Exploring the Impact of Positive Levers of Control on Organisational Resilience: The Mediating Role of Open Innovation

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Abstract

This study explores how positive control levers (belief systems and interactive control systems) affect organisational resilience, focusing on the role of open innovation as a mediator. Data were collected through a questionnaire administered to business managers and analysed using the partial least squares structural equation modelling (PLS-SEM) approach. The sample comprised 349 Moroccan industrial companies. The results demonstrate that positive control levers significantly impact open innovation and organisational resilience. Additionally, open innovation acts as a mediator, indirectly influencing the relationship between positive control levers and organisational resilience. This study contributes to the limited empirical research on management control systems by highlighting the importance of positive control tools and open innovation in developing sustainable organisational resilience.

Keywords: Management control system; positive levers of control; organisational resilience; open innovation; PLS-SEM.

The environment is becoming increasingly volatile, uncertain, complex, and ambiguous (commonly called the VUCA) (Gomez-Mejia et al., 2024). This necessitates organisations, especially industrial companies, to adapt and reconfigure their activities. The constant introduction of new products and processes and the need to optimise resource utilisation to reduce costs have become essential (Andersen et al., 2024). The industrial sector is constantly evolving owing to the rise of emerging countries and increased demand for regulations, standards, competitiveness, and profitability (Salem et al., 2023).

Amid this rapid change compounded by the current crisis, companies must constantly challenge themselves to survive (Lungu et al., 2021). They must devise new strategies, establish new structures, face tough competition, and, undergo transformation and change. This change creates turbulence and tests organisations (Shrivastava (1993). In this context, the concept of organisational resilience has emerged and developed. Resilience is now a fundamental

pillar and a critical guarantee of greater organisational sustainability (Marchese et al., 2018). Today, resilience goes beyond the ability to cope with crises, bounce back, and remain intact; it must also be associated with innovation (Dirkje et al., 2023), control systems, progress, and connections to certain human values that are often marginalised. Moreover, resilience is the ability to transform shocks, crises, and disruptive movements—essentially all forms of negative energy—into dynamic movements that propel progress and change them into positive energy to fuel new dynamics (Chen et al., 2023).

Companies currently face challenges that threaten their very existence (Al-omoush et al., 2020). The presence of national and international competition, rapid technological advancements, and the growing media influence are compelling organisations to find ways to tackle these challenges and minimise inherent risks (Vuchkovski et al., 2023). Many companies believe that innovation and effective management control systems are crucial in enabling them to adapt to increasingly complex and competitive environments (Semenova, 2021). However, regardless of whether these drivers have been adopted, companies are not completely immune to crises or turbulence and may not possess the same resources and skills to handle them (Javier et al., 2023). Some companies have developed an organisational culture and unique capabilities that make them more resilient in the face of turbulence, a concept commonly referred to as resilience (Hussen et al. 2021). For an organisation, resilience means not only being able to endure turbulence but also structuring itself in such a way that it can withstand and potentially even grow stronger from a crisis or shock (Hepfer and Lawrence, 2022).

Developing organisational resilience has become a strategic imperative for every company (Lengnick-hall et al. 2011). Repeated crises such as the breakdown of social connections, loss of employee confidence, management destabilisation, and media coverage of certain events can lead to a loss of direction and purpose, gradually eroding the organisation's identity and potentially causing its moral strength to collapse (Hay et al., 2020). Discussing resilience without acknowledging the existence of crises is impossible. The concept of crisis is prevalent in many organisations (Ketelaars et al., 2024). A profoundly disruptive crisis also exposes an organisation's practices and culture, particularly its level of preparedness to handle such extreme situations (Oscarsson, 2022). Although it is impossible to predict a crisis, it is possible to prepare for its management. Several authors define a crisis as an activity interruption that can jeopardise an organisation's survival (Gkeredakis et al., 2021).

The remainder of this paper is organized as follows: Section 2 presents a literature review and formulates the hypotheses. Section 3 outlines the study's methodology. Section 4 presents the results of the data analysis conducted using Smart PLS. Section 5 discusses the findings. Finally, the conclusions and recommendations are presented.

