HKA

CRUX INSIGHT

ENGINEERING AND CONSTRUCTION
A REGIONAL ANALYSIS OF CAUSATION

Lessons learned from claims and disputes

CONTENTS

CRUX

noun. (kruks)

1. The decisive or most important point at issue.
2. A particular point of difficulty.

FOREWORD

Welcome to the CRUX Insight 2020 report – the third in our series analysing claims and disputes on engineering and construction projects worldwide.

The web of acts and omissions, hindrances and failings that result in delays, overruns and other conflicts is – like many of these projects themselves – highly complex. Decoding this complexity requires detailed, informed research. The pattern of causation we report here is based on the analysis of our research findings, drawing on the expertise of our claims and dispute resolution teams.

HKA's integrated research programme captures an unparalleled wealth of data on projects from around the globe. More than 1,100 projects across 88 countries have been analysed for CRUX Insight 2020. The combined CAPEX value of these projects exceeds US$1.8 trillion.

This pool of data collected for CRUX Insight on major projects is unique and its analysis is underpinned by a robust methodology.

CRUX Insight 2020 is organised according to the regions in which HKA operates – the Americas, Asia Pacific, Europe, and the Middle East & Africa. Our analysis reveals the lessons to be learned from the claims we have investigated and the disputes we have resolved. In each chapter, HKA consultants in the field share their insights not only into the mix of factors driving claims and disputes in their region, but also the measures that will avoid or curtail them and their impacts on future projects.

A realist's view is that every project carries inherent risk. The prudent course is to anticipate, recognise, manage, and mitigate the risks that give rise to claims and disputes so as to minimise, if not avoid, delay, disruption and cost escalation.

HKA's true goal through CRUX is to inform and enable employers, contractors and the wider supply chain to make better choices and decisions by being aware of and heeding the lessons of our unrivalled experience. Too many projects lack a keen awareness of recurrent pitfalls and past successes. Consideration of these risks and opportunities can improve the contracting process and ultimately, minimise change and the risk of disputes occurring on projects.

Our data shows the high toll of claims and disputes on both money and time. The cumulative value of the claimed disputes on these 1,100-plus projects exceeded US$48.6 billion, and extensions of time (EOT) claimed would accumulate to 593 years, albeit with some notable variation between regional averages. These calculations do not include the many hours of managers' time as well as legal and other related costs.

CRUX insights also enhance our clients' ability – whatever role they play – to benchmark their performance by sector, gauge risks in different markets and regions, and identify areas for improvement. We urge them to make full use of the data and its potential (see page 45).

Professional bodies and policymakers too can draw on solid, empirical evidence to promote and encourage more cost-effective procurement, governance, and delivery of major projects across the industry.

We hope that you find the CRUX Insight 2020 findings informative and of practical use, and that you will engage with us as we share and grow the value of our ongoing research programme.

Simon Moon

Partner and Chief Operating Officer

“HKA's true goal through CRUX is to inform and enable employers, contractors and the wider supply chain to make better choices and decisions by being aware of and heeding the lessons of our unrivalled experience.”

OVERVIEW

HKA investigates and advises on claims and disputes on capital projects around the world. CRUX Insight is a distillation of the data collected and analysed as part of that work.

This third annual edition of CRUX Insight brings a regional focus to the main causes of claims and disputes through our analysis on hundreds of projects from around the world.

Data collection for this report ended in February 2020, before the impacts of COVID-19 began to take effect on the projects analysed here. We will track the resultant shifts in the causation pattern for disputes due to the global pandemic in future CRUX Insight reports, but the early effects are already being seen by HKA, not least in an upsurge of spurious claims. Our consultants consider the implications for their regions in the following chapters.

Underlying conditions

While the regional economies and the industries that we serve – engineering and construction, power, utilities, oil and gas, and industrial – face a coronavirus-induced recession, their underlying health varies widely.

Asia Pacific has come to the end of a sustained infrastructure boom, and the low profitability of contractors operating in that region leaves them vulnerable to tendering price wars. Fierce competition in the European market raises similar concerns, particularly for major players in the UK, with the added uncertainty of Brexit hanging over the region.

In South Africa too, where COVID is an added complication to its pre-existing downturn, leading contractors are ill-prepared for increasing international competition as the continent plays catch-up with more mature markets. In the Middle East, a very different yet challenging transition is underway amid a shift from oil-powered growth to a more diverse and sustainable economy.

Meanwhile, the Americas are coming to terms with the oil price shock as political uncertainty and friction over China-US trade casts a wider pall over the global outlook.

Root causes

CRUX Insight 2020 provides insights into the root causes of claims and disputes on projects over recent years and the latest trends. Our aim is to alert all industry stakeholders not just to their prime drivers, but also to the positive, practical actions that can be taken to avoid the most disruptive disputes, or at least minimise costs and delays.

These consequences are colossal for our global sample of projects. On average, claimed disputed sums amount to almost 56% of the planned capital cost of a project. Globally, extensions of time that were claimed would, on average, add more than 71% to projects' original scheduled duration.

While the primary cause of claims and disputes in the annual CRUX ranking is change in scope as projects increase in scale and complexity, other powerful drivers of disputes are exacting a heavy toll across all regions. These causes include:

- Incorrect or incomplete designs.
- Poor management of third parties.
- Inadequate contract management.
- Deficiencies in workmanship.

These and other factors play out in different ways, as our CRUX 2020 analysis reveals. The following chapters chart the varying pattern of causation in the Americas, Asia Pacific, Europe, and the Middle East & Africa, with commentary and insights from HKA consultants and partners in each region.

Toby Hunt

Partner, Chief Business Development Officer

GLOBAL CONSTRUCTION CLAIM AND DISPUTE CAUSES LAID BARE

The release of the 2020 CRUX Insight report is timely and more important than ever considering the uncertainties facing the engineering and construction sector due to the effects of the COVID-19 pandemic.

The 2020 CRUX Insight report provides an excellent opportunity to fully understand the causes of construction claims and disputes from the Americas to Asia Pacific by analysing data from more than 1,100 projects. The report clearly offers employers, contractors and the wider construction supply chain the information on how to make better choices and decisions that could prevent or reduce possible claims and disputes.

The report, which is underpinned by a robust methodology, is succinctly written and provides a good reference source and an interesting read for construction industry practitioners, policymakers and academics alike. I highly recommend the report and urge readers to visit CRUX online (hka.com/crux-interactive-dashboard) to experience the interactive dashboard alongside the report.

Dr Alex Opoku (PhD, MSc, BSc (Hons), MCIOB, MRICS)

Associate Professor in Project Management & Quantity Surveying
UCL Bartlett School of Construction & Project Management
University College London

1185
projects

88
countries

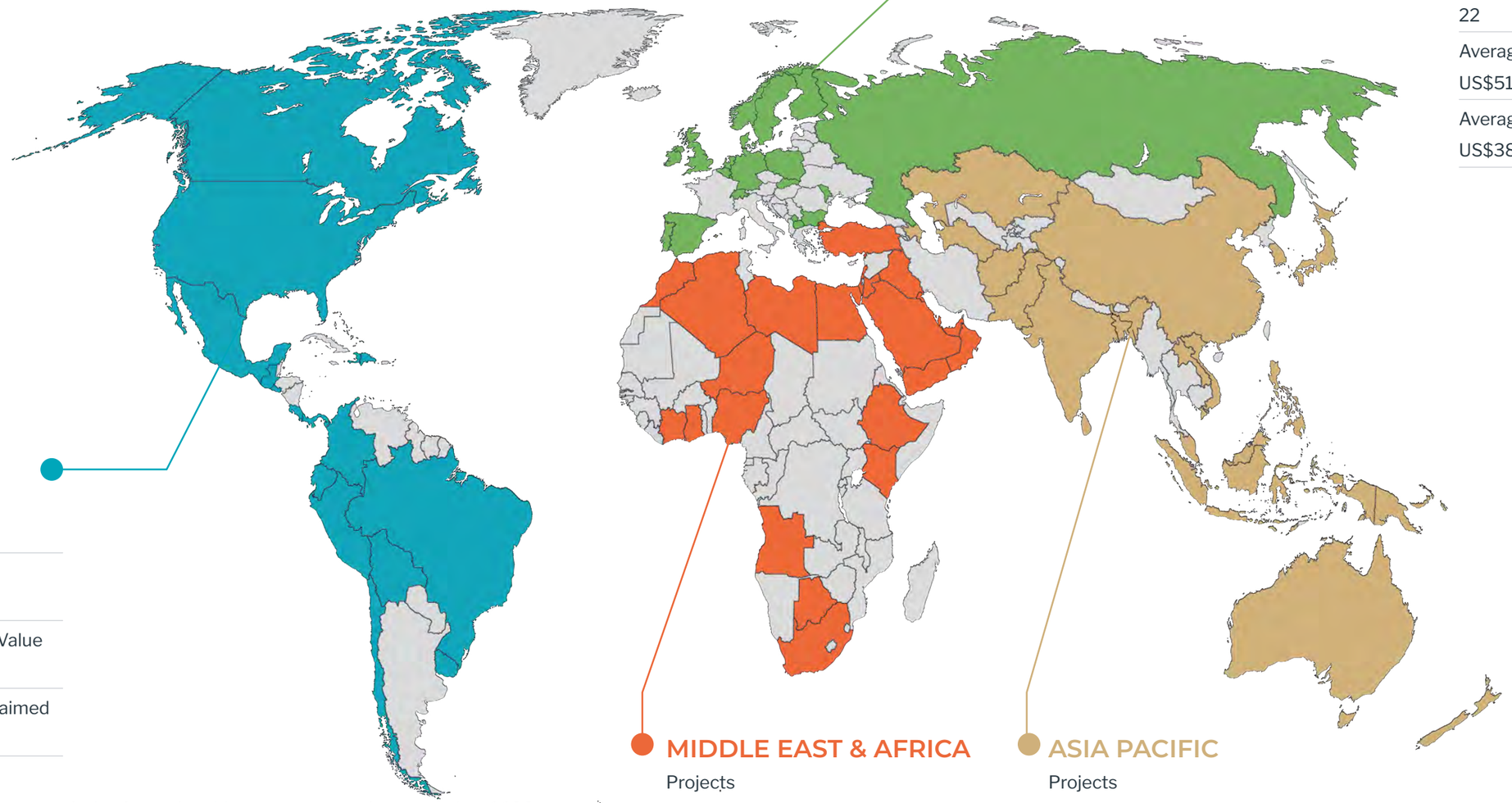
$1.8bn
average project CAPEX USD

55.9%
average cost claimed

71.3%
average EOT claimed

A WORLD VIEW

THE SCALE OF CLAIMS AND DISPUTES BY REGION



AMERICAS

Projects
410

Countries
17

Average CAPEX Value
US$1.1 billion

Average Value Claimed
US$65.5 million

EUROPE

Projects
254

Countries
22

Average CAPEX Value
US$517.9 million

Average Value Claimed
US$38.5 million

MIDDLE EAST & AFRICA

Projects
313

Countries
26

Average CAPEX Value
US$1.8 billion

Average Value Claimed
US$122.0 million

ASIA PACIFIC

Projects
208

Countries
23

Average CAPEX Value
US$4.8 billion

Average Value Claimed
US$95.0 million

CRUX Insight distills expert analysis of actual problems encountered on more than 1,100 projects across 88 countries. The breadth and depth of this worldwide intelligence – gleaned first-hand through investigations of claims and disputes – provides truly authoritative insights into the causes of project conflicts and their impacts.

