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Moving from Awareness to Practice: Change Management and Adoption Success in Saudi Architecture and Engineering Firms

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Abstract

Saudi Arabia's architecture and engineering (A/E) sector is changing rapidly under Vision 2030, yet little is known about how A/E firms manage organizational change. This study examines whether change management (CM) is practised in these firms and whether its practice, rather than awareness of its value, is associated with perceived success in adopting change. An online questionnaire was completed by 70 practitioners working in or with Saudi A/E firms and analysed with non-parametric tests, Spearman correlations and ordinal logistic regression, supported by four sensitivity analyses. Organizational change was nearly universal (84.3% reported change within five years), most often in management systems, technology and delivery systems. Awareness of CM was high, with 80.0% rating its relationship to firm success as strong or very strong, yet only 45.7% reported explicit use of CM strategies, which relied mainly on senior leadership rather than training, change agents or communication. Explicit strategy use was associated with higher perceived adoption success (Kruskal–Wallis $H(2) = 9.57$, $p = .008$) and remained the only significant predictor after adjusting for management system, external pressure and firm size (OR = 4.25, 95% CI [1.59, 11.36]). Perceived importance of CM was unrelated to success ($\rho = -.04$), and firm size, structure and management system did not differentiate outcomes. The findings reveal an awareness–implementation (knowing–doing) gap: Saudi A/E firms value CM but apply it inconsistently, and its benefits appear only where it is deliberately practised. The study offers baseline evidence

and practice-oriented recommendations for firms, professional bodies and Vision 2030 programme sponsors.

Keywords: Change management; Knowing–doing gap; A/E firms; Saudi Arabia; Vision 2030

Article Highlights

- Most Saudi architecture and engineering professionals value change management, but under half see it used.
- Firms that deliberately practise change management report more successful adoption of change.
- Firm size, structure and agile methods mattered less than whether change management was actually practised.

1 Introduction

Organizations nowadays operate in environments that are characterized by uncertainty, which requires them to continually adapt their structures, processes and capabilities. Globalization, digital technologies, economic volatility and sustainability demands have increased both the pace and the complexity of organizational change in all industries. Architecture and engineering (A/E) firms are under particular pressure in this regard, owing to their project-based nature, their fragmented workflows and their dependence on external stakeholders [1, 2]. In such settings, the success of any change depends on managing its human dimension as much as its technical one.

It is widely reported that organizational change initiatives fail, and estimates of up to 70% are frequently quoted [3]. Although Hughes [4] showed that this figure lacks a sound empirical basis, the broader evidence that poorly managed change undermines

performance remains consistent [5, 6]. In project-based industries, these difficulties are compounded by temporary multidisciplinary teams, in addition to the disconnect that often exists between firm-level strategy and project-level execution [7, 8].

In the Kingdom of Saudi Arabia, the need for effective change management (CM) is especially pronounced, since Vision 2030 is driving an extensive economic, organizational and technological transformation [9]. Large-scale developments such as NEOM, Qiddiya and the Red Sea Project place new demands on A/E firms, which are central to delivering the urban, infrastructure and sustainability objectives of the Vision. Industry reports estimate that the Saudi architectural, engineering and construction services market generated approximately USD 855 million in 2023 and may exceed USD 2.2 billion by 2030 [10]. On the other hand, the Saudi construction sector has long been associated with delays and cost overruns [11, 12]. Hierarchical organizational cultures have also been identified as a barrier to employee engagement in change [13], while formal preparation for change leadership in Saudi organizations remains limited [14].

According to change management theory, successful transformation requires more than introducing new systems. It requires deliberate practices, such as leadership sponsorship, communicating the benefits of change, training, realistic timescales and support during transition [6, 15, 16]. However, a recurring observation in management research is that knowing what should be done does not guarantee that it is actually done. Pfeffer and Sutton [17] described this as the *knowing–doing gap*, where organizations recognize the value of good practice yet fail to translate this knowledge into action. Whether such a gap exists in CM within Saudi A/E firms, and whether it matters for outcomes, has not yet been examined.

Research on CM in Saudi Arabia has mainly focused on public-sector reform [14, 18], whereas studies of CM in the architecture, engineering and construction (AEC) sector come largely from North America [1, 2]. Accordingly, evidence on how Saudi A/E firms manage change, and with what results, remains limited.

This research addresses these gaps through a survey of practitioners working in or with Saudi A/E firms. In this regard, three research questions were raised:

- RQ1: What types of organizational change, and which external pressures, have Saudi A/E firms experienced in recent years?
- RQ2: To what extent, and through which strategies, do these firms apply CM?
- RQ3: Is perceived success in change adoption associated with explicit CM practice, with awareness of CM's importance, or with firm characteristics?