Literature review and hypotheses development

This study focuses on four key variables: positive control leverage (belief systems and interactive control systems), organisational resilience, and innovation (Figure 1). To understand their interaction and impact on the organisational resilience of industrial enterprises in Morocco, conducting an in-depth analysis of existing literature on these variables is crucial. This detailed review provides valuable insights into the control systems that companies can implement to improve their performance and ensure sustainability in an uncertain and ever-changing environment.

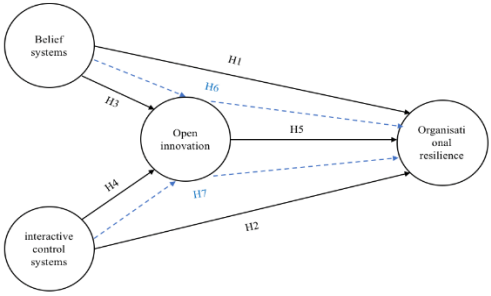

Figure 1. Conceptual model

2.1. Simons' (1995) levers of control and organisational resilience

Several proposals define management controls. Anthony (1965) proposed the oldest definition as "the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives" (Langfield-smith, 1997). However, this definition overlooks the behavioural dimension and the important role of accounting, and fails to differentiate between management, strategic, and operational control. Flamholz (1983) included the behavioural aspect in his studies, aiming to align individual actions with an organisation's objectives and direct human efforts towards clearly defined goals.

Simons (1995) introduced a conceptual framework called the levers of control, which focuses on how managers utilise control systems to achieve their objectives. The framework consisted of four types of controls: two positive (belief and interactive) and two negative (boundary and diagnostic)". Belief systems refer to "the explicit set of organizational definitions that senior managers communicate formally and reinforce systematically to provide basic values, purpose, and direction for the organization" (Simons, 1995, p. 34). Interactive control systems are "formal information systems that managers use to actively participate in the decision-making activities of subordinates". Boundary systems "define the acceptable scope of activity for organizational participants". Diagnostic control systems are "formal information systems that managers use to monitor organizational outcomes and correct deviations from predetermined performance standards".

There are several definitions for organisational resilience. According to John and Horne (1998), resilience is "a fundamental quality of individuals, groups, organizations, and systems as a whole to respond productively to significant change that disrupts the expected pattern of events without engaging in an extended period of regressive behavior". In simpler terms, resilience is the dynamic capacity for organisational adaptability that develops and strengthens over time. Organisational resilience refers to the ability of an organisation to adapt to disruptions and seize opportunities in a changed environment (Smith and Wandel, 2006). After a thorough assessment of the literature, McManus et al. (2008) defined organisational resilience as "the ability to adapt to changed situations with new and innovative solutions and/or the ability to adapt the tools that it already has to cope with new and unforeseen situations".

According to Bracci and Tallaki (2021), management control systems play a role in improving the resilience of organisations by orienting employee behaviour towards the company objectives. Specifically, they enhance communication and debate and streamline decision-making processes. Management control systems help organisations recover from unforeseen events (Phan et al., 2023). Therefore, this study focuses on the impact of positive control levers on an organisation's ability to survive, adapt, and develop (i.e. organisational resilience).

H1: Belief systems significantly affect organisational resilience.

H2: Interactive control systems significantly affect organisational resilience.

2.2. Positive levers of control and open innovation

In an environment characterised by difficult economic conditions and intensified global competition, companies must innovate more

rapidly to meet changing consumer demands, adapt to emerging markets, and match shortened product and service lifecycles while creating new market spaces (Gamage et al., 2020). They can no longer afford to innovate in isolation. Instead, they increasingly rely on a broad network of partners and skills to enhance and expedite their innovation capabilities (Rajapathirana and Hui, 2018). In recent years, there has been a growing trend of companies embracing 'open innovation' (Bigliardi et al., 2021). Open innovation involves collaboration with other companies (suppliers, customers, and manufacturers of complementary products), public bodies, researchers, universities, and individuals to generate ideas, identify new technologies, and develop new products and services (Borges and Silva, 2022). By integrating external knowledge, organisations can tap into the collective creativity of a broader ecosystem, allowing them to achieve more innovative and competitive results in a fast-paced business environment (Andriyani et al., 2024).