The toll on budgets and schedules is significant at project level, and globally, colossal. More than US$48 billion was disputed between the parties involved in the projects we analysed over the 2018-2020 period. The planned value of these contracts was more than US$1.8 trillion. The delays projects faced were no less significant or contentious. Claimed extensions of time would typically push back project completion by 323 days – more than 70% of the scheduled programme, on average.

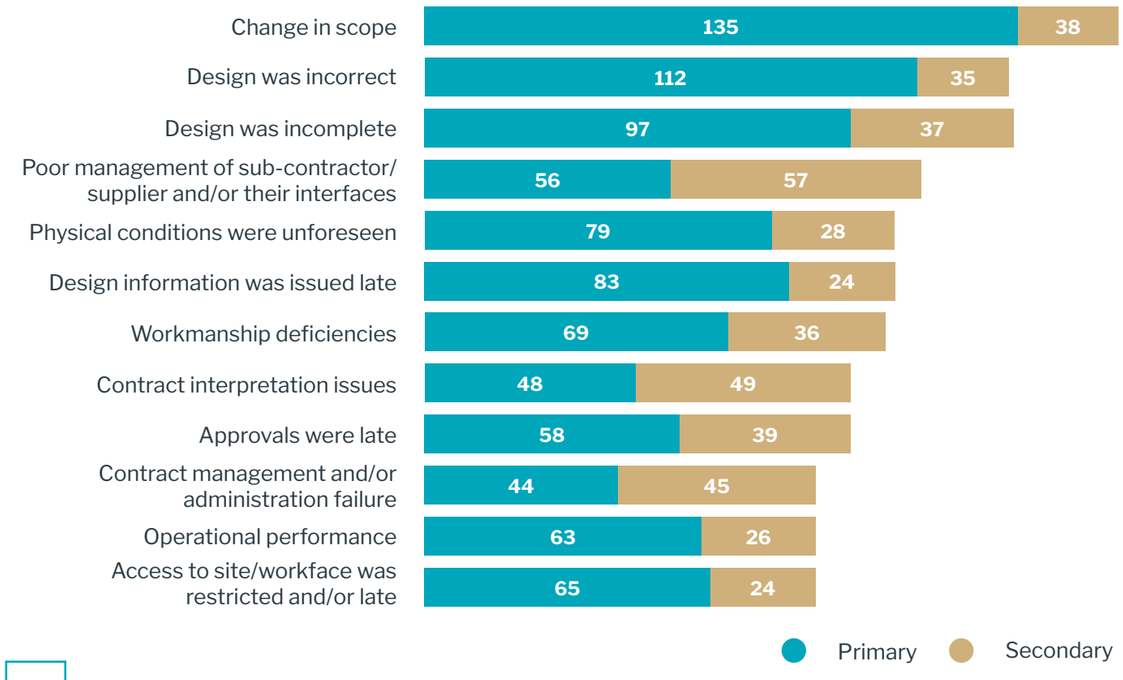
CRUX FINDINGS

Here we set out the main findings from our CRUX integrated research programme. The data is consolidated for the 2018-20 period, except where stated. The regional analyses that follow focus mainly on the 2020 dataset.

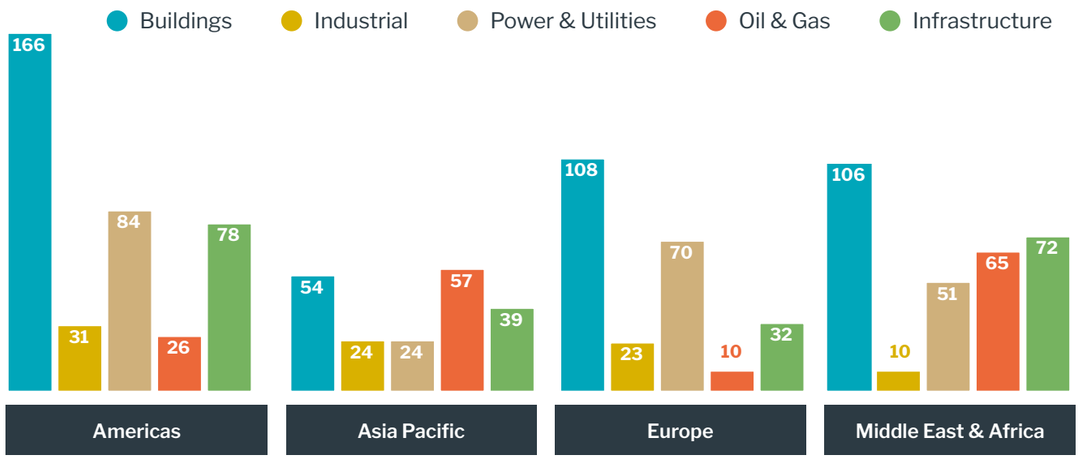
Global top causes of claims and disputes for project data collected from 2018-2020

Cause of claim and dispute	Primary	Secondary	Score
Change in scope	429	144	573
Contract interpretation issues	228	177	405
Contract management and/or administration failure	183	185	368
Design information was issued late	251	101	352
Design was incomplete	241	88	329
Poor management of sub-contractor/supplier and/or their interfaces	159	165	324
Design was incorrect	229	86	315
Physical conditions were unforeseen	187	87	274
Access to site/workface was restricted and/or late	202	70	272
Level of skill and/or experience	139	129	268
Claims were spurious, over-inflated, opportunistic and/or unsubstantiated	133	112	245
Approvals were late	138	104	242
Cash flow and payment issues	124	97	221
Workmanship deficiencies	135	81	216
Operational performance	128	61	189

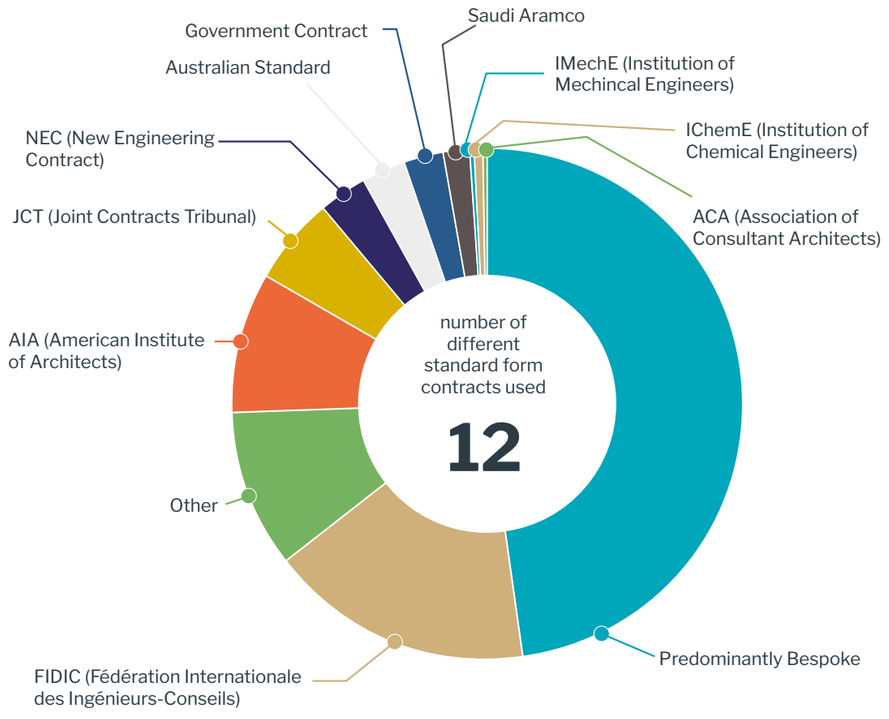
Global top causes of claims and disputes for project data collected in 2020



Regional breakdown of top sectors for project data collected from 2018-2020



Global types of standard form contracts used for project data collected from 2018-2020



Americas: Causes of claims and disputes for project data collected from 2018-2020

Cause of claim and dispute	Primary	Secondary	Score
Change in scope	84	40	124
Design was incomplete	74	28	102
Physical conditions were unforeseen	73	28	101
Design information was issued late	66	31	97
Poor management of sub-contractor/supplier and/or their interfaces	58	38	96
Contract management and/or administration failure	56	38	94
Design was incorrect	73	21	94
Contract interpretation issues	54	38	92
Workmanship deficiencies	62	28	90
Claims were spurious, over-inflated, opportunistic and/or unsubstantiated	44	33	77

Europe: Causes of claims and disputes for project data collected from 2018-2020

Cause of claim and dispute	Primary	Secondary	Score
Change in scope	84	27	111
Contract interpretation issues	64	46	110
Design was incorrect	79	20	99
Poor management of sub-contractor/supplier and/or their interfaces	47	46	93
Contract management and/or administration failure	55	32	87
Level of skill and/or experience	41	42	83
Design information was issued late	52	21	73
Design was incomplete	50	19	69
Workmanship deficiencies	38	26	64
Physical conditions were unforeseen	40	23	63

Asia Pacific: Causes of claims and disputes for project data collected from 2018-2020

Cause of claim and dispute	Primary	Secondary	Score
Change in scope	95	24	119
Access to site/workface was restricted and/or late	46	16	62
Contract management and/or administration failure	30	31	61
Contract interpretation issues	31	27	58
Design information was issued late	34	16	50
Poor management of sub-contractor/supplier and/or their interfaces	21	28	49
Design was incorrect	32	16	48
Claims were spurious, over-inflated, opportunistic and/or unsubstantiated	22	22	44
Design was incomplete	28	12	40
Level of skill and/or experience	19	21	40

ME&A: Causes of claims and disputes for project data collected from 2018-2020

Cause of claim and dispute	Primary	Secondary	Score
Change in scope	166	53	219
Contract interpretation issues	79	66	145
Design information was issued late	99	33	132
Contract management and/or administration failure	42	84	126
Design was incomplete	89	29	118
Approvals were late	58	52	110
Access to site/workface was restricted and/or late	83	20	103
Cash flow and payment issues	55	47	102
Poor management of sub-contractor/supplier and/or their interfaces	33	53	86
Level of skill and/or experience	36	39	75

AMERICAS

Economic overview

The latest slump in oil prices in spring 2020 shocked the resource-driven economies of the Americas. Having absorbed the impact on their booming shale oil and oil sands industries, the US and Canada – along with the region's other economies – are now suffering the effects of the COVID-19 pandemic. The collective GDP of the region is expected to shrink by between 4.5% and 6.6% in 2021, according to the International Monetary Fund.

With many oil and gas projects on hold, the expectation is that projects across many other sectors may follow suit. In a similar vein to events following the financial crisis over a decade ago, large-scale programmes are likely either to be cancelled or postponed owing to market uncertainty and restricted financing.

Meanwhile, political uncertainty around the 2020 Presidential election and social unrest cast a cloud over the region's largest economy. In addition, a trade war with China could have wider ramifications for the international flows and costs of equipment and materials.

These factors will compound the disruption caused by COVID-19. A probable effect will be that contractors divert CAPEX investment away from the development of essential new technologies, workforce training, and skills enhancement (notably in contract management and the management of third parties). New health and safety requirements – mandated to allow projects to be delivered amid a continuing threat from the coronavirus – may consume much of these funds.

