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## **Achieving Quality in Software Engineering Case Studies**

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## FINDINGS

### 1. Case Study A

This study aims to explore the tailoring of the Spotify model in other contexts than its originated, by focusing on the FinTech industry (Salameh & Bass, 2018, 2020). This case study is conducted in a multinational organisation, which is a market leader in the FinTech industry. Tables 1, 2, 3, and 4 show the strength and weakness in terms of the adopted research approach in according to (Yin, 2014), (Lincoln, 1985), (Pettigrew & Fenton, 2000), and (Robson, 2002) respectively.

*Table 1: Strengths and Weakness in Case Study A according to Yin's approach*

Criteria	Strengths	Weaknesses
Construct validity	Data triangulation: direct observation and interviews. Interview guide built after observations and reneled after two pilot interviews	Time consuming: validating observations with participant's perspective
Internal validity	Data Collection: Observations, artefacts, and interviews Bias mitigation: output from observations validates output from interview	-
External validity	In-depth insight of an explored phenomenon with findings benefitting other companies in similar contexts	Not concerned with generalization Difficulty obtaining research site consent
Reliability	Methodology is clearly explained, and data collection steps are transparent Subject to biasness if only direct observation is considered Memos were utilized to preserve data from observation Interview guide is unified and used for all participants	Direct observation leads to high dependability on researcher's perception

Table 2: Strengths and Weakness in Case Study A according to Lincoln's approach

Criteria	Strength	Weakness
Credibility	Obtaining the organization and practitioner's consents Unsupervised interviews Data interpretation and validity strengthened by data triangulation	Reliance solely on one data source impacts negatively the results
Dependability	Direct observation of the same variables for a long time strengthens the consistency of the findings	Expensive due to frequent and long observations Not concerned with generalization Replication may confirm results if conducted at similar contexts
Transferability	The findings may benefit other companies in similar contexts	Conducting a single case study
Confirmability	Grounded Theory was employed (coding, constant comparison, memoing, etc) Triangulation in data collection Interview data (practitioners' perceptions) were analysed and compared with the observation results to prevent any suspected deviation between "semi-structured interviews" view of matters and the "real" case	Highly dependent on researcher's perception due to extensive observations Subject to biasness if only direct observation is considered

Table 3: Strengths and Weakness in Case Study A according to Pettigrew and Fatton's approach

Criteria	Strength	Weakness
(1) Used multiple sources of evidence	(1) Triangulation in data collection and analysis was employed (observation and interviews)	-
(2) Followed a systematic method in the within-case construction	(2) GT follows a systematic approach of data collection and analysis to construct the research findings	-
(3) Obtained permission from the informants to publish the information once it had been checked.	(3) Permission was obtained from the research site and consent forms were signed by practitioner	(3) Confidentiality agreement constrained the publishing of the specific project details.

Table 4: Strengths and weakness in Case Study A according to Robson and McCartan's approach

Criteria	Strength	Weakness
Description	<p>Interviews transcribed verbatim and constant comparison technique was applied</p> <p>Supplementing the direct observation of agile practices with interviews</p>	-
Interpretation	<p>GT approach strengthens the interpretation validity of collected data by employing different systematic methods</p> <p>Every main category is derived from concepts which are derived from codes</p>	Categories might be influenced by observation data
Theory	<p>The revealed theory was grounded using an inductive paradigm by harnessing a constant comparison of collected data at increasing levels of abstraction</p> <p>Interviews were conducted with different roles from multiple teams to brace the transferability within the same case study organization</p>	Generation of theory using grounded theory

## 2. Case Study B

This case study aims to investigate agile implementation strategies in software development companies (Rahy & Bass, 2020). This study employs a qualitative research methodology to address the complex behaviour of human in the agile software development context following the Grounded Theory guidelines. Tables 5,6,7, and 8 show the strength and weakness in terms of the adopted research approach in according to (Yin, 2014), (Lincoln, 1985), (Pettigrew & Fenton, 2000), and (Robson, 2002) respectively.

Table 5: Strengths and Weakness in Case Study B according to Yin's approach

Criteria	Strength	Weakness
construct validity	Pattern matching as achieved by the constant comparison techniques within and across case studies  Exploratory pilot used to refine the interview guide accordingly	Different interpretations of interview questions by interviewees from diverse cultures
Internal validity	Causal relations are studied in multiple contexts  Chain of evidence through GT implementation in all research sites	Short research time limits the knowledge of all factors  Inability to track all six research site for time  The factors rising from the first studied research site may affect the researcher's input in the second
External validity	Wide exploration of research phenomena through exploring high level insights  Generalizability achieved with the study of six research sites	Sampling Strategy: Research site selection is subject to availability of organizations
Reliability	Methodology is clearly explained, and data collection steps are transparent  Interview guide is unified and used for all participants	Case study notes were limited to notes taken during interviews  Limited observation conducted

Table 6: Strengths and Weakness in Case Study B according to Lincoln's approach

Criteria	Strength	Weakness
Credibility	Obtaining the organization and practitioner's consents Unsupervised interviews Findings rooted on the practitioners' quotes	Neglecting aspects of study due to data complexity and time constraint
Dependability	Data was collected from multiple respondents in six different sites	The companies under study are spread across four geographical locations, The Netherlands, Lebanon, India, and Kenya, making replication of the precise circumstances is hard to achieve
Transferability	Diverse research sites enable to present the findings with stronger assurance that implications for practice may be applicable from one context to the other	Difference in research sites' size thus impacting the number of participants
Confirmability	Grounded Theory was employed (coding, constant comparison, memoing, etc) Conclusions depend on practitioner's perception All data, including research site description, practitioner interviews' audio and transcribed data were treated anonymously to eliminate any research bias	Case study notes were limited to notes taken during interviews Limited observation was conducted in research sites.