According to Simons (1995), belief systems are connected to transmitting values, objectives, and goals within an organisation. The use of interactive control systems emphasises collaboration to enhance organisational learning. Specifically, interactive control systems encourage face-to-face dialogue and foster creativity (Su and Baird, 2017). Therefore, the interactive use of control promotes organisational learning and innovation to improve organisational performance (Bisbe and Otley, 2004). Interactive control systems also facilitate communication with the external environment, enabling companies to understand better the threats and opportunities they face (Phan et al., 2023).

H3: Belief systems significantly impact open innovation.

H4: Interactive control systems significantly impact open innovation.

2.3. Open innovation and organisational resilience

Open innovation is a mode of innovation based on cooperation and sharing between a company and its broader ecosystem, including universities, schools, start-ups, customers, suppliers, competitors, and organisations from other sectors of different sizes (Öberg and Alexander, 2019). By embracing open innovation, companies can offer new products and services to customers and explore new target markets. This allows companies to broaden their perspective by discovering new uses and identifying opportunities for applications related to new technologies. This is achieved through collaboration, knowledge sharing, resource sharing, and codevelopment with other players who bring diverse and complementary perspectives (Portuguez-Castro, 2023). Open innovation enhances a company's ability to navigate crises and adapt quickly to the changing environment and strengthens its organisational resilience (Jutidharabongse et al., 2024). In addition, open innovation improves the success rate of new products and services and facilitates the timely resolution of problems by finding innovative solutions. Several authors have confirmed a positive relationship between innovation and organisational resilience (Zhang et al., 2021). Cardoso and Ramos (2016) suggest that open innovation offers businesses opportunities to thrive, grow, enter new markets, overcome persistent crises, and enhance their resilience.

H5: Open innovation significantly impacts organisational resilience.

2.4. Mediating the role of open innovation between positive levers of control and organisational resilience

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H6: Belief systems positively mediate the association between positive control levels and organisational resilience.

H7: Interactive control systems positively mediate the association between positive levers of control and organisational resilience.

Methodology

3.1. Data Collection and Sample

This study used a deductive approach to achieve its objectives. Based on the literature review, general hypotheses were formulated, observable consequences were deduced, and these consequences were verified using empirical survey data. In this quantitative study, the questionnaire was the primary tool used to collect data. Participants were given three weeks to complete an online questionnaire using Google Forms.

Our initial sample consisted of 349 Moroccan companies in the industrial sector. This sector plays a significant role in Morocco's economic life and employment. Of the 360 companies contacted, 349 completed the questionnaire, with a response rate of 96.94%.

3.2. Measurement of Variables

In our study, we measured the variables using measurement scales that were previously studied. The belief system was measured using four items, adapted from Widener (2007). To measure interactive control systems, we used a scale consisting of six items developed by Henri (2006). Organisational resilience was measured using eight items from Kantur and Iseri-Say (2015). Additionally, for measuring open innovation, four items from Jutidharabongse et al (2024) were used. The participants' responses to the questions were assessed using a Likert scale. The responses were classified as follows: 1 = totally disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = totally agree'.

Results

4.1. Descriptive statistics

Descriptive statistics included means, standard deviations, minimum, maximum, kurtosis, and skewness (Table 1). Regarding means, all respondents agreed with statements measuring belief systems (3,361), open innovation (3,383), interactive control systems (3,375), and organisational resilience (3,389). Notably, the standard deviations for all indicators were similar, suggesting a lack of dispersion in the study participants' responses. This underscores the reliability and consistency of the feedback from the study sample. As shown in Table 1, all indicators have a mean value greater than the standard deviation. This suggests that the current mean is an adequate representation of all data. Therefore, we prepared the data for further analysis. We analysed the data using the partial least squares structural equation modelling (PLS-SEM) approach.