Causes of claims and disputes for project data collected in 2020

Claims and disputes

HKA's CRUX 2020 analysis of the Americas captures data relating to 410 projects in 17 countries across the region, which includes the United States, South America and Canada. The data was captured from projects over the period 2018 to 2020 (see consolidated data table, page 9), and our analysis shows that the average value claimed was US$65.5 million on projects with an average CAPEX value of US$1.1 billion.

> Given the increased uncertainty associated with the pandemic, there will be benefits to planning projects far more rigorously at an early stage of their life cycle, so that all parties are aware of their roles, responsibilities and the risks they own.

From a 2020 perspective, design problems have now overtaken change in scope as the primary drivers of claims and disputes in the Americas, as in other regions. Projects have also become more prone to deficiencies in workmanship and unforeseen physical conditions (see chart on opposite page).

It is a concern also that failings in the management of third parties, across increasingly complex supply chains, continue to prevail. We believe this may be a contributory factor to the high ranking of design issues. Our experience is that design problems are more likely to occur as a result of increasingly tight timescales imposed upon third parties engaged in design. The result is often late or incomplete design, as well as clashes related to design implementation between parties. These conflicts are a more dominant factor than poor designs by individual parties.

In the COVID era, restrictions and delays associated with site access are triggering more claims. By contrast, in the oil and gas market, tighter margins are leading to a smaller number of defensive claims by contractors, who are more averse to potentially expensive actions that may not yield a favourable result. Contractors in multiple sectors will be challenged by restricted cashflow and by shortages in the administrative skills required to manage and execute contracts. Design coordination will prove even more challenging as supply chain partners work remotely from each other – as opposed to being colocated – requiring heightened efforts by lead contractors to coordinate all parties.

For employers, it will be essential to interrogate what may prove to be opportunistic contractor claims. Greater time will need to be invested in scrutinising the root cause of a claim or dispute to ascertain whether there is a clear and demonstrable causal link to COVID-19 if they are to minimise spurious claims.

410
projects

17
countries

$1.1bn
average project CAPEX USD

45.9%
average cost claimed

61.9%
average EOT claimed

Given the increased uncertainty associated with the pandemic, there will be benefits to planning projects far more rigorously at an early stage of their life cycle, so that all parties are aware of their roles, responsibilities and the risks they own. The new reality will also impact how parties choose to resolve their disputes.

Pathways to resolving disputes

The latest CRUX data points to a greater increase in mediation than litigation compared to previous reports. Mediation has always been part of the negotiation process for US matters. The data collected for the region in our 2020 research is showing a mediation increase of 10%, but it should be borne in mind that the project types sampled in our analysis can change from year to year.

Dispute resolution method	% Total Data collected in 2018 & 19	% Total Data collected in 2020
Negotiation	22%	24%
Mediation	15%	25%
Adjudication	0%	1%
Arbitration	25%	25%
Litigation	23%	29%

We also anticipate increased use of arbitration over litigation in the courts. Our experts have observed how arbitrators, attorneys and expert witnesses have quickly adapted to virtual hearings and testimony. The savings in travel time and expense are clear. Historically, feedback from experts operating in this region indicates that such costs have presented a barrier to the use of this resolution pathway.

Whereas in arbitration, the cost and time savings from virtual hearings seem to outweigh the downside of not being able to 'read the room' in a face-to-face setting, the courts are likely to lag in adopting the technology for litigation proceedings.

Adjudication also offers the advantage of a more rapid resolution. In Canada, the Ontario Construction Act, introduced in October 2019, is designed to promote a prompt payment and adjudication regime. While US state legislatures have not backed statutory adjudication (outside of particular industries with a historic precedent, such as regulated utilities), we expect other jurisdictions to follow the example of countries that do encourage adjudication.

So, what actions can be taken to avoid disputes?

Plan rigorously before taking action

There is an irony that planning is not seen as 'action'. Many of the problems that bedevil the successful delivery of projects can be laid at the door of undue haste in starting work without adequate initial planning. Promoters want to hit the ground running, the design phase is squeezed, and the pace of build outstrips the available resources, relative completeness of design, project controls and management.

Fasttrack construction and projects requiring the incorporation of new technologies mean that scope cannot be fixed early until these elements and their interfaces are finally confirmed. Therefore, designs cannot be frozen early in the project, giving rise to extensions of time and increases in costs, as changes are made.

Expert advice to slow down a project to help identify and resolve issues early tends to fall on deaf ears. Employers and contractors alike need to recognise that every project has its own specific requirements and risks, with a unique combination of financing, designs, workforce, and ground conditions. Projects are more likely to be completed on time and at less cost if efforts are made to:

- Progress Requests for Proposals (RFPs) only when design is as advanced as practicable, so that the associated schedule and cost can be relied upon.
- Structure RFPs so as to weight factors such as experience and expertise, quality and price in a more balanced way, and thus, gauge the true value bidders provide.
- Allocate adequate design resources and set realistic timelines for design deliverables.
- Ensure all relevant stakeholders are involved in a design review process that incorporates the appropriate level of quality assurance.
- Develop and implement a project execution plan with buy-in from the client, as well as the supply chain.
- Apportion risks and opportunities to the party best placed to own, manage and mitigate them, using an appropriately managed risk register.
- Promote transparency among all parties, and promptly address and communicate issues as they arise.

Capture the good, as well as the bad, learning points

The paradox is that lessons from good projects are rarely captured, but need to be, while many of those learned from bad projects are buried and forgotten after the saga of argument and litigation.

Apart from the pitfalls of incomplete design, and its impacts on scope and scheduling, other causes of failing projects – along with actionable measures to address them – emerge from the CRUX analysis:

- **Workmanship deficiencies –** The calibre of skilled construction workforces has been further reduced by the impacts of COVID-related cutbacks, and these skills will be harder to replace. Where budgets cannot stretch to formal training, mentoring schemes must be used to train new or inexperienced staff to improve quality and support productivity. Funds can then be focused on paying market pay rates to attract and retain the most essential workers in areas of high demand.
- **Management of third parties –** A significant factor in delivering projects on time and to budget, especially with multiple parties, is the well-structured management and coordination of parties across the supply chain. Regular and timely communication to articulate design requirements that are built into detailed plans is critical, and ensures all parties understand the contractual duties they must deliver. Supporting this, risk and reward must be allocated across the supply chain, commensurate with responsibility.
- **Physical conditions –** While most building projects have a well-defined area whose ground conditions can be tested, linear infrastructure projects are especially vulnerable to unforeseen ground conditions and disruption associated with rights of way, access limitations and environmental permitting. Again, there is scope for contract terms to reflect these risks and allow for appropriate remedies.

The dynamic nature of this region's market, coupled with an uncertain economic outlook as the global pandemic shows no signs of abating, makes for an increasingly tough operating environment. However, the diversity of working practices and high calibre of industry professionals at work across the Americas present an opportunity for sharing best practices between jurisdictions and market sectors. If successful project outcomes are to be achieved in the face of this adversity, more concerted engagement and action on these practical lessons are required of employers, contractors and the supply chain.

KNOWING THE LAND, AND THE LAW

While Canada and the United States are often viewed externally as homogenous markets; in reality, they are quite different in terms of political, social and environmental influences. These, in turn, have an impact on causation factors and project approach.

Within Canada for example, the lowest 2019 temperature recorded in Vancouver, British Columbia, was -7.8˚C, compared with -52˚C in Winnipeg, Manitoba. Apart from such extreme variations in temperature, seismic activity is a significant factor on the west coast, as is the risk of tsunamis. Intimate knowledge of local design standards and building codes is required to construct projects safely and successfully.

Similarly, jurisdictions have differing legislative procedures. As already noted, Ontario has recently legislated in favour of adjudication, while other provinces have yet to follow. Remedies for contract disputes vary across the country, the USA and Latin America.

The location-specific knowledge required to pursue work in pastures new extends, therefore, to both geography and the law. Contractors considering such a strategy would be well advised to consider acquiring or partnering with a local company with an experienced and knowledgeable workforce.

As the table below shows, the top causes of claims and disputes vary within regions and countries. This variance can be attributed to many factors beyond geography including differences in types of project surveyed and methods of project delivery.

Regional variation: Top causes of claims and disputes in four states/provinces

California (USA)	New York (USA)	Texas (USA)	Ontario (Canada)
Workmanship deficiencies	Physical conditions were unforeseen	Design information was issued late	Access to site/workface was restricted and/or late
Contract management and/or administration failure	Design was incorrect	Workmanship deficiencies	Physical conditions were unforeseen
Poor management of sub-contractor/supplier and/or their interfaces	Change in scope	Poor management of sub-contractor/supplier and/or their interfaces	Personality and/or cultural differences
Change in scope	Design was incomplete	Installation failure	Contract management and/or administration failure
Level of skill and/or experience	Design information was issued late	Operational performance	Change in scope

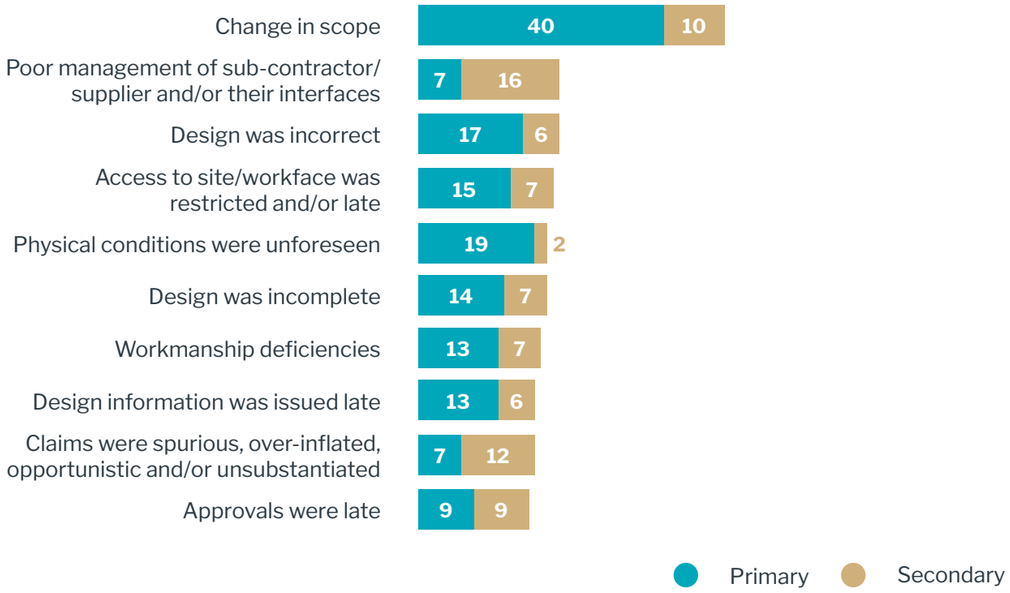
ASIA PACIFIC

Economic overview

In recent years the construction, engineering and infrastructure sectors have been an engine for economic growth across Asia Pacific. Growing urbanisation has driven demand for major infrastructure, increasingly complex multi-use buildings, power and utilities projects and, notably, Liquid Natural Gas plants.

However, as in other regions, the sustained boom has now been arrested by the COVID-19 pandemic. As a result, South East Asia's developing economies are set to contract for the first time in nearly six decades. Although growth is forecast to rebound in 2021, this will still leave GDP substantially below previous expectations. Notwithstanding the loosening of monetary policies, together with government pledges to stimulate slowing economies with further heavy investment in infrastructure, contractors across the region are braced for a squeeze on the availability of funding for projects. Where there is a resurgence of the coronavirus, delays to planned start dates or cancellations are likely. These are almost inevitable in the commercial office and housing sectors, which are facing a sharp drop in demand. For those projects that do progress, the impacts of ever-increasing competition and tighter margins will be felt throughout project execution by contractors trying to deliver on time, and to plan, while still trying to make a return.