By separating awareness of CM from its implementation, this research contributes baseline evidence from an under-researched and rapidly transforming context. It also identifies where practical intervention is most likely to improve change outcomes in the sector.

2 Literature Review and Hypotheses

2.1 Organizational Change in Project-based A/E Firms

A/E firms operate as project-based organizations, where a large part of the work is carried out by temporary teams that are assembled for individual commissions [7]. The knowledge and routines developed on one project are not easily retained or transferred to the next [8], which makes firm-wide change harder to embed. In their study of AEC firms, Lines and Reddy Vardireddy [1] identified technology adoption, changes in delivery methods and shifts in management practice as the main drivers of organizational change, and found that resistance is reinforced by professional norms and risk-averse cultures.

Digital technologies such as Building Information Modelling have intensified these pressures. Nevertheless, adopting technology alone does not ensure successful change, as the behavioural and organizational dimensions have to be managed alongside the technical implementation [2, 19].

This agenda is shaped by external pressures, including technological development, shifting stakeholder expectations, economic downturns and the COVID-19 pandemic. In Saudi Arabia, these pressures coincide with the scale and pace of Vision 2030, which demands agility, sustainability integration and digital capability from A/E firms [9, 20].

2.2 Change Management Models and Strategies

Lewin's [21] three-step model of unfreezing, changing and refreezing continues to inform planned change, although it has been criticized for its linearity [22]. Kotter's [15] eight-step model emphasizes urgency, a guiding coalition, vision, communication, short-term wins and institutionalization, and its focus on leadership makes it relevant to large-scale national programmes. Hiatt's [16] ADKAR model, on the other hand, shifts attention to the individual, specifying awareness, desire, knowledge, ability and reinforcement as the conditions for change. In addition, it has been argued that integrating CM with project management is now a necessity rather than an option [19].

A common set of practical strategies recurs across these models. These include visible sponsorship by senior leadership, the appointment of change agents, communicating the benefits of change to employees, sufficient training resources, realistic implementation timescales, clear performance benchmarks, and temporary workload adjustments while employees adapt [6, 15, 23]. Reviews indicate that combining several of these practices is more effective than relying on isolated interventions [5, 6, 24]. In hierarchical cultural

contexts, which characterize many Saudi organizations [13, 25], strategies driven by leadership are expected to be especially prominent.

2.3 From Awareness to Implementation

The distinction between recognizing the value of a practice and implementing it is well established in the literature. Pfeffer and Sutton [17] documented how organizations frequently know what they should do yet fail to act, substituting talk, planning or intention for implementation. Readiness research makes a related point, where favourable beliefs about change are seen as necessary but insufficient, and outcomes depend on whether organizations translate their commitment into concrete action and resources [26–28]. Similarly, reviews of how change recipients react show that the way change is implemented, including communication, participation and support, shapes outcomes more than general attitudes do [29].

For A/E firms, this suggests that a high awareness of the importance of CM may coexist with inconsistent practice. If CM matters, perceived success should therefore be associated with its explicit use rather than with the belief in its importance. Accordingly, the first two hypotheses were formulated as follows:

- H1: Respondents whose firms explicitly use CM strategies report higher perceived success in change adoption than respondents whose firms do not, or may not, use them.
- H2: Perceived importance of CM to firm success is positively associated with perceived success in change adoption.

Support for H1, combined with a lack of support for H2, would indicate an awareness–implementation gap.

2.4 Firm Characteristics

Firm characteristics may also shape the capacity for change. Larger firms have more resources for formal CM but may face greater inertia, while flatter or matrix structures may allow information to flow faster than divisional hierarchies. Agile project management, which is based on iterative delivery and continuous feedback, has been linked to project success in software and other sectors [30], although its applicability to design and construction is still debated [31]. Firm specialization may matter as well, since multidisciplinary firms integrate several professional cultures. As evidence on these differences in the Saudi A/E context is lacking, the third hypothesis was formulated as follows:

- H3: Perceived success in change adoption differs according to firm characteristics (management system, size, organizational structure and specialization).

The conceptual framework of this research is summarized in Figure 1. External pressures and firm characteristics were also used as control variables in the adjusted model testing H1.

