



FIG Working Week 2024

19-24 May

Accra, Ghana

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*Presented at the FIG Working Week 2024,
19-24 May 2024 in Accra, Ghana*

Delivering Sustainable Surveying Engineering Business in the 21st century - The Entrepreneurial Approach

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Introduction

The U.S. Bureau of Labour Statistics (BLS) data reveals that around 20% of new businesses fail in the first two years,

45% in the first five years, and

65% in the first 10 years.

Only 25% reach 15 years or more (Deane, 2022).

This data from the U.S. Bureau of Labour Statistics reveals a consistent pattern of business failure since the 1990s, where a notable percentage closes within specific periods

(e.g., 20% within the first two years, 45% within the first five years).

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Introduction (Cont'd)

Sustaining a business through societal changes is no easy feat - a feat, perhaps,

made much more difficult when that business find itself in a highly technical field like geomatics engineering, and in an era where the spate of technological changes is occurring at break-neck speed (Source: Sahare & Thampi, 2010; Zamora, 2017).

What even make matters worse is the disruptive impact of this technological changes.

It is, thus, no surprise that geomatics engineering of yesteryears appears quite different from what now prevails.

In the historical past, examples of geomatic engineering tools used for surveying were the

ropes and plumb bobs (by the Egyptians),

the lodestone (by the Chinese),

the diopter (by the Greeks),

the theodolite and the sextant (created between the 16th and the 18th century) (CourthouseDirect, 2018).

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Introduction (Cont'd)

In contrast, geomatic engineering in this modern era, the 21st century, is characterized by

digital mapping,
geographic information systems (GIS),
global positioning systems (GPS),
drones,
aerial surveys,
electronic distance meters (EDMs),
automation, artificial intelligence, and the like.

These new tools are all offshoots of modernization, products of the current digital revolution, spreading through the fabric of society like wildfire.

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Kubíčková & Chudá (2021) conducted a study to examine the critical success factors of engineering businesses in the Czech Republic.

Sixteen companies were studied.

The study found that key success factors in the engineering business included marketing, particularly pricing and product strategies, high-quality and diverse product offerings, and a strong focus on human resources, emphasizing employee stability, loyalty, and positive work attitudes.

There was no mention of the entrepreneurial approach as a key success factor.

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But then, it is worth noting that the critical success factors cited by Kubičková & Chudá (2021) respond to the entrepreneurial approach.

In other words, the success factors highlighted in the study

inherently align with principles commonly associated with an entrepreneurial mindset (Moustaghfir et al., 2020; Yadav & Bansal, 2020; Y. Yang & Ju, 2018),

even if not explicitly labelled as such in the study.

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AIM

- The aim of this presentation is to make a case for the use of the entrepreneurial approach in delivering sustainable surveying engineering business in the 21st century.
- The remaining portion of this presentation will be divided into four parts:
 - Part 2 emphasizes a cyclical cash flow model, ensuring that the loss of a single project does not jeopardize the stability of the surveying engineering business;
 - Part 3 will look at key actionable strategies; Section 4 will discuss the merits of delivering a sustainable surveying engineering business in the 21st century;
 - Part 4 will look at the elements that impede sustainable surveying engineering business.
 - Part 5 will cover the conclusion.



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Diversified Project Portfolio and Cyclical Cash Flow Model

Part 2

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Diversification of Project Portfolio

Diversification of project portfolio and the creation of a cyclical cash flow model is one of the vital pillars in the delivery of a sustainable surveying engineering business, and these strategies are entrepreneurial in nature.

Some of these entrepreneurship approaches are:

- innovation and adaptability,
- risk-taking and experimentation,
- market research and opportunity identification,
- flexible business models,
- portfolio management strategy,
- multiple revenue streams, and
- customer-centric approach.

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Innovation and Adaptability

Entrepreneurs in surveying engineering demonstrate a fundamental drive for innovation,

compelled by an intrinsic motivation to continually seek novel solutions and adapt to the evolving market dynamics.

In a sector traditionally focused on precision and accuracy, these entrepreneurs recognize the necessity of embracing innovation to stay competitive (Al-Khatib & Al-ghanem, 2021; Azeem et al., 2021).





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Innovation and Adaptability - 1

This commitment to innovation is not merely a reaction to market changes but a proactive effort to shape the industry itself.

Surveying engineers who use the entrepreneurship approach are often pioneers in identifying gaps and opportunities (Chen et al., 2020),

leading them to conceptualize and implement projects that not only meet current client demands but also anticipate future trends.

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Innovation and Adaptability - 2

Diversity in project exploration naturally stems from this innovation-centric approach.

Kock & Gemünden (2021) in an empirical analysis involving 257 firms showed that

both innovativeness and risk-taking, as dimensions of entrepreneurial orientation, positively moderate the relationship between managerial practices and performance in innovation project portfolio management (IPPM).

The study findings suggest that firms with higher levels of innovativeness and risk-taking tendencies will experience enhanced performance outcomes

when implementing managerial practices in Innovation Project Portfolio Management (IPPM)

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Risk Taking and Experimentation

The entrepreneurial approach is marked by a fundamental willingness to take calculated risks,

a quality that distinguishes entrepreneurs in this specialized field.