Table 1. Descriptive statistics

Name	Mean		Min	Max	STD	Kurtosis	Skewness
BESY1	3.433		1.000	5.000	1.246	-0.712	-0.515
BESY2	3.458	3,361	1.000	5.000	1.205	-0.731	-0.504
BESY3	3.427		1.000	5.000	1.222	-0.772	-0.454
BESY4	3.126		1.000	5.000	1.207	-0.943	-0.116
OPIN1	3.473		1.000	5.000	1.266	-0.813	-0.501
OPIN2	3.436	3,383	1.000	5.000	1.241	-0.792	-0.475
OPIN3	3.473		1.000	5.000	1.277	-0.839	-0.515
OPIN4	3.152		1.000	5.000	1.101	-0.447	-0.407
INCO1	3.504		1.000	5.000	1.284	-0.817	-0.548
INCO2	3.415		1.000	5.000	1.195	-0.736	-0.491
INCO3	3.304		1.000	5.000	1.223	-0.778	-0.408
INCO4	3.335	3,375	1.000	5.000	1.148	-0.413	-0.454
INCO5	3.246		1.000	5.000	1.149	-0.476	-0.447
INCO6	3.447		1.000	5.000	1.285	-0.752	-0.561
ORRE1	3.393		1.000	5.000	1.332	-0.892	-0.520
ORRE2	3.330		1.000	5.000	1.334	-0.997	-0.424
ORRE3	3.393		1.000	5.000	1.302	-0.916	-0.460
ORRE4	3.398	3,389	1.000	5.000	1.298	-0.911	-0.463
ORRE5	3.476		1.000	5.000	1.279	-0.867	-0.474
ORRE6	3.281		1.000	5.000	1.318	-1.038	-0.287
ORRE7	3.358		1.000	5.000	1.307	-0.938	-0.399
ORRE8	3.484		1.000	5.000	1.310	-0.937	-0.457

Note: Belief systems (BESY), Interactive control (INCO), Open innovation (OPIN) Organisational resilience (ORRE).

4.2. Partial least squares analysis

The Smart PLS 4 software was used for the quantitative analysis. It tests the validity and reliability of the measurement model and examines the causal model through structural equation modeling (SEM). Leguina (2015) proposed the PLS method as an alternative to SEM, which relies on covariance estimation (Leguina, 2015). The PLS method evaluates a conceptual model in two stages. First, it ensures the validity of the measurement model, which accurately measures the quality of the latent variables. Second, it tests the structural model by verifying the formulated hypotheses.

4.2.1. Measurement model

All connections between the indicators and the variables or latent constructs were used to assess the measurement model. To evaluate the measurement model, we employed the following criteria: the reliability of individual indicators and internal consistency, discriminant validity and convergent validity.

4.2.1.1. Individual indicators' reliability

To test the reliability of the individual indicators, we calculated the loading factors. The results are summarised in Table 2. By checking the values of the loading factor, we can see that all the indicators have a threshold greater than the 0.7 (T statistics > 1,96) threshold set by Hair Jr et al. (2017). Therefore, we can state that all the items are reliable.

Table 2. Outer loading

	Outer loading	**T statistics**
BESY1 <- Belief systems	0,897	68,314
BESY2 <- Belief systems	0,920	90,987
BESY3 <- Belief systems	0,928	102,784
BESY4 <- Belief systems	0,794	30,523

INCO1 <- Interactive control	0,840	49,346
INCO2 <- Interactive control	0,844	53,173
INCO3 <- Interactive control	0,786	30,821
INCO4 <- Interactive control	0,742	25,422
INCO5 <- Interactive control	0,758	27,122
INCO6 <- Interactive control	0,855	60,335
OPIN1 <- Open innovation	0,886	68,067
OPIN2 <- Open innovation	0,894	66,556
OPIN3 <- Open innovation	0,907	83,747
OPIN4 <- Open innovation	0,772	29,555
ORRE1 <- Organisational resilience	0,817	35,653
ORRE2 <- Organisational resilience	0,844	49,638
ORRE3 <- Organisational resilience	0,852	43,085
ORRE4 <- Organisational resilience	0,850	43,115
ORRE5 <- Organisational resilience	0,856	51,717
ORRE6 <- Organisational resilience	0,824	42,829
ORRE7 <- Organisational resilience	0,863	57,409
ORRE8 <- Organisational resilience	0,804	39,726