Table 7: Strengths and Weakness in Case Study B according to Pettigrew and Fatton's approach

Criteria	Strength	Weakness
(1) Used multiple sources of evidence	(1) Data was collected from interviews with practitioners in different roles	(1) Due to availability of resources, all the roles are not replicated across organizations
(2) Followed a systematic method in the within-case construction	(2) GT follows a systematic approach of data collection and analysis to construct the research findings	-
(3) Obtained permission from the informants to publish the information once it had been checked.	(3) Permission was obtained from all six research sites and consent forms were signed by practitioners	-



## DETAILED FINDINGS

*Table 8: Strengths and Weakness in Case Study B according to Robson and McCartan's approach*

Criteria	Strength	Weakness
Description	Interviews transcribed verbatim and constant comparison technique applied	Field notes were scarce Lack of observation video taping
Interpretation	GT approach strengthens the interpretation validity of collected data by employing different systematic methods  Every main category is derived from concepts which is derived from codes	Categories rising from the first research site may affect data interpretation in the other
Theory	The revealed theory was grounded using an inductive paradigm by harnessing a constant comparison of collected data at increasing levels of abstraction  Phenomena developed are studied across six research sites. Alternative explanations for each category arise with the investigation conducted in each research site	Generation of theory using grounded theory

## DETAILED FINDINGS

### 3. Case Study C

This study aims to raise awareness in how development processes are tailored to meet the needs of large-scale offshore software development programmes (Bass, 2016). The study focuses on artefact inventories used in the development process. Tables 9, 10, 11, and 12 show the strength and weakness in terms of the adopted research approach in according to (Yin, 2014), (Lincoln, 1985), (Pettigrew & Fenton, 2000), and (Robson, 2002) respectively.

*Table 9: Strengths and Weakness in Case Study C according to Yin's approach*

Criteria	Strength	Weakness
construct validity	Constant comparison technique was applied back and forth between data collection and analysis	Different interpretation for the interview questions were done by interviewees done diverse cultures
Internal validity	Snowball and intensity sampling was used.  Snowball sampling provided data from a wide selection of projects.  Intensity sampling allowed for in-depth contact with a range of respondents, including corporate executives, project portfolio managers, project managers and various development team members.	Research time limits the knowledge of the different issues  The factors rising from the first studied research site may affect the research input for the others
External validity	Generalizability in large scale offshore software development programs was achieved	Research site is subject to availability of organizations
Reliability	The steps of the study were described in detail such that another researcher may apply these steps	Limited observation

## DETAILED FINDINGS

*Table 10: Strengths and Weakness in Case Study C according to Lincoln's approach*

Criteria	Strength	Weakness
Credibility	Multiple sources of evidence have been used: observation, documentary sources, and practitioner interviews	-
Dependability	Conducting studies in 9 different organizations  Achieving meaningful parallelism across the different sources	Difference was present between the team size in each research site
Transferability	Conducting the studies across 9 companies provided access to a wide range of project stakeholder respondents	Specialization of research sites reduces the generalizability of the study in research sites with different characteristics
Confirmability	Grounded Theory was employed (coding, constant comparison, memoing, etc)  Analysis depends on multiple sources of evidence  The sequence steps conducted in the study have been described in detail	Limited observations were conducted

## DETAILED FINDINGS

*Table 11: Strengths and Weakness in Case Study C according to Pettigrew and Fatton's approach*

Criteria	Strength	Weakness
(1) Used multiple sources of evidence	<p>Multiple sources of evidence: observation, documentary sources, and practitioner interviews</p> <p>Practitioners are from different roles and different organizations</p>	Not all roles of resources are replicated across the different organizations
(2) Followed a systematic method in the within-case construction	The systematic method of Grounded theory was applied in this study	The availability and the willingness of the studied organizations to grant access is not something we can control
(3) Obtained permission from the informants to publish the information once it had been checked.	<p>All research sites remained anonymous to avoid bias from respondents acting in pursuit of some perceived marketing objectives.</p> <p>All interviewees signed consent forms</p>	It is always feasible and possible to get respondents to confirm the accuracy of transcripts from interview recordings

## DETAILED FINDINGS

Table 12: Strengths and Weakness in Case Study C according to Robson and McCartan's approach

Criteria	Strength	Weakness
Description	Interviews were transcribed using a specialist commercial transcription service and reviewed to ensure verbatim transcription.	Field notes were scarce Limited observation due to lack of approval from research sites
Interpretation	GT approach strengthens the interpretation of collected data by applying the described steps Interview concepts were grounded to form categories which were grouped to form concepts	When the number of interviews gets large, constant comparison technique becomes time consuming
Theory	Capture the understanding of the respondents to build the theory	Cultural biases and researcher assumptions interfere in our ability to that accurately

## DETAILED FINDINGS

### References

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