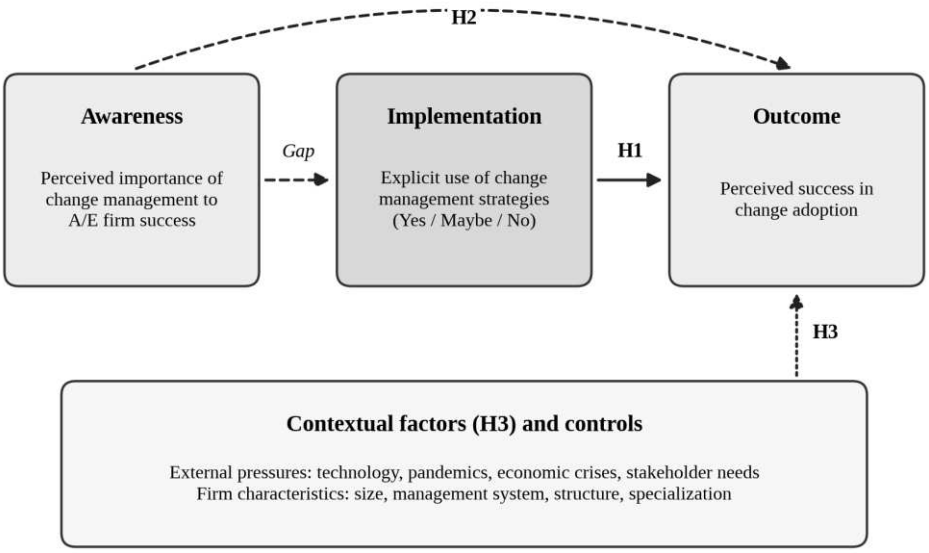


Fig. 1 Conceptual framework. Awareness of change management (CM) is expected to lead to implementation only imperfectly (the awareness–implementation gap); implementation is hypothesized to be associated with perceived success in change adoption (H1). H2 tests whether awareness alone is associated with success, and H3 tests differences by firm characteristics. External pressures and firm characteristics serve as controls in the adjusted model.

3 Methods

3.1 Research Design

This research adopted an exploratory, quantitative and cross-sectional survey design. Since the aim was to establish baseline evidence rather than to test a latent-variable model, the questionnaire used short and directly worded items, and the analysis relied on methods suited to categorical and ordinal data. Accordingly, the inferences drawn are associative rather than causal.

3.2 Questionnaire

The questionnaire was developed based on the CM literature [1, 2, 6, 15] and was administered online in English. It contained 16 items, divided into four parts as follows:

- Respondent profile: current occupation and years of professional experience.
- Firm characteristics: specialization (architecture, engineering, multidisciplinary, construction), size (small, 1–49 employees; medium, 50–249; large, 250 or more),

management system (traditional/waterfall or agile, with a short definition of each provided), and organizational structure (divisional, matrix or flat).

- Change experience: whether the firm had undergone change in the previous five years; the type of change (management system, technology implementation, delivery system, other; multiple responses allowed); and the impact of four global pressures (technological revolution, pandemics/lockdowns, economic crises, changing stakeholder needs) rated from 1 (no impact) to 5 (very strong impact).
- Change management practice: whether the firm uses CM strategies (yes, maybe, no); which strategies are used (seven options derived from the literature plus "other"; multiple responses allowed); the extent to which the firm has succeeded in change adoption, rated from 1 (lowest) to 5 (highest); and the extent to which CM relates to the success of A/E firms, rated from 1 (lowest) to 5 (highest).

Perceived success in change adoption was the dependent variable. Explicit use of CM strategies was taken as the indicator of implementation, while the perceived importance of CM to firm success was taken as the indicator of awareness. The "maybe" response for strategy use was kept as a separate category, as it reflects uncertainty about whether CM is practised, which in turn says something about how visible CM is within firms.

3.3 Sampling and Data Collection

A purposive sampling approach was used to reach professionals working in or with A/E firms in Saudi Arabia, with the aim of achieving variation in firm size, specialization, structure and professional role. The questionnaire was distributed through professional networks, email lists and LinkedIn, and approximately 120 direct invitations were sent. Since the LinkedIn posts could be shared onward, the total number of people reached, and therefore the response rate, cannot be determined. Responses were collected from

November 2025 until data collection closed on 9 August 2026, and a total of 71 responses were received by that date. All items were required, except for the list of strategies used, which was optional. One response that gave a co-author's own answers was excluded, which left an analytic sample of $N = 70$. Three further responses were entered by a member of the research team on behalf of colleagues, recording those colleagues' answers about their own firms. These responses were retained, and a sensitivity analysis excluding them ($n = 67$) is reported. The response platform recorded the respondents' email addresses, which were removed before analysis and were used only to identify the excluded response and to check for repeat submissions.