4.2.1.2. Reliability of internal consistency

The recommended method for measuring the internal consistency (also known as homogeneity or consistency) of measurement scales is typically composite reliability and calculation of Cronbach's alpha. This coefficient was used to determine whether all the items were related to the same concept. Therefore, Cronbach's alpha was used to assess the internal consistency of the group of items. A value of 0.7 (Tenenhaus et al., 2005) is commonly used to indicate a high level of reliability. The results presented in Table 3 demonstrate that the items of each construct are consistent and reliable.

Table 3. Reliability of internal consistency

	Cronbach's Alpha	Composite reliability (rho_a)	Composite reliability (rho_c)
Belief systems	0,908	0,921	0,936
Interactive control systems	0,891	0,900	0,917
Open innovation	0,888	0,899	0,923
Organisational resilience	0,940	0,940	0,950

4.2.1.3. Convergent validity

Convergent validity is verified when the average variance extracted (AVE) for each construct is greater than 0.5 (Hair Jr et al., 2017). Table 4 presents the AVE values for each construct. Based on the information in this table, it can be concluded that the AVE for each construct is greater than 0.5, thereby confirming convergent validity.

Table 4. Convergent validity

	average variance extracted (AVE)
Belief systems	0,786
Interactive control systems	0,649
Open innovation	0,751
Organisational resilience	0,704

4.2.1.4. Discriminant validity

According to the empirical criteria, discriminant validity refers to how distinct a concept is from other constructs. This means that one construct stands out and captures phenomena that other constructs in the model fail to capture (Leguina, 2015). To test discriminant validity, we recommend using the Fornell-Larcker, cross-loading, and Heterotrait-monotrait ratio (HTMT).

The Fornell-Larcker criterion compares the square root of the AVE for each latent variable with its correlations with other latent variables. The square root of the AVE for each construct should be higher than its correlations with the others to validate that it shares more variance with its measurement items than with the others. From Table 5, we can infer that discriminant validity was confirmed.

Table 5. Fornell-Larcker criterion

	Belief Systems	Interactive control	Open innovation	Organisationnal resilience
Belief Systems	0,886			
Interactive control	0,694	0,805		
Open innovation	0,734	0,736	0,866	
Organisational resilience	0,723	0,793	0,737	0,839

An indicator (item) cannot have a higher loading for another construct than for that to which it is attached. Table 6 shows that this condition is satisfied.

Table 6. Cross-loading

	Belief systems	Interactive control	Open innovation	Organisational resilience
BESY1	0,897	0,639	0,656	0,664
BESY2	0,920	0,646	0,701	0,696
BESY3	0,928	0,664	0,707	0,664
BESY4	0,794	0,493	0,517	0,521
INCO1	0,604	0,840	0,652	0,726
INCO2	0,601	0,844	0,645	0,705
INCO3	0,557	0,786	0,547	0,570
INCO4	0,442	0,742	0,505	0,549
INCO5	0,512	0,758	0,533	0,529
INCO6	0,617	0,855	0,647	0,713
OPIN1	0,700	0,683	0,886	0,679
OPIN2	0,638	0,628	0,894	0,642
OPIN3	0,687	0,664	0,907	0,693
OPIN4	0,496	0,567	0,772	0,525
ORRE1	0,618	0,660	0,633	0,817
ORRE2	0,600	0,656	0,613	0,844
ORRE3	0,602	0,681	0,615	0,852
ORRE4	0,599	0,648	0,626	0,850
ORRE5	0,611	0,668	0,629	0,856
ORRE6	0,569	0,620	0,589	0,824
ORRE7	0,629	0,693	0,623	0,863
ORRE8	0,620	0,691	0,619	0,804

To ensure discriminant validity, Henseler et al. (2015) recommended testing the HTMT ratio derived from the multitrait-multimethod matrix (Henseler et al., 2015). This ratio is calculated as

the geometric mean of the ratio between the mean correlations of indicators between constructs (heterotrait method) and the mean correlations of indicators within the same construct (monotrait method). A lack of discriminant validity is indicated when the HTMT value is greater than 0.9 (Henseler et al., 2015). The results of the HTMT ratio test presented in Table 7 show that each coefficient is well below this threshold, allowing us to establish the discriminant validity of the constructs.