Causes of claims and disputes for project data collected in 2020



Claims and disputes

In total, 208 projects across the Asia Pacific region were analysed for CRUX 2020. The data – gathered between 2018 and 2020 (see data, page 9) – covers more than 20 countries. Our analysis reveals that the average value claimed per project was US$95.0 million, while the CAPEX value for these major projects averaged US$4.89 billion.

Across the region, scope change is still the perennial driver of disputes on such large projects and will remain the dominant source of discord and claims between parties. However, compared with previous CRUX Insight reports, poor management of sub-contractors and suppliers, followed by design-related issues, are much higher in the 2020 hierarchy of causation factors (see chart on opposite page).

As contractors take on increasingly challenging projects, design and construction complexities increase, requiring more specialists at various levels within the supply chain. However, to remain competitive, bidders often discount prices, and cost reductions pass down the supply chain. As a result, contractors/suppliers and other downstream players may not be able to deliver to the standards expected in the contract.

Additionally, these factors introduce design and co-ordination problems. Design issues not resolved early enough in a project's development – often as a result of poor engagement or mismanagement of contractors and suppliers – inevitably store up problems downstream, and manifest in overrunning costs and schedules.

> Design issues not resolved early enough in a project's development inevitably manifest in overrunning costs and schedules.

The fallout from the coronavirus pandemic will distort the current pattern of claims and disputes. Lockdowns, restricted working, limitations on access to site, lower productivity, and delayed deliveries of materials are propelling a wave of claims for extension of time. The tougher financial climate is also likely to exacerbate the underlying causes of what are now the most frequently recurring disputes, as constrained resources and higher complexity collide.

Pathways to resolving disputes

Complementing our investigation of the key causes of claims and disputes, the CRUX 2020 dataset for Asia Pacific affords new insights into how disputes are being resolved. It shows a growing preference for alternatives to arbitration and litigation as a means of resolving disputes in the region, such as negotiation and mediation.

208
projects

23
countries

$4.8bn
average project CAPEX USD

50.5%
average cost claimed

88.5%
average EOT claimed

Dispute resolution method	% Total Data collected in 2018 & 19	% Total Data collected in 2020
Negotiation	18%	22%
Mediation	3%	9%
Adjudication	5%	17%
Arbitration	35%	31%
Litigation	11%	7%

In Malaysia's price-conscious, highly competitive market, for example, contentious and drawn out proceedings tend to be seen as commercially unviable. Also, in a relatively small territory, parties are keen to keep business relationships cordial and avoid a reputation for being litigious. Hence, a negotiated or mediated route can offer a more acceptable means of resolving disputes.

Adjudication is well established in both Malaysia and Australia. Notwithstanding this, each Australian state has its own supportive legislative framework, with specific requirements to be understood.

Elsewhere, Engineering, Procurement & Construction (EPC) contracts in South-East Asia commonly provide for Dispute Avoidance Boards. Using a neutral party (as under the FIDIC and NEC forms of contract) helps identify and resolve potential problems before they escalate.

In the wider Asia Pacific region, we foresee a continuing rise in the number of disputes following these faster and more cost-effective Alternative Dispute Resolution routes as they gain wider acceptance across the industry. The need to protect project costs and contractor margins in the wake of the pandemic will reinforce this trend.

So, what actions can be taken to avoid disputes?

Decode complexity

Growing urbanisation and changes in market demand have caused a pronounced shift towards more complex projects, such as power and utility projects and multi-use buildings.

While contractors need to bring a wider and deeper multi-disciplinary input to these projects, they are also under pressure to deliver within ever-tighter budgets and timescales. This inherent contradiction leads to delays, cost overruns and changes in scope that culminate in claims and disputes.

Management of sub-contractors, suppliers and their interfaces has not kept pace with rising project complexity. Greater specialisation, more providers, and extended supply chains mean more interfaces have to be managed. Clear co-ordination of contracts and of commercial and technical teams is more essential than ever, so that changes and variations in design and scope are managed effectively. Failures in this area also increase the potential for design inaccuracies and parties not fulfilling all their contractual responsibilities.

There has also been a lack of investment in supply chain management processes, especially by less profitable contractors. As main contractors push risk down the chain, and sub-contractors seek to defend their interests and do not collaborate with each other, aggravating frictions at interfaces.

Tier-one contractors can make projects run more smoothly by making better use of the expertise vested in the supply chain.

Tier-one contractors can make projects run more smoothly and improve their margins by unifying these fragmented interests and making better use of the expertise vested in the supply chain. There is scope for them to:

- Draw up a Project Execution Plan at project inception, with input from all supply chain members and buy-in from the employer.
- Set core design parameters and delegate decision-making to speed up approvals.
- Enhance understanding of process management and the allocation of risk by:
  - Conducting multi-disciplinary workshops to manage design variations, and so avoid conflicting decisions and design clashes.
  - Establishing a clear controls structure with a single point of contact, such as a coordination manager, who can liaise with the various teams – contracts, commercial, engineering, site, cost, and legal – before setting a strategy, so as to avoid disputes.
  - Implementing change management process tools that draw upon information from key personnel and a common document management system, to resolve changes in a timely and efficient way.
- Use a common standard and format for reports for use by all.
- Share a single project reporting dashboard, used by all, so that there is 'a single version of the truth' of performance against all agreed measures.

Learning the lessons

The public sector's desire to get projects into the construction phase rapidly could store up problems in the form of under-developed designs and unforeseen conditions. Both factors are already high in the CRUX 2020 ranking for the region.

In both Asia Pacific and Australia, in particular, there is the further danger of a return to unsustainable tender fees, undervaluing the true cost of risks, and attendant practices that will lead to claims. The unbalanced allocation of risks on publicly funded projects could overwhelm contractors, themselves already weakened by the sector's low profitability.

A change of culture is required:

- Both private and public sector clients need to set aside their assumptions that, in a downturn, projects can be delivered cheaper.
- Contractors must use the tender query process to inject more realism, educating and engaging with employers, who need to be receptive to alternative approaches.
- Risks must be allocated and managed appropriately to avoid putting the viability of both bidders and projects in jeopardy.
- At an industry or state level, the regional associations of major contractors need to work more closely with government departments acting as employer to encourage greater engagement with the supply chain. By working in unison, public and private representatives can set the bar for quality standards, realistic costings and a more equitable approach to risk sharing on major projects.

CRUX Insight 2020's findings and first-hand observations from HKA's team members of these recurring disputes point to other actionable measures.

Contract management

Failures in managing and administering contracts no longer rank in the top 10. This reflects how contractors, not least in South Korea, have reinforced their contract management capacity and capability in recent years. We have also witnessed a recent trend in Malaysia for employers to require proof from contractors of competent contract management prior to contract award.

In Australia, public sector agencies responsible for major infrastructure have invested in training for their contract management teams. Some have also implemented organisational change programmes, improving governance and control systems.

Shortages of skills and competencies

To counter the rise in deficient workmanship in Asia, contractors (and employers opting for low-priced bids) must learn the lesson that cheap labour is a false economy that, more often than not, will result in the need for rectification work or claims for latent defects that emerge after apparent completion.

Problems related to low-skilled workforces will be compounded by the requirement for higher-grade construction. Incorporating more complex technology, these designs require input from highly skilled technicians who may be in short supply. Indeed, we have often seen contractors profess, at project inception, to have a workforce capable of integrating such technology, whereas their teams have to learn how on-the-job.

Although margins are tight – and are increasing pressure on training and staff development budgets – contractors and employers across Asia Pacific stand to benefit by adopting the Australian practice of 'buddying' among staff. Sharing the knowledge and experience of senior team members can reduce the risk in delivering projects to increasingly complex contractual obligations. Succession planning benefits also accrue as the skills of more junior staff are enhanced.

Elsewhere, such as in Australia, skills shortages will stem mainly from the loss of talent imported to manage its construction boom. Amid the downturn, it is anticipated that proficient designers and construction professionals may return to America and Europe. To counter this, the country should invest in developing more home-grown engineers, or future projects will continue to be troubled by design issues.

> Successful project management must incorporate planning.

Planning

Too often, especially on EPC contracts, we see deficient project management giving rise to disputes. One specific ingredient from across the array of disciplines that successful project management must incorporate is planning. In many instances, we witness baseline programmes that are not well defined or sufficiently detailed. Developing a project schedule earlier with input from all relevant supply chain members, together with subsequent adherence to the schedule by all parties, will pre-empt late approvals and help managers anticipate other sources of dispute.

Opportunistic claims

Our teams anticipate a rise in global claims and opportunism as programme slippage and other problems are incorrectly wrapped up with COVID-related issues. Objective, contemporaneous data is necessary to substantiate specific claims. Accurate records of site activity will be essential to justify slower progress and additional costs. They are also critical to demonstrate the causal link between the risk event and resultant delays and additional costs and/or loss. For example, site access could have stricter controls, following the lead of highly regulated sectors such as oil and gas.

Despite the seemingly irreconcilable pressures of increased project complexity, tighter timescales and lower budgets, there is latitude for improvement in the region. This requires recognition by all stakeholders that the long road may in fact be the short road; that a shift toward a more collaborative culture will yield benefits for all parties; and that developing increased skills will be essential to the sustainability of project delivery across the longer term.

EARLY ENGAGEMENT

Intervening early to manage problems as and when they emerge on a project can reduce costs in the long run – as a Korean engineering contractor showed.

An oil plant development project in South-East Asia involved increasing oil production capacity by 50%. Only about 10% of the work had been carried out when the EPC contractor commissioned an audit of the project's contract and commercial processes and procedures.

This early engagement allowed a raft of new procedures to be put in place to enable contemporaneous recording of information, precise scheduling, and a more robust basis for managing differences/disputes. A significant commercial settlement was achieved, underlining the benefits of early engagement.

Such a rapid intervention was decisive to the outcome, but is relatively rare in the region, and elsewhere. Experience in oil and gas and other sectors shows time and again the effects of delays in investigating and settling claims.

Getting to the root cause promptly and taking corrective action avoids cost escalation. It also limits the unnecessary drain on goodwill and management time, and the extent of forensic work required to get to the bottom of a long-festering claim or dispute.

Intervening early to manage problems as and when they emerge on a project can reduce costs in the long run – as a Korean engineering contractor showed.

EUROPE

Economic overview

The grave impact of COVID-19 on European markets is continuing through 2020 as both public and private sectors strive to re-boot economic activity amid attempts to suppress the resurgent pandemic continue.

As 2021 approaches, the risk of ongoing disruption compounds the uncertainties already facing the engineering, infrastructure, and construction sectors. On the one hand, the substantial drop in oil prices reduces construction costs, providing a badly needed boost to projects (with the clear exception of projects for production and/or processing of oil-related products). Oil price reductions also fuel the transition from traditional generation to renewables, as seen in moves being made by oil majors to enter that market.

On the other hand, as a continent with scarce natural resources, Europe is exposed to restrictions on the movement of goods and escalation in the cost of imports. The impacts of a potential no-deal Brexit, global rebalancing driven by UN policy to prioritise developing countries, and US-China trade tensions are as yet unknown. In addition, CAPEX investments, previously earmarked for technology, innovation and employee training that would make contractors more efficient, may instead be diverted towards making workplaces safe and worker welfare. While governments are committed to investment in construction and infrastructure as a stimulus in the face of recession, this economic backdrop will test the resilience of the industry and its capability to deliver, and also shift the pattern of claims and disputes.