Two email addresses appeared twice each, with different answers in each submission. As they could not be confirmed as duplicate reports of the same firm, both submissions were retained in the primary analysis, and a sensitivity analysis excluding the later submission of each pair ($n = 68$) is reported. In addition, nineteen respondents (27.1%) described their occupation as professor, teaching assistant or lecturer. Since the questionnaire asked about the respondent's current firm, and some academic respondents may have been reporting on university-affiliated or consulting practices, the principal analyses were replicated on the industry-only subsample ($n = 51$). Finally, 11 respondents reported no change in the previous five years but still rated success in change adoption; therefore, the analyses were repeated for the 59 respondents who reported change.

3.4 Data Handling

Participation in the survey was voluntary, and respondents were informed of the purpose of the study before beginning the questionnaire. No firm names were collected, email addresses were removed before analysis, and the results are reported only in aggregate.

3.5 Data Analysis

Analyses were conducted in IBM SPSS Statistics (IBM Corp., Armonk, NY). Descriptive statistics, namely frequencies, percentages, means, standard deviations and medians, were computed for all variables. Multiple-response items were summarized as counts and percentages of the relevant respondents; hence, the percentages do not sum to 100%. Change types were analysed for the 59 respondents who reported change. The strategy item was completed by 48 respondents, including 16 who had answered “maybe” or “no” to the preceding question. This suggests that some respondents listed practices that exist in their firm without regarding them as a deliberate CM strategy. For this reason, the item was analysed descriptively only, and strategy frequencies are reported relative to both the 48 respondents listing strategies and the full sample. The internal consistency of the four external-pressure items was assessed using Cronbach’s alpha.

Since the outcome is a single ordinal item and several groups were small, the hypotheses were tested using non-parametric methods. H1 and H3 were tested with the Kruskal–Wallis H test (for three or more groups) and the Mann–Whitney U test (for two groups). Effect sizes are reported as $\eta^2H = (H - k + 1)/(n - k)$ for Kruskal–Wallis tests and $r = Z/\sqrt{N}$ for Mann–Whitney tests [32]. Pairwise follow-up comparisons used separate Mann–Whitney U tests with Holm [33] adjustment, rather than the Dunn–Bonferroni procedure built into SPSS. The association between management system and strategy use was tested with the continuity-corrected (Yates) χ^2 test, while H2 was tested with Spearman’s rank correlation. In order to examine whether the association in H1 held after adjustment, an ordinal logistic regression with a logit link [34] was used to predict the success category from explicit strategy use (yes versus maybe/no), management system (agile versus traditional), mean external pressure score and firm size (small as reference).

Model fit was assessed with the likelihood-ratio test and McFadden's pseudo-R^2, and the proportional-odds assumption with the test of parallel lines. Statistical significance was set at $\alpha = .05$. It should be noted that effect sizes (η^2H and r) and the Holm adjustments are not produced directly by SPSS and were calculated from the SPSS output.

4 Results

4.1 Sample Profile

The profile of the sample is summarized in Table 1. Respondents were experienced, as 61.4% had more than ten years of professional experience and 31.4% had more than 20 years. Multidisciplinary (41.4%) and architecture firms (38.6%) predominated. Small (41.4%) and large firms (40.0%) were well represented, whereas medium-sized firms formed 18.6% of the sample. Most firms used traditional (waterfall) management (70.0%) and divisional structures (55.7%).

Table 1 Profile of respondents and their firms (N = 70)

Variable	Category	n	%
Years of experience	Less than 5 years	8	11.4
	5–10 years	19	27.1
	11–15 years	14	20.0
	15–20 years	7	10.0
	More than 20 years	22	31.4
Occupation group	Industry roles	51	72.9
	Academic (professor, teaching assistant, lecturer)	19	27.1
Firm specialization	Multidisciplinary	29	41.4
	Architecture	27	38.6
	Engineering	10	14.3
	Construction	4	5.7
Firm size	Small (1–49 employees)	29	41.4
	Medium (50–249 employees)	13	18.6
	Large (250 or more employees)	28	40.0
Management system	Traditional (waterfall)	49	70.0
	Agile	21	30.0
Organizational structure	Divisional	39	55.7
	Matrix	21	30.0
	Flat	10	14.3

4.2 Types of Change and External Pressures (RQ1)

It was evident from the responses that organizational change was nearly universal, as 59 respondents (84.3%) reported that their firm had undergone change in the previous five years. Among them, changes to the management system were the most common (71.2%), followed by technology implementation and changes to the delivery system (49.2% each) (Table 2). Of the four external pressures, technological revolution ($M = 3.37$, $Md = 4$) and changing stakeholder needs ($M = 3.31$) were rated as having the greatest impact, followed by economic crises ($M = 3.14$) and pandemics/lockdowns ($M = 2.86$). The difference between the top two pressures is small and should be interpreted descriptively. The four pressure items showed modest internal consistency ($\alpha = .646$). Since they represent

conceptually distinct pressures, they were interpreted individually, and their mean was used only as a control variable.

