. Therefore, it is imperative to allocate resources toward training initiatives and foster organizational support to effectively address environmental concerns (Paille et al., 2018). The importance of environmental education in influencing environmentally friendly behavior is explored in the meta-analysis conducted by Cadamio et al. (2018). The authors emphasize the effectiveness of environmental education programs that specifically target conservation efforts and underscore the need for documenting their direct impacts.

Furthermore, Ardoi et al. (2018) emphasize the significance of addressing both local issues and the broader dimensions of local problems in environmental education programs aimed at conservation. According to Hadi (2013), humans exert significant ecological dominance due to their superior ability to compete for the fulfillment of their life necessities, and as a result, human activities have a profound impact on the environment.

Incentive driving force

Table 4 shows incentive as a driving force of environmental behavior. Formal governmental incentives were implemented through regulations and government policies in the red brick industry. However, compliance with these regulations was not widespread among industry actors. Of the total, 26 individuals (78.78%) did not fully comply with the stipulated regulations, while 7 individuals (12.12%) demonstrated a moderate level of compliance in their conduct. None of the respondents (0%) exhibited complete non-compliance with

the regulations or policies. All 33 actors within the red brick industry believed that market signals, such as pricing and demand for red bricks, significantly influenced their production decisions.

Table 4. *Incentive as a driving force of environmental behavior*

Driving Force (Incentive)	Amount[a]	Percentage (%)[a]
GOVERNMENT INCENTIVES		
Less complying with regulations	26	78.78
Simply complying with regulations	7	12.12
Complying with regulations	0	0
MARKET SIGNAL (PRICE INFORMATION)		
Less driving production decisions	33	100
Simply driving production decisions	0	0
Always driving production decisions	0	0

[a]*Results of research data analysis in 2021 from the authors*

The red brick production industry exhibits low compliance with formal regulations and minimal reliance on price information as a decision-making factor. This indicates that external incentives have failed to effectively motivate compliance (Bahamondes, 2003). Environmental behavior among red brick industry managers operates largely without controls or sanctions for environmental regulation violations.

The influence of capacity and incentive driving forces on environmental behavior

The regression analysis employing ANOVA revealed that the significance level for capacity and incentives was 0.939, exceeding the threshold of $\alpha = 0.05/2 = 0.025$. This implies that the null hypothesis (Ho) stands, suggesting that both capacity and incentives did not significantly influence environmental behavior. When considering capacity and incentives collectively, there were no significant correlations observed between variables such as environmental knowledge, social status, financial capital, natural capital, physical capital, governmental incentives, market signals, and environmental behavior.

Examining these variables independently, environmental knowledge (sig. 0.743), social status (sig. 0.794), financial capital (sig. 0.478), natural capital (sig. 0.997), physical capital (sig. 0.839), governmental incentives (sig. 0.283), and market signals (sig. 0.953) all exhibited values higher than α ($\alpha = 0.05/2 = 0.025$), suggesting that none of these factors significantly impact environmental behavior. The cumulative effect of these variables on environmental behavior denoted as KP was calculated as $(rx_1, x_2, x_3, x_4, x_5, x_6, x_7)^2 \times 100\% = (0.286)^2 \times 100\% = 8.1796$.

In isolation, the correlations of environmental knowledge, social status, financial capital, natural capital, physical capital, governmental incentives, and market signals with environmental behavior showed that environmental knowledge displayed a very weak positive correlation (0.077), social status exhibited a weak negative correlation (−0.055), financial capital showed a very weak negative correlation (−0.146), natural capital displayed a weak negative correlation (−0.033), physical capital exhibited a weak negative correlation (−0.064), governmental incentives demonstrated a weak positive correlation (0.227), and market signals showed a very weak positive correlation (0.007).

These findings about environmental behaviors within the red brick industry underscore the limited influence of capacity and incentives as driving factors (Karyanto, 2010). Factors such as human capital (knowledge), financial capital (income), natural capital (availability of resources and fuel), physical capital (production facilities and equipment), and social capital (wealth, honor, education, power, and employment) collectively accounted for only 8.17% of the variance in environmental behavior during the COVID-19 pandemic. It is important to note that other factors beyond capacity and incentives contributed to the remaining 91.83% of the influence on environmental behavior. Within the capacity and incentive domains, their combined effect was a mere 57.56%, consistent with the very weak positive and negative correlations observed in individual factors. Moreover, the majority (81.81%) of the respondents within the red brick industry exhibited environmental behaviors categorized as *pretty good* or less than *pretty good.*

These results emphasize the need for a multidimensional approach when studying human behavior and its determinants. Lewin (1935) posited that behavior is a function of both internal states and the environment, while Altman (1977) and Lee (1976) argued that humans are not solely task-oriented but are influenced by their environment. The human perceptual-cognitive-motivational model emphasizes internal processes and subjective factors, whereas the human-behavioral model focuses on overt human behavior. The

human-ecological model views humans as part of a complex ecosystem (Hawley, 1986). Therefore, behavior analysis must account for multifaceted causes that are context-dependent (Karyanto, 2012). For example, in waste management, socio-economic factors have been identified as key drivers of pro-environmental behavior (Beni et al., 2014), and the environmental practices of company owners are influenced by industry sector, location, and size (Agustina and Tarigan, 2016). Additionally, the concept of self-regulation (ADS) has emerged as a new paradigm in environmental management, reflecting the individuals' ability to adapt to the environment (Soemarmoto, 2009).