This risk-taking mentality is far from impulsive decision-making (Isles et al., 2018).

The calculated risk-taking aspect within surveying engineering entrepreneurship is

deeply grounded in a comprehensive understanding of the potential benefits and drawbacks associated with specific ventures.





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Risk Taking and Experimentation - 1

Surveying entrepreneurs embrace the spirit of venturing beyond their comfort zones, recognizing that innovation and growth often necessitate exploration into uncharted territories within the surveying engineering domain.

This willingness to take calculated risks is particularly relevant when considering project portfolios.

By diversifying their surveying projects, surveying entrepreneurs ensure that the success of one project can offset potential challenges in another, fostering resilience and sustainability.

Entrepreneurs in the surveying engineering business will acknowledge that a diversified portfolio serves as a potent risk mitigation strategy (Reinholtz et al., 2021).

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Market Research and Opportunity Identification

Market research is a fundamental aspect of the entrepreneurial toolkit in surveying engineering,

- involving a thorough analysis of market conditions,
- customer behaviours,
- industry trends, and
- competitive landscapes (Gilmore, 2010).

Surveying engineering entrepreneurs possessing the skills to discern market opportunities and gaps may tend to always have an edge over those that cannot.

It is a skill that invariably puts them one step ahead of the competition.





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Market Research and Opportunity Identification - 1

The proactive nature of surveying entrepreneurs in market research extends beyond mere data collection.

It embodies a forward-thinking mindset that anticipates
shifts in consumer preferences,
technological advancements, and
regulatory changes.

The inclusion of new projects in the entrepreneurial portfolio within surveying engineering is a direct outcome of this rigorous and forward-looking market research (Blank & Dorf, 2020).

When armed with a profound understanding of the market's intricacies,
surveying entrepreneurs can conceptualize and implement projects that
fill existing gaps or
cater to unmet needs in surveying and geospatial technology.

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Flexible Business Models

The application of the entrepreneurial approach, in surveying engineering,

is also marked by dynamic adaptability,

a trait synonymous with successful entrepreneurial ventures.

This adaptability is facilitated by the implementation of flexible business models,

designed to swiftly adjust to market feedback (Chesbrough, 2007).

The flexibility of business models within surveying engineering is deeply rooted in their responsiveness to market feedback.



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Flexible Business Models - 1

- Recognizing the need to evolve strategies in response to shifts in consumer preferences, technological advancements, or economic changes,
 - a surveying entrepreneur could implement flexible business models that empower them.
- The following flexible business models are proposed:
 - **Subscription-based Services:**
 - this has to do with offering surveying services on a subscription basis rather than one-time projects.
 - **Technology Integration and Upgrades:**
 - entails implementing a business model that readily integrates new surveying technologies and software.

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Flexible Business Models - 1

– Agile Project Teams:

- involves structuring the business with agile project teams that can be quickly assembled or adjusted based on project requirements.

– Hybrid Project Approaches:

- involves adopting a flexible approach to project execution, combining traditional surveying methods with innovative technologies such as drones or LiDAR.

– Data Analytics and Insights Services:

- entails offering data analytics and insights services alongside traditional surveying.

– Outcome-Based Pricing:

- implementing pricing models based on project outcomes rather than fixed fees.

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Scenarios – A Drone and a Vehicle

- Scenario #1: A sustainable surveying engineering business is like:
 - Vehicle running on 4 Wheels.
 - If one of the wheels fails, the vehicle will not be able to move well.
 - If the condition persists and is not attended to, the vehicle will eventually stop moving.
- Scenario #2: A sustainable surveying engineering business is like:
 - A motor rotor drone with 4 propellers.
 - It needs these propellers to be functional and effective in air.
 - Imagine one of the propellers falling of, what happens next is anybody's guess.

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Scenarios – A Drone and a Vehicle

- Hence for sustainable Surveying Engineering Business we need minimum of four Surveying Engineering Projects in cycle:
 - Cashflow 1 feeds into Cashflow 2 and
 - Cashflow 3 feeds into Cashflow 4.
- In event of we losing Project one and Cashflow 1, Projects 2, 3 and 4 will support the business until we reinstate project 1.