Causes of claims and disputes for project data collected in 2020

Claims and disputes

Our latest CRUX analysis of Europe examines the commercial performance of 254 projects with an average CAPEX value of US$517.9 million from across 22 European countries. Over the period 2018 to 2020, the projects had an average claimed dispute value of US$38.5 million (see data, page 10).

Design problems, poor management of sub-contractors and suppliers, and deficiencies in workmanship have risen up the causation ranking. Along with change in scope, these are the dominant causes in the data collected for our latest analysis (see chart opposite).

Our experience suggests an interesting linkage. Design problems often arise from a failure to coordinate different design disciplines, sub-contractors, and suppliers, rather than from poor component design. The prominence of these causal factors may also be related to a change in procurement models – i.e. from discrete package contracts to Engineering, Procurement, and Construction (EPC) arrangements. As more employers shift to EPC-type contracts, their contractors may not be fully resourced for this work or appreciate the level of coordination required. Gaps between digital design technology capabilities and the practicalities of physical construction cause further co-ordination issues. Poorly co-ordinated work conducted under tight time pressures is a recipe for poor workmanship.

In an ultra-competitive market, contractors face a daunting, additional challenge. While they must secure revenue, this cannot be done by chasing prices to the bottom to win projects. This will serve to erode what are often already dangerously thin profit margins. Their ability to deliver projects on time and budget will be further weakened by the increased costs and logistics of implementing health and safety measures related to COVID-19, which may in turn limit investment in improving essential workforce skills.

Pathways to resolving disputes

As well as examining the key causes of claims and disputes, the CRUX database captures the main routes taken to resolve disputes. Our latest data indicates a move within the industry away from arbitration to other pathways, as well as an increase in litigation. Adjudication (in the UK and Ireland) and negotiation are becoming more common, and mediation is also spreading from a low base.

We expect these trends to continue as:

- Recognition grows that arbitration and litigation are not best suited to many engineering and construction disputes.
- Wider use of collaborative forms of contract (such as NEC) gradually encourages a shift away from the more adversarial options for dispute resolution.

254
projects

22
countries

$517.9mn
average project CAPEX USD

84.3%
average cost claimed

57.8%
average EOT claimed

- Less expensive and faster alternatives become more attractive to all parties, especially amid rising financial pressures.
- Specialist claims consultants are enlisted under strategic framework agreements to provide facilitation and mediation between parties unable to negotiate a resolution.
- Conflict avoidance panels and Dispute Avoidance Boards are adopted to pre-empt disputes, drawing on industry good practice.

Dispute resolution method	% Total Data collected in 2018 & 19	% Total Data collected in 2020
Negotiation	15%	24%
Mediation	2%	4%
Adjudication	10%	22%
Arbitration	23%	13%
Litigation	11%	21%

So, what actions can be taken to avoid disputes?

Tackle design issues

Incorrect design, and also incomplete design, have risen up the CRUX ranking of dispute causes in the 2020 analysis. Rather than negligence, incorrect design often arises from failures in coordinating the design of a project's different components. Our experience suggests that this could be rooted in ever-tightening commercial agreements, which have a negative impact on expected ways of working. Although reducing planning and managerial roles saves on up-front costs, the lack of early coordination can have knock-on effects, creating larger challenges, and costs, at the point of delivery. On EPC-type projects, contractors working to fixed fees look at all areas to reduce their base cost – possibly to the detriment of wider project delivery. One solution would be to ensure that sufficient funds are allocated for the proper management and coordination of complex projects.

Co-ordination aside, pressures on time and resources in the face of rising project complexity invariably result in more designs that are incomplete. The truism that a rushed design is seldom a good design applies. Given that design represents only a small fraction of overall project cost, scrimping time on design is a manifestly false economy. Design consultants on lump-sum contracts leaving details to be resolved by contractors on site are, after all, merely pushing the problem further along the construction life cycle. Gaining an early understanding of desired project outcomes and design requirements is far more likely to reduce subsequent construction costs.

In some situations, however, detailed design requirements are rightly left to the fabricators/manufacturers to finalise; for example, because fabricators are familiar with the constraints of the fabrication process, whereas a general design consultant would not be.

Design accuracy requires all parties – including specialist suppliers as well as consultants – to be proactive. However, employers can lead the concerted action to pre-empt design and other problems through Early Contractor Involvement (ECI). All parties stand to benefit.

The supply chain can:

- Better understand the outcomes required.
- Clarify the design requirements and maturity of the design.
- Engage in preliminary design activity prior to contract award for detailed design.
- Understand their risks and likely costs, so that they can be built into prices, with the knowledge of the employer.

The employer can:

- Actively involve the contractor in the preliminary design.
- Better understand the supply chain's capacity and capabilities.
- Recognise the levels of design and contract management capability.
- Gain a balanced perspective to award contracts based on best value and supply chain capability, rather than price alone.

Other factors, which have arisen from the pandemic, need to be addressed:

- Working practices have in many instances curtailed the colocation of designers from different project partners. As designers work digitally from separate locations, it will become even more important for project directors to set up and run regular multi-disciplinary design reviews.
- Employers and their consultants have been given time to pause and reflect. This could lead to new interpretations of scope and specification with time and cost implications for the project, which need to be recognised.

Spend to save

While poor management of sub-contractors remains a major cause of claims and disputes, some companies are moving to address this. We have noted growing sophistication, and investment, in construction management departments, especially among international contractors. This may be in response to prescriptive contracts, such as FIDIC, and should result in reduced rework and greater adherence to project schedules.

The lesson is that spending in certain key areas can avoid or mitigate the problems that give rise to disputes and save money over the life of a project. To drive continual improvement, this needs to be applied in other areas:

- Deficiencies in workmanship have risen in importance as a cause of disputes, which correlates with an observed reduction in funding for training. This trend is likely to continue as contractors retrench, which may lead to more defects and rework. In our experience, where budgets do not allow formal training, 'buddy' systems can help share knowledge and expertise, while also supporting morale. Government grants or contributions may also be available to offset some of the costs of training.
- Spurious claims are a less prominent causation factor in the latest analysis, but we are already seeing an upsurge as contractors strive to recoup losses predominantly related to COVID-19. This may be exacerbated by increased project complexity, which raises the risk of misinterpretation of contractual requirements among many parties. Ensuring that all team members understand their contractual responsibilities, while also putting systems in place to particularise claims, will manage this risk.

Challenging times lie directly ahead. But rather than retrench to siloed positions, now more than ever is the time for all stakeholders across the supply chain to collaborate, share knowledge, and set a new standard in effective project delivery. The means is there, but all parts of the supply chain must be willing and proactive.

COVID & BIM: A NEW CATALYST FOR CONSTRUCTION DIGITALISATION

Previous CRUX reports described hopes that digitalisation in the construction industry would facilitate better information management and higher productivity.

When implemented appropriately, Building Information Modelling (BIM) and the culture of collaboration that BIM promotes can help reduce the occurrence of disputes. The global pandemic has clearly had many negative impacts; however, it can perhaps be credited with accelerating the digitalisation of construction workflows, thereby increasing productivity.

COVID-19 has prevented many industry professionals from being able to travel or attend face-to-face meetings. This has forced designers and stakeholders within the construction industry to increase digital ways of working to continue to meet rising demands. It is hoped that this new way of working will encourage a "digital by default approach" in the future.

Although BIM adoption in Europe has increased by 19% since 2016[1], using BIM does not necessarily lead to a project evading design-related disputes. This is demonstrated in the causes of claims and disputes of European projects using BIM (opposite).

Under the latest standard, ISO 19650, BIM is defined as "the use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions"[2]. While a building information model can act as a digital rehearsal for a project, a building information model cannot intrinsically identify whether it has been produced with reasonable skill and care, or that the design is fit for purpose.

Top causes of claims and disputes of European projects using BIM:

1. Design was incorrect.
2. Poor management of sub-contractor/supplier and/or their interfaces.
3. Change in scope.
4. Design was incomplete.
5. Design information was issued late.

In the European claims analysed where BIM was used, it is notable that BIM processes themselves are not a root cause of any disputes; they are merely the medium through which recurrent issues are witnessed.

Since the release of the 2019 CRUX report, a new international standard has been published for BIM: ISO 19650 will supersede BS 1192. Industry professionals hope that the adoption of the ISO 19650 standard will improve contract drafting by removing legally ambiguous terminology in contracts, such as the phrase "BIM Level 2". This in turn will help to reduce claims and disputes relating to contract interpretation issues, a persistent challenge affecting projects across Europe.

By using BIM intelligently and enhancing digital capabilities, the construction and engineering industry in Europe can take advantage of the opportunity presented by COVID-19 and help to reduce claims and mitigate the severity of disputes.

1 NBS 10th Annual BIM Report 2020

2 The Institution of Structural Engineers BIM guidance part 1: Introduction to BIM

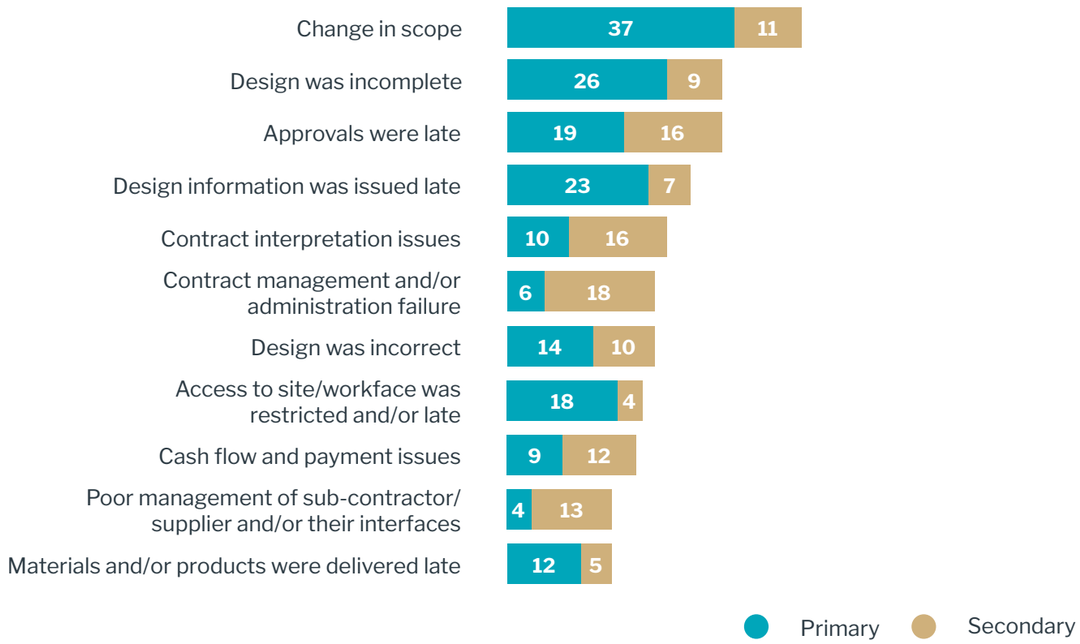
MIDDLE EAST & AFRICA

Economic overview

For economies across the Middle East & Africa, the COVID-19 pandemic could hardly have struck at a more difficult time. With oil prices at rock bottom levels, players in the region's dominant sector are already seeking to diversify away from their historic dependence on oil-generated revenue. To achieve this, significant commitments in research time and CAPEX are essential as nation states build more mixed and sustainable economies. In a further wave of change, COVID-19 has triggered the consolidation of government agencies as well as several large developers and banks based in the Middle East. Building demand, residential as well as commercial, will drop following the departure of many ex-patriates, despite significant investment aimed at encouraging tourism and long-term residency in an effort to shore up economies in the region.