Table 2 Types of organizational change and impact of external pressures. For change types, the columns show frequency and percentage; for pressures, mean, standard deviation and median.

Item	n / M	% / SD	Md
Type of change (n = 59 reporting change; multiple responses)			
Management system	42	71.2	–
Technology implementation	29	49.2	–
Delivery system	29	49.2	–
Other	4	6.8	–
Impact of external pressures (1 = no impact, 5 = very strong impact; N = 70)			
Technological revolution	3.37	1.34	4
Changing stakeholder needs	3.31	1.21	3
Economic crises	3.14	1.23	3
Pandemics/lockdowns	2.86	1.24	3

4.3 Awareness and Use of Change Management (RQ2)

Awareness of CM was high. The mean rating of the relationship between CM and the success of A/E firms was 4.23 (SD = 0.87, Md = 4), where 56 respondents (80.0%) rated it 4 or 5 and no respondent chose the lowest rating. On the other hand, explicit use of CM strategies was much less common, as 32 respondents (45.7%) answered “yes”, 28 (40.0%) answered “maybe” and 10 (14.3%) answered “no”. Among the 56 respondents who rated CM as important, only 28 (50.0%) reported explicit strategy use, while 20 (35.7%) were unsure and 8 (14.3%) reported none. Perceived importance did not differ by strategy use ($H(2) = 0.64$, $p = .728$). In fact, respondents reporting no strategy use gave the highest mean importance rating (M = 4.40).

The strategies reported by respondents are listed in Table 3. Senior leadership was the most cited strategy (54.2% of respondents listing strategies), followed by workload adjustments (39.6%), and then clear performance benchmarks and realistic

implementation timescales (35.4% each). Communicating the benefits to employees (31.3%), providing sufficient training resources (29.2%) and appointing a change agent (18.8%) were less frequent. Respondents who answered "yes" reported a mean of 3.0 strategies (*SD* = 1.65; range 1–7), which indicates that even among explicit users, the portfolio of strategies was often narrow.

Table 3 Change management strategies reported (multiple responses). The 48 respondents listing strategies comprise 32 who answered "yes", 14 "maybe" and 2 "no" to the preceding question on strategy use.

Strategy	n	% of listing (n = 48)	% of total (N = 70)
Senior leadership	26	54.2	37.1
Workload adjustments until employees adapt	19	39.6	27.1
Establish clear performance benchmarks	17	35.4	24.3
Follow a realistic implementation timescale	17	35.4	24.3
Communicate the benefits for employees	15	31.3	21.4
Provide sufficient training resources	14	29.2	20.0
Appoint a change agent	9	18.8	12.9
Other	5	10.4	7.1

4.4 Strategy Use, Awareness and Perceived Success (H1, H2)

Perceived success in change adoption was moderate ($M = 3.36$, $SD = 0.90$, $Md = 3$), where 47.1% of respondents rated it 4 or 5, 41.4% chose the midpoint and 11.4% rated it 1 or 2. Success differed significantly by strategy use, $H(2) = 9.57$, $p = .008$, $\eta^2H = .113$ (Table 4). Respondents reporting explicit use had the highest ratings ($M = 3.72$, $Md = 4$); none of them rated success below the midpoint, and 65.6% rated it 4 or 5, compared with 28.6% of "maybe" and 40.0% of "no" respondents (Figure 2). Holm-adjusted comparisons showed a significant difference between "yes" and "maybe" ($p = .009$, $r = .38$), but not between "yes" and "no" ($p = .126$) or between "maybe" and "no" ($p = .831$). It should be noted that the "no" group was small ($n = 10$) and that its ratings were dispersed (*SD* =

1.15). When explicit users were compared with all other respondents, success was higher among explicit users ($U = 850.0$, $p = .002$, $r = .37$). Accordingly, H1 was supported.