Table 7. Discriminant validity – Heterotrait-monotrait ratio (HTMT)

	Belief systems	Interactive control	Open innovation	Organisational resilience
Belief systems	-			
Interactive control	0,762	-		
Open innovation	0,805	0,820	-	
Organisational resilience	0,777	0,857	0,802	-

4.2.2. Structural model

Having assessed the reliability and convergent and discriminant validity of our model's measurement instruments, the next step was to evaluate the results of the structural model. The structural model was estimated by analysing various factors such as the coefficient of determination (R2), size effect (f^2), predictive relevance (Q^2), variance inflator factor (VIF), and path coefficient. The structural model encompasses all relationships between the latent constructs and represents the network of causal relationships the researcher aims to establish.

The coefficient of determination of endogenous variables (R2) is the most commonly used measure for evaluating structural models. We used this coefficient to determine the variance in which the endogenous variables explained and evaluated the significance of the effects. If R^2 is greater than 0.1, the model prediction is considered significant (Falk and Miller, 2014). To assess the model's predictive validity, we calculated Q^2 using the Stone-Geisser method. The model is considered predictively valid if $Q^2 > 0$. Negative results indicated no predictive validity (Tenenhaus et al., 2005). Table 8 shows that the R^2 and Q^2 values are satisfactory.

Table 8. The values of R^2 and Q^2

	R- square	R- square adjtsred	Q – square	RMSE	MAE
Open innovation	0.638	0.635	0.631	0.610	0.476
Organisational resilience	0.704	0.701	0.682	0.567	0.449

Effect size f^2 is used to assess the impact of each exogenous latent variable on the endogenous latent variable (Chin, 1998). According to Cohen (1988), values of 0.02, 0.15, and 0.35 indicate small, medium, and large effect sizes, respectively, while a value below 0.02 indicates no effect (Hair Jr et al., 2017). Table 9 presents the values of f2.

Table 9. The values of f^2

	f-square	Status
Beleif systems -> Open innovation	0,266	Large
Beleif systems -> Organisational resilience	0,078	Small
Interactive control -> Open innovation	0,272	Large
Interactive control -> Organisational resilience	0,298	Large
Open innovation -> Organisational resilience	0,059	Small

Note that although VIF can help detect collinearity, it does not offer a solution to the problem; possible solutions may include eliminating variables with high VIF values. The VIFs for all items are below five (Hair Jr et al., 2017), implying that our model has no collinearity issues (Table 10).

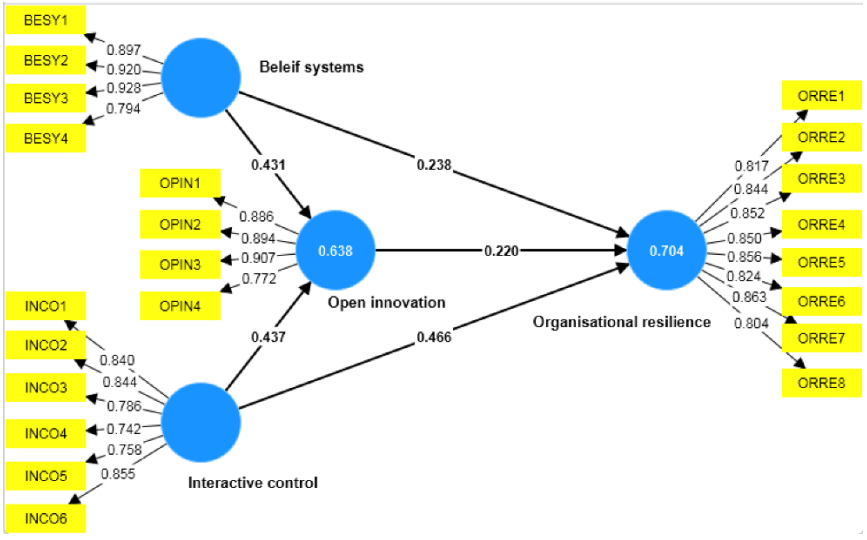
Table 10. Collinearity statistics (VIF)