Meanwhile in Africa, Morocco has seen a downward trend in economic performance over the last two years, worsened by the impacts of COVID-19. For Libya, oil blockades have had a significant impact on the supply side of the economy. Algeria, though one of a handful of countries to have reduced poverty by 20% in the past two decades, faces a slowdown in consumption and investment, while falling oil prices cut into fiscal and export revenues, and COVID-19 continues to impact the country.

Causes of claims and disputes for project data collected in 2020



For South Africa, still an economic powerhouse of the continent, the pandemic has hit the construction sector particularly hard. The presence of international competitors continues to depress domestic contractors' margins, prompting an increased emphasis on claims. Lack of work following an extended economic downturn will further increase competition and reduce profit margins. Contractual disputes are likely to rise as contractors' operating environment becomes more challenging.

Post COVID, the South African economy is unlikely to emerge from recession for some time. Exacerbated by the pandemic, its root causes are to be found in a multitude of factors such as power shortages, high unemployment, a downturn in manufacturing and mining, expensive public bailouts, and widespread corruption.

Claims and disputes

More than 310 projects across the Middle East & Africa have been analysed for CRUX 2020. The research – covering the period from 2018 to 2020 – analysed 313 projects from 26 countries within the region, with an average CAPEX value of US$1.8 billion and an average claimed dispute value of US$122.0 million (see data, page 10).

In line with previous years, change in scope dominates our updated ranking of causes behind these claims and disputes, with late approvals emerging as the next most significant factor in 2020 (see chart on opposite page).

In African countries including Algeria, Libya, Morocco, and Nigeria, contract interpretation, management of sub-contractors, access to site, and cashflow continue to blight project performance, giving rise to claims.

As in other geographies, design-related problems also loom larger than before, namely – incomplete design, late provision of design information, and also design errors. This is suggestive of poor coordination of designs produced to tightening timescales. The late provision and poor coordination of design information may also be a factor in pushing late approvals towards the top of the CRUX table of causes of claims and disputes.

The interpretation and management of contracts – though ranked slightly lower in the analysis of data collected in 2020 compared with previous years – remain among the top six factors. While we have observed some improvement in skills and the adoption of better practice, parties in many territories are still hampered by their incomplete knowledge of contract forms.

COVID-related disruption is already generating claims, with many more expected to follow. However, the main drivers of disputes are deep-seated and will persist if not addressed by employers and contractors – especially, as market dynamics test their ability to keep pace with change.

313
projects

26
countries

$1.8bn
average project CAPEX USD

60.6%
average cost claimed

80.0%
average EOT claimed

Pathways to resolving disputes

As in other regions, the pathways that employers and contractors choose to reach a resolution in their disputes may be shifting, as shown below.

Dispute resolution method	% Total Data collected in 2018 & 19	% Total Data collected in 2020
Negotiation	29%	43%
Mediation	1%	0%
Adjudication	1%	2%
Arbitration	29%	33%
Litigation	9%	9%

Tighter cashflows in the wake of COVID-19 and weakening construction markets mean the number of negotiated settlements can be expected to continue rising. Contractors are likely to prioritise early payment while avoiding local courts that are unsuited to determining complex engineering and construction issues.

In Africa, negotiations tend to focus on productivity and expediting progress as owners are willing to pay a premium to achieve completion. However, some decision-makers do not understand best practice and the savings that can be achieved through robust claims determination. Unless clients appreciate that well-structured claims can produce a better financial outcome, without compromising project progress, rough and ready settlements are likely to remain popular.

Although some Middle East countries still require that state companies ultimately resolve disputes in local courts, arbitration is well established across the region. The recent successes of state governments in a series of significant disputes will encourage even wider use of arbitration. Some quasi-government agencies in the region are adopting dispute resolution boards, but the potential benefits of this less adversarial approach do not become clear when the process is run more like an arbitration.

So, what actions can be taken to avoid disputes?

Act proactively as markets transition

The Middle East and Africa differ greatly in the relative maturity of their construction markets, and especially, claims processes. While the contributing factors to disputes vary, projects in both regions are beset by late approvals, design failures borne of unrealistic timescales, and inadequate management of contracts and third parties. For each there are practical actions that can be taken.

Late approvals

Previous falls in the oil price have led to a wave of late approvals in the Middle East as oil and gas companies paused to reappraise the viability of projects. More widely, demand for the latest technologies and sustainable materials has introduced a lag as employers' engineers and regulatory authorities assess their compliance. Integration of emerging technologies with existing plant on brownfield projects is another complication.

Elsewhere, late approvals in Africa tend to stem from a mismatch, especially in the case of larger client organisations, between their bureaucratic internal controls and the expedited approval matrices set out in contracts. This results in a large backlog, overwhelming administrators who lack the capacity to process requests. Another stumbling block on long-term projects arises when the original designers are no longer retained, and knowledge is not imparted before their departure.

Fewer late approvals will occur if:

- Decision-making processes within employer organisations are simplified to expedite approvals.
- Parameters for approvals are shared with parties closely engaged with design, resulting in more local decision-making, and escalation by exception rather than as a rule.
- Contractors are proactive in seeking approvals as early as possible.
- Experienced staff supervise the process, ensuring submissions are complete.
- Defined review points are fixed to avoid arguments over 'reasonable' timelines.
- Contracts incentivise engineers to process submissions promptly and deter non-essential requests for additional information.
- The capacity, skills and capabilities of admin and technical staff are increased.
- Knowledge is passed from one design party to the next, so that the design adopted can be developed, rather than restarted, which inevitably slows up approvals.

Incomplete design

The design failures driving more disputes across the region stem, in large part, from unrealistic timetabling of projects tendered on immature designs.

In the Middle East, competition drives prices down as contractors offer value-engineered solutions that they cannot mature due to extremely tight programmes. As employers set the timescale, and the open tender price is initially decisive, contractors seek additional fees and time through variations orders.

Employers also seek the lowest design price, so consultants operating on slim margins push design detail and associated risk down the chain to contractors. Claims are effectively embedded in contracts at the point of signature when design is incomplete.

Yet design represents a small proportion of the overall capital cost of increasingly large and complex projects. Both the employer and contractor would gain from delivering projects on time, to specification and budget, if:

- More time were undertaken to mature design earlier, alongside more detailed early project planning.
- Greater emphasis could be placed on engaging supply chain stakeholders earlier, pre-empting latent design issues.
- Design risk was apportioned to the party best equipped to address it.

While these changes may slow the design process, the overall project schedule should not be adversely affected if construction proceeds in a more efficient and effective manner. They would also result in greater price and schedule certainty, fewer defects and less rework, and a more acceptable risk profile.

Contract management and management of third parties

Our experience is that forms of contract and the roles and responsibilities of the parties are routinely misunderstood in the Middle East. Both EPC (Engineering, Procurement & Construction) and design & build contracts can be run by employers and engineers as if traditional construction-only agreements. Contractors moving into new industries, such as power and renewables, face a steep learning curve, not least in design and partnering with specialists for EPC projects.

Claims are becoming increasingly sophisticated in the Middle East, with the exception of those prepared in-house by contractors. South Africa, however, is a decade behind developed markets. This immaturity is seen also in the administration of internationally established contract forms such as NEC and FIDIC.

There is a need for:

- Formal training in a wider breadth of contract forms.
- Enhanced communication between parties so that delivery timescales and contractual commitments are understood by all stakeholders.
- Clarity over roles, responsibility, and ownership of risk.
- Knowledge transfer from senior team members to those growing through their career as part of succession planning.
- 'Buddying' systems akin to those adopted in Australia, so that lessons learned can be applied in the future.

Risk imbalance

As with project timetabling, risk allocation is unrealistic, and the imbalance has increased over the last 12 months. This time and risk combination is unhealthy, triggering a rash of claims symptomatic of troubled projects. Employers and their lawyers seeking to unload maximum risk should adopt a more commercial, less legalistic mindset. Contractors must deepen their understanding of contract terms and their implications.

> Contractors must deepen their understanding of contract terms and their implications.

Employers need to:

- Give contractors, who are better placed to manage time-related risks, a greater say on timescales.
- Resist the temptation to allocate COVID-related risks (as mooted for oil and gas contracts) to contractors, and explore pragmatic joint measures instead.
- Consider open-book contracts, especially for infrastructure projects where ground conditions pose unforeseeable risks.

Contractors need to:

- Appreciate, as design & build specialists, the full risks they assume when moving to EPC contracts.
- Resist pressure to assume the risk of interface delays with other EPC contractors.
- Match the employer team's sophisticated delay and quantum analytical capabilities to maximise cost recovery.

While the levels of maturity and types of activity differ widely in the Middle East and African markets, there are clear and common lessons that can, and need to be learned to ensure progress is made during the next 12 months and beyond.

WATCHDOG KEEPS WORK ON TRACK

In South Africa, a sizeable employer was faced with a significant unparticularised claim from one of its 'project critical' contractors.

To resolve the issue a joint expert process was agreed between the parties. This also involved building the claim openly in view of a standing Dispute Adjudication Board (DAB) through regular updates and feedback sessions. Instead of formally determining the matter, the DAB:

- Had a watching brief over each party's experts.
- Provided feedback and raised concerns about the parties' approach and general progress at monthly meetings.
- Could, if needed, be approached to provide limited decisions on narrow issues in dispute.

For the employer, the DAB offered an incentive to the contractor to maintain construction progress while avoiding the need to negotiate around an unparticularised claim. Whereas the contractor lacked the in-house expertise to develop a robust claim to recoup its costs, the DAB process compelled the contractor to seek external expert representation while continuing to work on site.

Having a DAB proved a useful watchdog as, without a formal dispute, it was difficult to hold the contractor to a strict timetable, production of contemporaneous documents or general claims assessment best practice.

TASKFORCE SUPPORTS DISPUTE RESOLUTION

In the Middle East, a government-owned body was undertaking several complex integrated projects using multiple consortia of international contractors. The ultimate dispute resolution mechanism provided for reference to the local courts.

However, in drafting the EPC contracts, a dispute mechanism was added to allow the parties to argue their claims and disputes before Dispute Resolution Boards (DRBs) prior to resorting to litigation. The primary benefit to the parties was that the DRBs comprised technical specialists appointed by an international dispute resolution body to hear the disputes.

A taskforce was assembled to help the owner manage the contractors' claims and disputes. It was made up of an international law firm and HKA as claims consultant, together with senior members of the owner's organisation. This team worked during the early stages of projects to review and respond to events as they arose, with the taskforce expanding and contracting to meet their specific needs.

However, the key to its effectiveness was the continuity of the core team, maintaining the consistency of approach and retaining historical project knowledge. For claims and disputes that could not be settled amicably, the taskforce was enhanced to include discipline experts (engineering, delay and quantum), local lawyers and senior counsel. This fully integrated team was able to best formulate and present the owner's case before the DRBs.

The taskforce provided the owner with greater confidence that a competent resolution would be reached either through negotiation or the contract's DRB mechanism.