The individual characteristics, namely age, experience, and education, were seen as potential determinants of behavior. The questionnaire revealed that character development is influenced by learning, aligning with the notion that maturity enhances emotional control (Mar'at and Kartono, 2010).

Efforts to enforce penalties for non-compliance with environmental policies and regulations have often been ineffective, failing to achieve the intended deterrent effect. This lax enforcement has led to incidents such as forest fires in Meranti Islands Regency, environmental pollution in Padalarang District, and the Dumai Sea pollution (Sood, 2019). Inadequate implementation of legal instruments, including sanctions, has allowed certain groups, notably actors in the red brick industry, to disregard regulations, resulting in suboptimal pro-environmental behavior and hindering the transition to a greener industry (Zulkifli, 2018).

Contrary to some prior research findings, this study did not find a significant impact of capacity and incentives on environmental behavior, whether simultaneous or partial. For example, Lidjin (2014) found correlations between knowledge-related factors and behavior, particularly in health knowledge and community participation. Iskandar (2013) observed a correlation between homemakers' knowledge of waste management and their behavior in waste management practices. Kosdiansah (2014) also identified a correlation between awareness of family planning initiatives and program efficacy. However, Susilo's (2012) research, like our findings, did not find a correlation between social status and environmental behavior.

Susilo's (2012) research additionally highlights the importance of two additional factors in shaping the environment: the level of human-environment interaction and the prevailing cultural paradigm in society. Consequently, similar physical environments can yield diverse manifestations based on these factors.

This study reveals a notable correlation between environmental knowledge acquisition and certain aspects of environmental behavior. Specifically, individuals aged 5 to 10 and those aged 50 to 70 demonstrated similar levels of environmental knowledge – primarily obtained through natural means and from personal experiences – accounting for 45.45% of the overall sample.

The COVID-19 pandemic has produced both positive and negative effects on the global environment, as evidenced by numerous studies (Severo et al., 2021; Cohen, 2020; Ali et al., 2021; Zambrano-Monserrate et al., 2020; Sarkis 2020; Mallick et al., 2021). Concurrently, there has been a surge in initiatives aimed at mitigating environmental harm resulting from economic activities (Van Ootogem, 2022; Velenzuela-Fernandes et al., 2022; Savero et al., 2021). Studies by Mi et al. (2021), Bronfman et al. (2021), Correia et al. (2023), Szlachciuk et al. (2022), and Si et al. (2022) contribute to expanding awareness of the relationship between environmental disturbances and responsible environmental behavior during the COVID-19 pandemic. These studies underscore the pivotal role of environmentally responsible behavior in promoting environmental improvement and sustainable societal development.

This research acknowledges its limitations, which stem from the unique circumstances of the COVID-19 pandemic. The study primarily focuses on the knowledge aspect of human capital, while other dimensions such as attitudes, needs, actions, and personality remain underexplored. Notoatmodjo (2010) and Mar'at and Kartono (2010) contend that individuals possess unique traits, temperaments, and personalities that influence their behavior.

The intricate relationship between humans and the environment during the COVID-19 pandemic has yet to be fully understood. Every human activity can impact the environment and vice versa, creating a cycle (Kristanto, 2013). Therefore, family environment and culture warrant further attention. Yusuf and Nurihsan (2007) argue that environmental factors influence personality. While this study draws on limited behavioral theories, it encourages further exploration using alternative theories such as Antecedent Behavior Consequence, Reaction-Action, Preced-Proceed, Behavior Intention, and Thought and Feeling theories (Mar'at and Kartono, 2010).

Conclusions

The environmental behavior of actors within the red brick industry during the COVID-19 pandemic was suboptimal, with a combined percentage of 81.81% falling into the categories of *pretty good or less good* behavior. This falls significantly short of the desired level of environmental compliance outlined in constitutional and regulatory frameworks. Examining the capacity domain of driving forces, which includes human capital (knowledge) (*less good* 21.21% and *pretty good* 78.78%), social status (*low* 18.18% and *medium* 66.66%), financial capital (*low* 78.78% and *medium* 18.18%), natural capital (always use natural availability 100%), and physical capital (always use physical availability 100%), these findings indicate that these driving forces have not been effective in motivating environmental behavior toward a better or optimal direction. When considering the combined influence of both capacity and incentive-driving forces on environmental behavior, the impact was found to be *very weak*, measuring only 8.2%. In both combined and individual analyses, these driving forces did not demonstrate a significant effect on the environmental behavior of actors within the red brick industry.

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