Indicators	VIF	Indicators	VIF
BESY1	3,044	OPIN2	2,940
BESY2	3,677	OPIN3	3,028
BESY3	3,897	OPIN4	1,728
BESY4	1,920	ORRE1	3,176
INCO1	2,832	ORRE2	3,742
INCO2	2,954	ORRE3	3,331
INCO3	1,954	ORRE4	3,083
INCO4	1,808	ORRE5	3,195
INCO5	1,884	ORRE6	3,355
INCO6	2,520	ORRE7	4,026
OPIN1	2,665	ORRE8	2,268

We tested the hypotheses using path coefficients. This coefficient is calculated using the bootstrap procedure. If the p-value is below the 5% significance level, the hypothesis is validated; a higher value indicated rejection (Leguina, 2015). Table 11 and Figure 2 demonstrate the validity of all the hypotheses.

Table 11. Path coefficients and significance tests (direct and indirect effects)

Path coefficients and significance tests (direct effect)					
	Original sample	Sample mean	Standard deviation	T statistics	P Values
Beleif systems -> Open innovation	0,431	0,431	0,057	7,619	0,000
Beleif systems -> Organisational resilience	0,238	0,237	0,044	5,423	0,000
Interactive control -> Open innovation	0,437	0,437	0,055	7,974	0,000
Interactive control -> Organisational resilience	0,466	0,468	0,052	9,002	0,000
Open innovation -> Organisational resilience	0,220	0,220	0,049	4,496	0,000
Path coefficients and significance tests (indirect effect)					
	Original sample	Sample mean	Standard deviation	T statistics	P Values
Beleif systems -> Open innovation -> Organisational resilience	0,095	0,095	0,024	3,946	0,000
Interactive control -> Open innovation -> Organisational resilience	0,096	0,096	0,025	3,793	0,000



Discussion

This study examines the relationship between positive control levers and organisational resilience, focusing on the mediating role of open innovation in Moroccan industrial firms. The study results support several important points in existing academic literature.

The findings showed that belief systems and interactive control significantly impact organisational resilience ($p < 0.05$, $T > 1.96$). In the face of strategic uncertainty, a company can limit itself by communicating its values and missions effectively. Belief systems are used by organisations to inspire and guide their search for new opportunities, allowing them to navigate through unexpected events and shocks. Interactive control systems can take the form of meetings and debates between superiors and subordinates or activities to develop and steer action plans. These systems help develop organisational resilience capacity.

Positive control has a positive impact on organizational resilience. By cultivating a constructive work environment and promoting employees to exercise positive control, the organization enhances its capacity to adapt and recover from challenging circumstances. In particular, teams experience advantages such as enhanced unity, more efficient communication, and an increased capability to develop solutions in the face of adversity. The favorable effects of positive control on resilience underscore its crucial significance in effectively addressing organizational challenges.

Furthermore, the study revealed that belief systems and interactive control significantly influenced open innovation ($p < 0.05$, $T > 1.96$). Belief systems define the company's values and encourage employees to work towards organisational goals. These values promote cooperation and sharing with various stakeholders such as universities, schools, customers, suppliers, competitors, and other companies. Interactive control enables managers to focus on strategic uncertainties and promotes open innovation by establishing regular debates with partners.

The synergy between positive control and open innovation presents substantial potential advantages, such as enhanced ideation and product quality through a more stringent filtering process. Moreover, positive controls can

promote collaboration and co-creation by establishing a defined framework for the guidance and administration of open innovation initiatives. Nevertheless, it is crucial to acknowledge that excessive control may inhibit creativity and restrict the variety of ideas. Achieving a harmonious equilibrium between structure and freedom is imperative to optimize the benefits of open innovation while upholding a certain level of positive control.