CONCLUSION

The causes underlying claims and disputes on major projects are as universal as they are perennial. However, as CRUX 2020 shows, there are important variations from region to region and year to year. Our analysis and insights from specialist experts in these territories point to priorities for action that would limit if not pre-empt the impacts on project outturn costs, schedules and outcomes generally.

Here we recap those regional insights, before drawing conclusions from a global perspective and considering the implications of the unfolding pandemic for claims, disputes and the industry as a whole.

REGIONAL INSIGHTS

Americas

A smarter start

On many projects, fast-track construction causes collateral conflicts and disruption that negate any gains. As promoters push to hit the ground running, the design phase is squeezed, and the pace of build outstrips the available resources, project controls and management. Apart from design quality and completeness, workmanship and coordination of sub-contractors and suppliers also suffer.

A more realistic, risk-aware approach to achieving successful outcomes would see:

- More time invested in up-front planning, design and coordination.
- Requests for proposals based on practicable designs, reliable schedules and a review process that accounts for quality as well as price.
- Risks apportioned to the party best able to own, manage and mitigate them.

Replace skills

Layoffs in the pandemic have reduced the calibre of construction workforces, and skilled personnel will be hard to replace.

To secure future project delivery budgets must accommodate:

- Training and mentoring schemes for new and inexperienced staff to improve quality and support productivity.
- Market pay rates to attract and retain workers in areas of high demand to forestall regional skills shortages.

Asia Pacific

Decode complexity

Urbanisation is driving a shift in the market dictating demand for more complex projects, many involving power generation and utilities, and multi-use buildings. Contractors are being challenged to harness multi-disciplinary expertise while meeting tighter budgets and timescales.

To reconcile these conflicting pressures tier-one contractors must:

- Invest in supply chain management processes and systems.
- Agree baseline plans for all parties, clearly define responsibilities, and delegate where appropriate.
- Enhance workforce capability to align competence with increasingly complex design and construction.
- Set a common standard for reporting and share a joint project dashboard as ‘a single version of the truth’.

Culture change

Following its infrastructure boom, the region risks a return to unsustainable pricing and adversarial practices that will spawn more claims and disputes. The allocation of risk from the employer across the supply chain needs to be addressed, so that contractors, already weakened by the sector’s low profitability, are not overwhelmed. Also, the competence and skills of the workforce need to be enhanced. A culture change is required:

- Contractor associations and state governments can jointly set the bar for quality standards, risk sharing and realistic costings.
- Contractors should use the tender query process to inject realism and engage with and educate employers.
- Government and industry need to invest in the next generation of home-grown engineers.

Europe

Design discord

Design problems now drive more claims and disputes. These can often be traced back to failed coordination rather than poor component design or incompetent designers. Pressure on time and prices for lump-sum design commissions are compounding these issues.

Through Early Contractor Involvement (ECI), employers can lead the concerted action needed to pre-empt these problems by:

- Actively involving the contractor in the preliminary design.
- Clarifying design requirements and maturity before contract award.
- Recognising the true capabilities of the supply chain, design teams and contract management.
- Resolving buildability issues ahead of construction.

Remote working

Colocation of designers from different project partners is an important aid to coordination, especially on large or complex projects. The need for remote working post-COVID requires compensating measures:

- Continued and improved use of digital technology to document and record processes and procedures, check for mistakes, and identify errors.
- Regular multi-disciplinary design reviews by experienced specialists.

Middle East & Africa

Late approvals

Demand for new technologies and sustainable materials on projects across the Middle East is leading to more late approvals as employer engineers and regulatory authorities struggle to check compliance. Oil projects stall as owners reappraise the viability of projects. In South Africa, a lack of administrative capacity results in backlogs of contractor requests.

Late approvals could be curbed if:

- Contractors took a more proactive approach and submitted requests earlier.
- Review points were set in contracts to specify acceptable timelines.
- Client organisations simplify internal processes and train more administrative and technical staff.

Contract confusion

The region as a whole is affected by a wider and more fundamental weakness in the way contracts are administered. Further investment in training contract managers and engineers is essential to avoid a rise in claims and disputes by addressing these challenges:

- Contract roles and responsibilities are routinely misunderstood across the Middle East, so EPC and design-and-build contracts are handled as if they were more traditional construction-only agreements.
- Immaturity in preparing and administering claims leaves Africa a decade behind other more developed markets.

THE GLOBAL PERSPECTIVE

There are multiple, interlinked causes of claims and disputes, but the CRUX analysis isolates and ranks them to reveal how certain factors recur, causing highly detrimental effects for projects and industry. In summary, we draw together these strands of causation in four main themes, themselves intertwined, and also consider the forthcoming ramifications of the pandemic.

Understanding contracts and risk

Failure to read and understand what contracts actually commit the parties to do is a continuing problem. Contractors, with reason, blame overly long, prescriptive, one-sided contract documents. To attend to this, first-tier contractors need to lay greater emphasis on managing lower tiers of the supply chain, so that all parties understand and meet their contractual obligations. Equally, there is a need to align the allocation of risks with the contracting parties best placed to manage them. There is concern across all regions that parties ill-equipped to own and manage risk are carrying too great a financial burden. The unintended consequences crystallise in claims, disputes, and overrunning time and costs.

Less haste, more speed

Time is one such risk too often dictated by project promoters and competitive pressures, rather than realism. The sooner owners enjoy the revenue or use from their new asset, the stronger the business or political case for the project. But compressed timelines lead to immature designs, inappropriate procurement routes, design conflicts, and poor workmanship. If expert interventions were sought with the same enthusiasm – when fractures first surface – much of the resultant disruption, claims and cost blow-outs might be avoided. Best of all would be to invest more up front in design and planning to save time and money later.

Dovetailing designs

Design-related issues are looming larger as drivers of project failures in successive CRUX analyses. Compressing the budget and timeframe will always increase the risk that design outputs are inaccurate, incomplete or late. With rising project complexity and multiple design partners and elements to integrate – along with new materials and emerging technologies – those risks rise further. Far greater onus must be placed on synchronising the design undertaken by multiple parties and aligning it with a reliable schedule, backed up with regular multi-disciplinary reviews to ensure accuracy and coherence.

Building competence

From deficiencies in workmanship to the management and administration of contracts, the skills of people impinge on just about every other driver of disputes. Cash-strapped organisations cut back on training and development and fail to invest in ‘buddying’ schemes to share knowledge and experience between seasoned and younger staff. The extent and nature of shortages vary between regions, but a recurring concern is that highly skilled and experienced people made redundant in downturns prove difficult to replace. Corporate knowledge is not captured before they depart, as succession planning has often not been implemented. Competitive advantage is, therefore, lost.

Behaviours and mindsets must change if the contracting parties and professions are to break out of their silos and unite in the common interest of delivering the best possible project outcomes.

COVID effects

As well as a potentially deep recession in multiple territories, the fallout from coronavirus threatens to intensify the disruptive influences that already bedevil projects. From under-pricing risk to over-stating claims, from squeezing cash flow to stretching delivery delays, from slowing down productivity to accelerating infrastructure so as to jump-start economic activity, there is a danger that projects are more likely to be driven by claims and disputes.

Pending a raft of new and tighter force majeure clauses in future contracts, the scope for conflating events in opportunistic or exaggerated claims is clear.

Employers and contractors need to raise the bar in their approach to claims by:

- Ensuring systems are in place to capture contemporaneous and objective data to substantiate cause and effect.
- Improving the accuracy of site activity records to justify lower productivity and additional costs.
- Developing a better understanding of the relevant contract provisions.
- Adopting more widely the strict site access controls of regulated industries such as oil and gas.

Pathways to resolving disputes

Another by-product of the pandemic may be a greater willingness, and pressure, to pursue less adversarial routes to resolving disputes.

We expect that:

- Tighter profit margins, and the need for early settlement to allow for project continuity, will make litigation and arbitration less attractive.
- Adjudication, negotiation, mediation, and expert determinations should gain in popularity where available in existing jurisdictions, and may be adopted in other countries, though this will require a sea change in thinking.

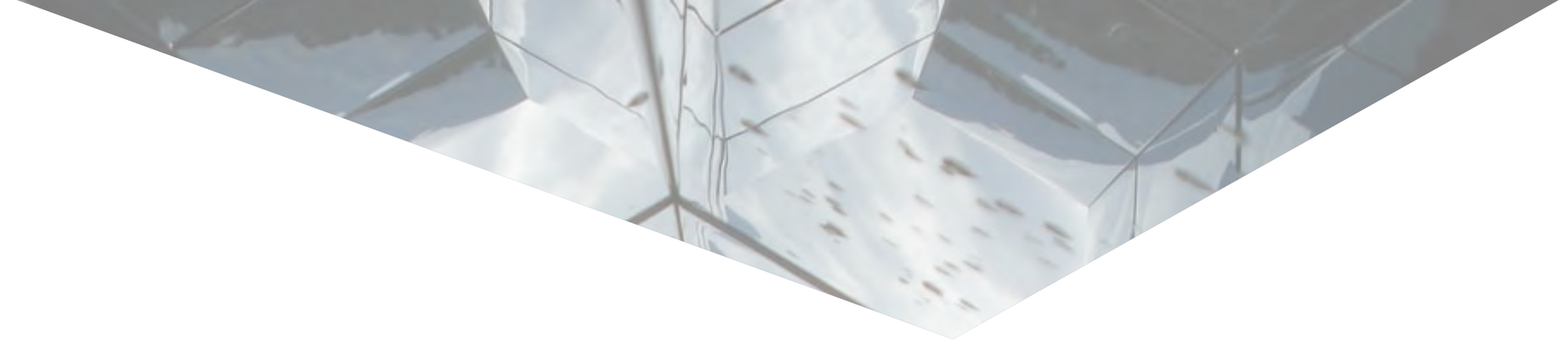
We foresee a continuing rise in the number of disputes following these faster and more cost-effective Alternative Dispute Resolution methods.

Re-set to build back better

If sustained, this trend towards less adversarial methods of resolving disputes would be a benign side-effect of a global phenomenon wreaking havoc across economies. It need not be the only positive by-product of the pandemic.

The World Economic Forum and some national governments envisage an economic recovery that ‘builds back better’ – with greener and sustainable development. There is an equivalent opportunity for a re-set in the global engineering and construction sector. This change can be driven, not by some utopian vision, but by hard-headed calculation.

In an environment afflicted by pandemic, and threatened by future outbreaks, the benefits of meticulous planning and collaborative working are amplified. Early contractor involvement, leveraging the deep expertise of the supply chain, more balanced risk-sharing, greater transparency, conflict avoidance mechanisms and alternative routes to dispute resolution all make even greater business sense. As ever, this reinforces the need to learn the lessons from both good and bad projects.



HOW TO USE CRUX

Our integrated research programme is rooted in empirical evidence and expert analysis, not theory or surveys of opinion. In the same vein, our goal for CRUX is to improve project outcomes in the real world by sharing with stakeholders our insights into the proven causes of claims and disputes.

The rankings of causes of claims and disputes – overall and, in this year's report, by region – provide a comprehensive overview of the primary and secondary drivers of project failures, delays and cost overruns. Our consultants operating in these regions also share their experience and advice on the practical measures that can pre-empt or minimise the impact of these risks on future projects.

Industry and professional bodies can help use the lessons learned from CRUX widely. Governments can apply them in legislation, policy, and practice – as proposed in the UK, where a parliamentary inquiry into management of major state projects cited the findings of CRUX Insight 2018[1].