Table 4 Perceived success in change adoption by use of change management strategies (N = 70)

Strategy use	n	M	SD	Md	Holm-adjusted comparison
Yes	32	3.72	0.58	4	Yes vs Maybe: U = 634.0, p = .009
Maybe	28	3.07	0.98	3	Yes vs No: U = 216.0, p = .126
No	10	3.00	1.15	3	Maybe vs No: U = 134.0, p = .831
Kruskal–Wallis H(2) = 9.57, p = .008, η^2H = .113					

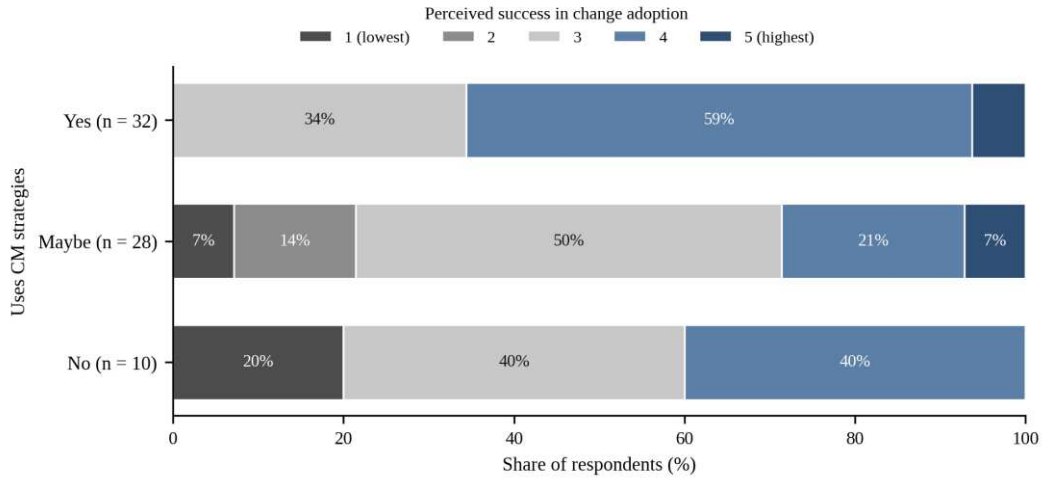


Fig. 2 Distribution of perceived success in change adoption (1 = lowest, 5 = highest) by reported use of change management (CM) strategies. Segments smaller than 7% are not labelled.

In contrast, the perceived importance of CM was unrelated to perceived success ($\rho = -.039$, $p = .748$); hence, H2 was not supported. Among the external pressures, technological revolution showed a weak positive correlation with success ($\rho = .278$, $p = .020$), as did the mean pressure score ($\rho = .272$, $p = .023$). Changing stakeholder needs ($\rho = .200$, $p = .097$), pandemics ($\rho = .129$, $p = .288$) and economic crises ($\rho = .150$, $p = .217$), on the other hand, were not significantly related. Taken together, the support for H1 and the lack of support for H2 are consistent with an awareness–implementation gap.

4.5 Firm Characteristics (H3)

Perceived success did not differ significantly by management system, firm size, organizational structure or professional experience (Table 5). Respondents in agile firms reported somewhat higher success than those in traditional firms (M = 3.62 versus 3.24), yet the difference was not significant (U = 629.0, p = .113, r = .19). Agile firms were also more likely to report explicit strategy use (61.9% versus 38.8%), but again this difference was not significant (continuity-corrected $\chi^2(1) = 2.31$, $p = .129$). Firm specialization produced a significant omnibus result ($H(3) = 8.01$, $p = .046$, $\eta^2 H = .076$), with multidisciplinary firms reporting the highest success (M = 3.66) and construction firms the lowest (M = 2.50). However, no pairwise comparison remained significant after Holm adjustment (lowest adjusted $p = .066$, construction versus multidisciplinary), and the construction group included only four respondents. Therefore, H3 was largely not supported.

Table 5 Perceived success in change adoption by firm and respondent characteristics (N = 70)

Characteristic	Group means (n)	Test
Management system	Agile 3.62 (21); Traditional 3.24 (49)	U = 629.0, p = .113, r = .19
Firm size	Small 3.31 (29); Medium 3.23 (13); Large 3.46 (28)	H(2) = 1.48, p = .478, η^2H < .01
Organizational structure	Divisional 3.33 (39); Matrix 3.57 (21); Flat 3.00 (10)	H(2) = 2.57, p = .276, η^2H < .01
Professional experience	Five experience bands; means 3.00–3.57	H(4) = 2.99, p = .559, η^2H < .01
Firm specialization	Multidisciplinary 3.66 (29); Architecture 3.22 (27); Engineering 3.20 (10); Construction 2.50 (4)	H(3) = 8.01, p = .046, η^2H = .076 (no Holm-adjusted pairwise difference)

4.6 Adjusted Model and Sensitivity Analyses

The ordinal logistic regression was significant overall (likelihood-ratio $\chi^2(5) = 17.10$, p = .004; McFadden R^2 = .100). Explicit strategy use was the only significant predictor, where respondents reporting explicit use had 4.25 times the odds of reporting a higher success

category, holding management system, external pressure and firm size constant (B = 1.448, p = .004, 95% CI [1.59, 11.36]) (Table 6). Neither agile management nor firm size was significant, and external pressure did not reach significance once strategy use was controlled (p = .077). The test of parallel lines was borderline ($\chi^2(15) = 24.7$, p = .054), partly because few respondents chose the two lowest ratings (four each). A model in which success was collapsed into three categories (1–2, 3, 4–5) satisfied the assumption (p = .152) and led to the same conclusion (OR = 5.22, 95% CI [1.84, 14.78], p = .002).