Based on the analysis of specific indirect effects using Smart PLS, Table 11 shows that open innovation acts as a mediator between belief systems and organisational resilience, as well as between interactive control and organisational resilience. The mean values of 0.095 and 0.096 indicate this mediation effect. The standard deviations (STDEV) of 0.024 and 0.025 suggest relatively low variability in the respondents' responses. A t statistic greater than 1.96 highlights the statistical significance of the effect, supported by P values below the conventional significance level of 0.05. Businesses often enhance their open innovation capabilities to optimise returns on investment. By adopting this strategy, companies can strengthen their resilience and thrive under challenging circumstances. In an increasingly interconnected world, companies rely on extensive networks of partners and their innovation skills. Companies must implement positive control systems to improve and accelerate open innovation.

The complex, multidimensional interactions between positive control, open innovation, and organizational resilience are vital to a company's success. Positive control creates an environment that fosters the free expression of ideas and collaboration, allowing open innovation to thrive. This encourages employees to explore new opportunities, continually fueling innovation within the organization. Furthermore, it is important to highlight that positive control also plays a crucial role in cultivating organizational resilience. By nurturing employees' confidence, motivation, and adaptability in the face of challenges, it establishes a firm foundation on which the organization can depend. Employees feel supported and confident in their ability to overcome obstacles, enabling them to rebound from difficult times more easily. Through promoting employee responsibility and autonomy, positive control significantly contributes to enhancing the organization's overall capacity to tackle the challenges it encounters.

Conclusions

This study examines how open innovation functions as a mediating variable between positive levers of control and organisational resilience. The first section outlines the conceptual and theoretical foundations of our study. Next, we addressed the link between belief systems, interactive control, open innovation, and organisational resilience by examining the contributions of the literature on this subject. Finally, we report the findings of our quantitative research.

The concept of organisational resilience has taken on a new dimension resulting from a set of interacting factors. Open innovation is vital for business development. Organisations tend to rely on positive control systems to motivate employees to innovate, collaborate with partners, and gather as much information as possible to make the safest decisions possible. Despite in-depth research on these two concepts, only a few studies have demonstrated their relationship in the Moroccan industrial sector. Therefore, this study is specifically interesting.

In conclusion, it is evident that positive control exerts a substantial influence on organizational resilience and open innovation, stimulating collaboration and creativity within organizations. Enterprises that have adopted positive control measures have witnessed advantages including enhanced productivity, improved product quality, and heightened customer satisfaction. Nevertheless, it is

imperative to consider the ethical and legal aspects entailed in safeguarding intellectual property. To ensure the triumph of open innovation under positive control, it is advisable to establish unequivocal and transparent policies, foster a culture of professional ethics, and strike a harmonious equilibrium between safeguarding intellectual property rights and fostering collaboration and knowledge dissemination.

Despite the promising findings of this study, there are certain limitations that need to be taken into account. Firstly, the sample size could be viewed as a constraining factor, as it hinders the ability to generalize the results to a broader population. Moreover, the research methodology employed may have inherent limitations, particularly in terms of data collection and measurement of variables. Lastly, it is imperative to acknowledge that this study concentrates on a specific sector, thereby potentially restricting the extent of its conclusions.

Future research in this exciting area offers many opportunities to deepen our understanding of positive control and its implications. It would be relevant to further explore the effect of positive control on aspects such as change management, complex problem solving and strategic management. In addition, it would be interesting to study how positive control can be integrated into different types of organizations, including startups, large corporations and government agencies. In conclusion, positive control represents a revolutionary approach to driving innovation, strengthening organizational resilience and fostering collaboration with world-class external players. The results of this in-depth study suggest that positive control can be a powerful catalyst for organizational growth and success. It is therefore essential to continue exploring this concept and developing innovative strategies to put it into practice. Positive control offers enormous potential for shaping the future of organizational performance and contributing to sustainable development.

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