At the level of the project, programme or portfolio is where the greatest benefits can be found in the shorter term. Employers, contractors, insurance providers, designers, suppliers, financiers, lawyers, and other stakeholders all stand to gain most from further analysis of CRUX.

Below this report's high-level findings lies the CRUX dataset that we believe to be the widest-reaching, fact-based analysis of claims and disputes on engineering and construction projects worldwide. New insights are constantly emerging from our ongoing, tailored analysis. These are helping clients shape strategy and set priorities for planning, procurement, and project controls and governance.

As well as highlighting the relative incidence of the factors triggering claims and disputes in regions and globally, CRUX captures and isolates multiple parameters and answers an array of questions posed by clients, including:

- How do building projects' outcomes vary by contract type?
- What share of industrial disputes were settled and not settled in a particular jurisdiction?
- How much higher, proportionally, are dispute values on renewable energy projects compared with oil & gas? Or combined heat and power versus wind?
- Are extensions of time for infrastructure significantly longer in Europe than other regions?

The applications for such insights are numerous, and include helping clients to:

- Benchmark current performance.
- Analyse and mitigate project risks more accurately.
- Gauge overall and specific areas of risk in new target markets.
- Re-calibrate the risk profile of a business.
- Refine the risk picture at corporate level or by region or sector.
- Improve commercial decision-making.
- Better inform comparisons of procurement options.
- Influence consideration of dispute resolution methods.

1 House of Commons Public Administration and Constitutional Affairs Committee review of government management of major projects

HEALTHCARE: DIAGNOSIS AND CURE

Dissecting the CRUX 2020 data reveals deeper insights into regions and sub-sectors, not least healthcare construction projects around the world. Our research involving 51 healthcare facilities in eight countries confirms that there are fundamental issues that recur – from year to year, and project to project. These persistent problems are within the control of the various project stakeholders, but the lessons are not being learned across the sector.

Incorrect design and deficiencies in workmanship on healthcare projects emerge as the top causes of claims and disputes, overtaking change of scope and the contract management issues that dominate on building projects generally.

Our analysis identified common frailties in project planning and execution, their side effects, and actions to prevent the chronic failures afflicting construction in this sector:

- CRUX data shows that the main design issue was incorrect design. Complex hospital contracts have multiple interfaces between trades and design disciplines across every aspect of the buildings and systems. Clearly defining the design, scope and responsibility for all such interfaces is critical to a complete, compliant and accurate design.
- Incorrect design can also stem from poor briefing documents and scoping. Failure to reference national building bulletins and technical standards (even fire resistance) in designs and scope of works is a disturbingly frequent omission.
- Investing more resources earlier in the design, project brief and scope development would pre-empt many of the most common disputes. An immature scope results in increased risk of design changes, time and cost.
- Changes in regulatory standards and guidance during construction are not unusual. Yet contracts may not be clear on the change management process and who should bear the cost.
- Poor workmanship and installation failures often emerge after the construction phase. The impacts on senior management time and operations (e.g. limiting space in tightly designed healthcare settings and patient safety concerns) are significant, as are the potential penalties triggered by PFI non-availability clauses.
- Contractors (and all members of the construction and design teams) must understand exactly what their responsibilities are and cascade that knowledge through the entire contracting chain.
- Keep an accurate record of changes and design decisions in accordance with the contract. Poor record-keeping results in many claims being dismissed for want of evidence, whatever their actual merits.

METHODOLOGY

The 2020 CRUX Insight report presents the high-level findings from our analysis of claims and disputes on 1,185 projects worldwide.

This year's publication builds on our CRUX Insight reports published in 2018 and 2019, and benefits from:

- An updated taxonomy listing all causes of claim and dispute as can be seen in the CRUX Dashboard, available at https://www.hka.com/crux-interactive-dashboard.
- An analysis of the pathways to dispute resolution followed.
- A new and improved bespoke data collection process.
- An enlarged dataset of project disputes.
- A review of the four geographic regions in which HKA operates.
- A series of one-to-one interviews with 20 industry experts to contextualise the findings.

How did we define the main causes of claims and disputes?

CRUX Insight 2020 uses the same methodology to define the main causes of claims and disputes on engineering and construction projects as before.

This methodology was refined in 2019. The CRUX team extracted a list of all causes of claims and disputes contained within 57 peer-reviewed academic publications, industry reports and other available sources worldwide. This yielded a list of 1,750 causes. Through detailed analysis and mapping to establish trends and variations in terminology, we were able to rationalise these into 50 coherent and separate causes of claim and dispute.

This list was then examined by a HKA CRUX Expert Review Panel comprising Franco Mastrandrea, Jeffrey Badman and Derek Nelson – senior Experts within HKA, each with over 30 years' professional experience – who tested these often-theoretical factors against practical experience of live projects. This exercise produced a refined list, which the panel then ranked – according to frequency rather than gravity – to give the top 40 most common causes of claim and dispute.

The next stage saw this list shared more widely with HKA experts from all quantum, delay and engineering disciplines and the four geographic regions in which HKA operates. Their input ensured that the causes of claim and dispute were comprehensive and representative of the projects handled across the business. Following further refinements, a final list of the top 30 causes of claims and disputes was agreed and included in the 2019 questionnaire. Each cause of claim and dispute was defined, and examples were included to avoid confusion and crossover.

Respondents also had the option to identify additional factors. Some responses to the 2019 survey included a manually entered cause: Socio-political and regulatory issues. This was included as an additional cause in the 2020 list.

Project selection and data collection

Projects on which HKA provided claims and dispute resolution services were eligible for inclusion in the questionnaire subject to a specific test: to ensure the integrity of the data, each project reviewed had to have been worked on for more than 75 hours by HKA consultants. All projects on which HKA provided advisory services unrelated to commercial disputes or claims were ineligible and therefore excluded. With projects identified, questionnaires were sent to over 350 of our experts who contributed to the overall findings.

The composition of the 1,185 projects assessed in our 2020 report was as follows:

- 173 assessed from 2018.
- 520 assessed from 2019.
- 492 assessed from 2020.

How has this report dealt with COVID-19?

Due to the ongoing nature of COVID-19 and the potential impacts it might have on a macro- and micro-economic level, we decided to only capture projects up the end of February 2020. Therefore, no projects undertaken during the period affected by the coronavirus have been captured in this report. We intend to report in 2021 on the impacts of the pandemic on projects and the pattern of causation as these are captured in the CRUX research programme.

Analysis and assessment of the findings

This year's report focuses on a regional analysis relating to the four geographical markets in which HKA operates: the Americas, Asia Pacific, Europe, and the Middle East & Africa. A list of the countries included in each region is available on page 49.

The findings – including the top causes of claims and disputes for each region – were presented to HKA's CRUX interviewees for review. These experts were drawn from all HKA disciplines and offices and provided expert insights and sector perspectives based on their direct project experience.

Our findings from the data analysis and these interviews are summarised within this report to provide a quantitative and qualitative perspective on our insights into the causes of claims and disputes.

> The CRUX research has generated a wealth of data from what we believe to be the widest-reaching, fact-based analysis of claims and disputes on engineering and construction projects worldwide.

LIST OF COUNTRIES

Please see below the full list of countries included in the CRUX 2020 regional insight. The full list of CRUX variables is available at https://www.hka.com/crux-insight-variables.

Americas

Bolivia
Bonaire
Brazil
Canada
Chile
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
Guatemala
Haiti
Mexico
Panama
Peru
United States
Uruguay

Asia Pacific

Afghanistan
Australia
Azerbaijan
Bangladesh
China
Hong Kong
India
Indonesia
Japan
Kazakhstan
Lao PDR
Malaysia
Maldives
Marshall Islands
New Zealand
Pakistan
Papua New Guinea
Philippines
Singapore
South Korea
Sri Lanka
Turkmenistan
Vietnam

Europe

Belgium
Bulgaria
Denmark
Finland
Germany
Ireland
Kosovo
Luxembourg
Malta
Moldova
Netherlands
North Macedonia
Norway
Poland
Portugal
Romania
Russia
Slovak Republic
Spain
Sweden
Switzerland
United Kingdom

Middle East & Africa

Algeria
Angola
Bahrain
Botswana
Côte d'Ivoire
Egypt
Ethiopia
Ghana
Iraq
Israel
Jordan
Kenya
Kuwait
Lebanon
Libya
Mauritius
Morocco
Niger
Nigeria
Oman
Qatar
Saudi Arabia
South Africa
Turkey
United Arab Emirates
Yemen

> All stakeholders should benefit from the use of CRUX data to re-assess the risk profile of their business, including by service, sector and location.

CRUX INTERACTIVE DASHBOARD

HKA's integrated research programme, CRUX, draws on our unprecedented bank of knowledge to provide valuable insights into the most common causes of claims and disputes on engineering and construction projects where our experts have provided claims consulting and dispute resolution services across multiple sectors around the world.

www.hka.com/crux-interactive-dashboard

As the world's leading construction claims and dispute resolution firm in the industry, we have access to a rich resource of major project data from more than 1,100 projects with a combined value exceeding US$1.8 trillion. All decision-makers on projects can profit from a clearer understanding of the recurring causes of claims and disputes. We encourage governments and professional bodies to engage with the CRUX research programme's findings and its implications for planning, procurement, project governance and controls. Please feel free to contact a member of the CRUX team should you be interested in collaborating with us.

We anticipate.
We investigate.
We resolve.

WHO WE ARE

HKA is one of the world's leading privately owned, independent providers of consulting, expert and advisory services for the construction, manufacturing, process and technology industries.

We also have particular experience advising clients on the economic impact of commercial and investment treaty disputes and in forensic accounting matters.

In addition, HKA supports companies that conduct business with the US Federal Government, providing them with consulting services on complex government contracting matters.

We bring a proud record of excellent service and high achievement – established over more than 40 years – to bear on today's challenges.

As trusted independent consultants, experts and advisers, we deliver solutions amid uncertainty, dispute and overrun, and provide the insights that make the best possible outcomes a reality for public and private sector clients worldwide.

Whether providing expert advisory, expert determination or expert witness services, HKA provides the unique, multi-disciplinary service that combines quantum, engineering, delay, disruption, and damages (QED+). Clients can have direct access either to stand-alone experts or an integrated expert team of problem-solvers, who thrive on decoding complexity.

HKA has more than 1,000 advisors and consultants – across 47 offices in 17 countries – with the skills and experience that are essential to get to the heart of even the most complex issues.

Our people have vast first-hand experience spanning all major industries and the world's most complex megaprojects, as well as an international track record of achieving successful outcomes. HKA's global portfolio includes prestigious projects on every continent and in market sectors that include buildings, industrial and manufacturing, power and utilities, resources, technology and transportation infrastructure.

Our forensic accounting and commercial damages teams specialise in areas such as valuations, economic damages, investigations, bankruptcy and intellectual property.

HKA experts' experience in government contracting is profound and covers contract disputes, investigating allegations of false claims and defective pricing, compliance reviews and audit services as well as other tailored support.

> Clients have access to thought leaders and subject-matter experts with diverse skills and the ability to anticipate, investigate and resolve complex challenges.

CRUX INTERVIEWEES

Below are our CRUX experts, drawn from all HKA disciplines and offices, who were interviewed as part of the research process to provide their expert insights and regional perspectives based on their direct experience from working on some of the world's large and most complex engineering and construction projects worldwide.

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