Table 6 Ordinal logistic regression predicting perceived success in change adoption

Predictor	B	SE	p	OR	95% CI for OR
Explicit CM strategy use (yes vs maybe/no)	1.448	0.501	.004	4.25	[1.59, 11.36]
Agile management (vs traditional)	0.400	0.551	.468	1.49	[0.51, 4.39]
Mean external-pressure score	0.506	0.286	.077	1.66	[0.95, 2.91]
Medium firm (vs small)	−0.565	0.619	.362	0.57	[0.17, 1.91]
Large firm (vs small)	0.414	0.531	.436	1.51	[0.53, 4.28]
Model: likelihood-ratio $\chi^2(5) = 17.10$, p = .004; McFadden R^2 = .100; N = 70					

The main result proved robust in all four sensitivity analyses (Table 7). In the industry-only subsample, success still differed by strategy use ($H(2) = 8.63$, p = .013), and explicit use remained the strongest adjusted predictor (OR = 5.72, p = .004). Excluding the later of each repeated submission gave almost identical results (OR = 4.22, p = .005). The association was even stronger among the 59 respondents who reported change ($H(2)$ = 12.92, p = .002; OR = 6.20, p = .001).

Table 7 Sensitivity analyses for the association between explicit change management strategy use and perceived success.

Analysis	Full sample (N = 70)	Industry only (n = 51)	Repeats excluded (n = 68)	Reported change (n = 59)
Kruskal–Wallis H(2)	9.57	8.63	9.77	12.92
p	.008	.013	.008	.002
η^2H	.113	.138	.120	.195
Mean success: Yes / Maybe / No	3.72 / 3.07 / 3.00	3.81 / 3.11 / 2.67	3.74 / 3.07 / 3.22	3.69 / 2.81 / 3.22
Adjusted OR for explicit use [95% CI]	4.25 [1.59, 11.36]	5.72 [1.75, 18.70]	4.22 [1.55, 11.45]	6.20 [2.01, 19.11]
p for adjusted OR	.004	.004	.005	.001

5 Discussion

5.1 Pervasive change, partial practice

The findings show that change is a normal condition for Saudi A/E firms, as more than four in five respondents reported recent change, most often in management systems, technology and delivery systems. This mirrors the drivers identified in North American AEC firms [1]. The prominence of technological revolution and stakeholder needs suggests that digitalization and client expectations, rather than one-off shocks such as the pandemic, are shaping the change agenda of the sector. The weak positive association between technological pressure and perceived success may indicate that technology-driven change is more concrete and therefore easier to judge as adopted. However, this association did not persist once strategy use was controlled.

Against this background of pervasive change, CM practice was found to be only partly established. Fewer than half of the respondents reported explicit use of CM strategies, and a large group (40.0%) were unsure whether their firm used any. This uncertainty is a finding in itself, since deliberate CM practice would be expected to be visible to experienced professionals, most of whom had more than ten years in the field. The strategies reported were led by senior leadership, which is consistent with the hierarchical organizational cultures described in Saudi Arabia [13, 25]. Meanwhile, strategies that

build individual capability and engagement, such as training, communicating benefits and dedicated change agents, were reported less often. In ADKAR terms, firms appear to rely on leadership to create awareness and desire, while investing less in the knowledge and ability that employees need to sustain change [16].

5.2 The Awareness–Implementation Gap

The central finding of this research is the contrast between awareness and practice. Four in five respondents regarded CM as strongly related to firm success, yet only half of these reported that their firm explicitly used CM strategies. More importantly, awareness had no association with perceived success, whereas explicit practice did, both in the unadjusted tests and after controlling for management system, external pressure and firm size. This is the pattern that Pfeffer and Sutton [17] described as the knowing–doing gap, where recognizing the value of a practice is not the same as doing it, and benefits follow from doing.

This finding is consistent with readiness research, which holds that favourable beliefs about change have to be translated into structures, resources and actions before outcomes improve [26–28]. It also agrees with the evidence that the process of implementing change shapes outcomes more than general attitudes do [29]. For Saudi A/E firms, the implication is that advocacy for CM has largely succeeded, and that the remaining challenge lies in implementation.