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Conceptual Framework

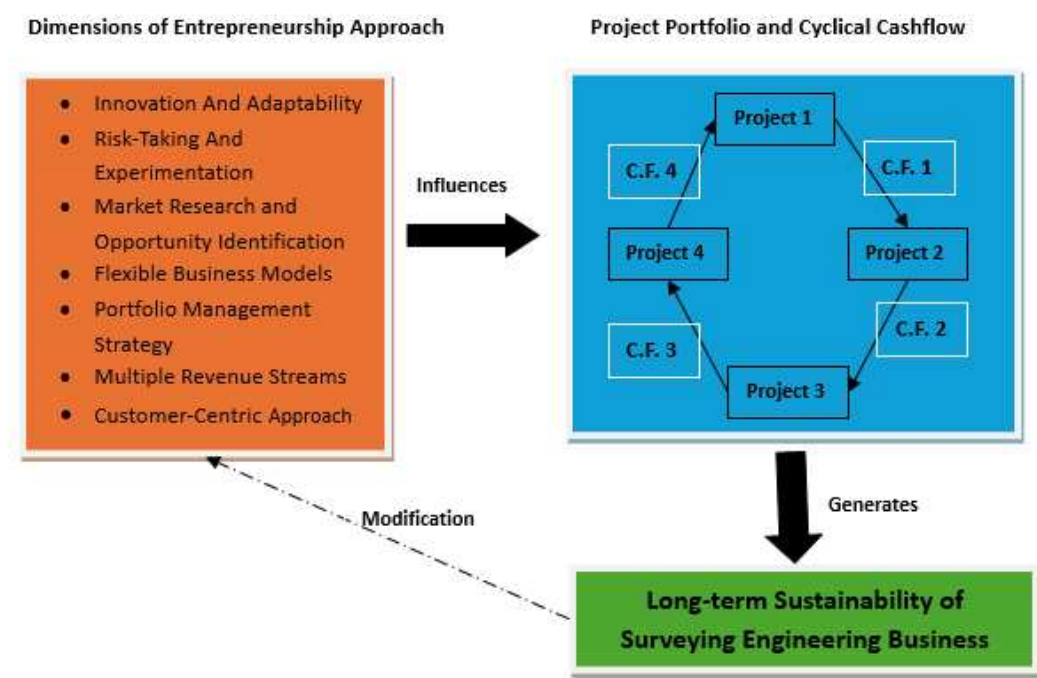


Figure 1: Proposed Entrepreneurship Approach based Model for Delivering a Sustainable Surveying Engineering Business in the 21st Century. C.F.1 to C.F.4 represent cashflows from projects 1 to 4 respectively (Source: Author's construct).



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Key Actionable Strategies for delivering a sustainable engineering business

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Key Actionable Strategies

- Establishing and sustaining a successful surveying engineering business requires a strategic and multifaceted approach.
- Seven pivotal strategies aimed at delivering a sustainable surveying engineering business are proposed:
 - A. Identification of potential clients
 - B. Being on the vendor list
 - C. Writing proposals
 - D. Expression of Interest (EOI)
 - E. Forming composite engineering surveying teams
 - F. Applying value and risk management
 - G. Understanding the client value matrix

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Elements Impeding Surveying Engineering Business

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Impediments

- One significant impediment to the success of surveying engineering businesses lies in the failure of varying contract types to recognize the pivotal role of surveying engineers.
 - Particularly, the oversight of not acknowledging surveying engineers as key consultants immediately after the development consultant in all capital projects
 - can hinder their effective contribution.
 - In some contractual arrangements, the importance of surveying expertise might not be adequately emphasized,
 - leading to potential misunderstandings regarding the essential role these professionals play in the project's success
 - This oversight may result in a lack of
 - alignment between the scope of work expected from surveying engineers and
 - their actual contributions, impacting project outcomes.

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Impediments - 1

- Another notable challenge confronting surveying engineering businesses is the insufficient funding available to invest in new technologies that enhance their work (Brown & Clark, 2019).
 - The domain of surveying engineering is experiencing swift evolution,
 - where technological progress is pivotal in enhancing
 - efficiency,
 - precision, and
 - the range of services provided.
 - Nevertheless, financial limitations confronted by businesses in obtaining cutting-edge technologies
 - can hinder their capacity to maintain competitiveness.
 - Deprived of access to the most recent tools and equipment, surveying engineers might encounter difficulties in
 - meeting ever-changing industry standards,
 - delivering services of superior quality, and
 - adjusting to the dynamic requirements of the market.

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Conclusion Part 5

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- In conclusion, the entrepreneurial approach not only redefines how surveying engineering is practiced
 - but also forms a robust foundation for delivering sustainable businesses in the 21st century.
- The entrepreneurial approach transcends conventional boundaries, fostering
 - innovation,
 - adaptability, and
 - strategic alignment that position surveying entrepreneurs as dynamic agents of change,
 - propelling their enterprises towards long-term success in an ever-evolving business environment.

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- It is, therefore, suggested that surveying entrepreneurs will do well to actively pursue a diversified project portfolio
 - by strategically selecting initiatives that cater to various surveying needs and preferences.
- It is also recommended that surveying engineers implement flexible business models
 - that align with the dynamic nature of the surveying engineering industry.

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Sustainable Development Goal 11

This presentation aligns with a number of the United Nations Sustainable Development Goals, particularly:

- Goal 11: Sustainable Cities and Communities - Since surveying is crucial for urban planning and management, this goal is relevant as it focuses on making cities inclusive, safe, resilient, and sustainable.
- Goal 17: Partnerships for the Goals - The entrepreneurial approach might involve partnerships across sectors, aligning with this goal of strengthening the means of implementation and revitalizing global partnerships for sustainable development.

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SUSTAINABLE DEVELOPMENT **GOALS**

International Federation of Surveyors supports the Sustainable Development Goals

End of my Presentation

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