The clearest contrast was found between the “yes” and “maybe” respondents, while the difference between “yes” and “no” was not statistically significant. The “no” group was small and heterogeneous, and some of its members may have had no recent change against which to judge adoption. In addition, uncertainty about whether CM is practised may signal that change was introduced without clear communication or structure, which the

CM literature associates with poor adoption [6, 15], although the present data cannot confirm this.

5.3 Firm Characteristics

Firm size, structure and management system did not differentiate perceived success. Agile firms reported slightly higher success and more frequent strategy use, but neither difference was significant, and management system had no independent effect once strategy use was controlled. This suggests that how firms manage change matters more than their formal delivery model. It also cautions against assuming that adopting agile methods will in itself improve change outcomes, which remains an open question in design and construction [31]. The higher success reported by multidisciplinary firms may reflect their greater experience in integrating different professional cultures. However, the omnibus result did not hold in pairwise comparisons and the construction subgroup was very small; hence, this finding should be treated as a hypothesis for future research.

5.4 Theoretical and Practical Contributions

This research makes three contributions. First, it provides baseline evidence on change and CM in Saudi A/E firms, a context that is important to Vision 2030 but has been little studied. Second, it shows that the knowing–doing gap applies to CM in project-based professional firms, where implementation, rather than awareness, is associated with outcomes. Third, it indicates that size, structure and management system matter less than whether CM is deliberately practised. For practitioners, the priority is therefore not to persuade firms of the value of CM, but to help them act on it.

6 Recommendations

Based on the findings of this research, the following recommendations are proposed:

- Making CM explicit and visible. Firms should designate responsibility for managing change, communicate a clear change plan, and ensure that employees know which CM measures are in place. The large “maybe” group suggests that CM, where it exists, is often invisible to staff.
- Broadening CM beyond leadership directives. Senior sponsorship should be complemented by training resources, by communicating the benefits of change to employees, and by change agents who support teams during transition.
- Protecting capacity during change. Temporary workload adjustments and realistic implementation timescales should be planned as part of change initiatives, particularly where change coincides with project deadlines.
- Building CM into project processes. Since A/E work is project-based, CM activities should be integrated into project start-up, review and close-out routines, so that lessons are retained across projects [8, 19].
- Developing capability at the sector level. Professional bodies, universities and Vision 2030 programme sponsors could support short CM training for A/E managers, in addition to including CM expectations in the requirements of major projects.

7 Conclusions

This research examined change and change management in architecture and engineering firms in Saudi Arabia. It was evident that change was nearly universal and that awareness of the importance of CM was high. However, fewer than half of the respondents reported explicit use of CM strategies, and practice relied mainly on senior leadership. Explicit strategy use was associated with higher perceived success in change adoption, and this association held after adjusting for firm characteristics and external pressures, as well as

in all four sensitivity analyses. On the other hand, awareness of CM was not associated with success, and firm size, structure and management system did not differentiate outcomes. Accordingly, the findings point to an awareness–implementation gap, which firms and sector bodies can address by moving from recognizing the value of CM to practising it deliberately.

7.1 Limitations and future research

This research has several limitations. First, the sample was modest and non-probabilistic; hence, the results cannot be generalized statistically to all Saudi A/E firms, and some subgroups were very small. Second, the data are cross-sectional and self-reported, so the associations cannot be interpreted causally, and common method bias cannot be excluded [35]. Third, the key constructs were measured with single items, which limits reliability and does not allow construct validity to be assessed. Fourth, about a quarter of the respondents held academic roles, and although the main results held in the industry-only subsample, their firm reference may differ from that of industry respondents. Fifth, the questionnaire did not record firm location, so the Saudi focus relies on the sampling approach rather than on verifying each response. Finally, the strategy-use item relied on the respondents' own judgement of whether their firm used CM strategies, and some respondents who answered "maybe" or "no" still listed specific practices; therefore, the boundary between explicit and informal practice is not sharp.

Future research is recommended to use validated multi-item measures of CM practice and organizational readiness [36] with larger and verified samples of Saudi A/E firms. This would allow latent-variable modelling of the pathways between CM maturity, readiness and change outcomes.

Declarations

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Data availability. The anonymized dataset supporting the findings of this study is available from the corresponding author on reasonable request.

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Use of generative AI. During the preparation of this manuscript, the authors used Claude (Anthropic) to assist with restructuring and editing the text, reviewing English language and style, preparing the figures and conducting preliminary statistical analyses; these analyses were subsequently verified by the authors in IBM SPSS Statistics. The authors reviewed and edited the content and take full responsibility for the publication.

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