

# Agile Methodologies in Global Software Development

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## ABSTRACT

This research investigates the issues with remote software development, whether Agile methodologies are a suitable solution for remote software development teams in global software development (GSD) companies, and the advantages and disadvantages of using Agile methods in GSD. This study describes GSDs approaches in the literature and the main advantages and disadvantages. Agile concepts and methods in GSD are explained, the challenges faced by Agile GSD teams are discussed, and the practices to achieve distribution and Agility, and advantages of Agile methods in GSD are examined. Finally, this work analyses the combination of both the Agile methodology and the GSD approach, and discusses that Agile practices may help to avoid some GSD issues.

**Keywords:** Agile, global software development

## 1. INTRODUCTION

This report reviews the literature to investigate whether Agile methodologies are suitable in GSD. In order to address this, this study proposes to answer the following research questions:

RQ1. What are the issues with remote software development?

RQ2. Are the Agile methodologies a suitable solution for remote software development teams in global software development (GSD) companies and why?

RQ3. What are the advantages and disadvantages that managers need to know to make a right decision about using Agile methodologies in GSD?

The research questions' outcomes will provide relevant information for GSD companies which are considering adopting an Agile methodology.

## 2. GLOBAL SOFTWARE DEVELOPMENT

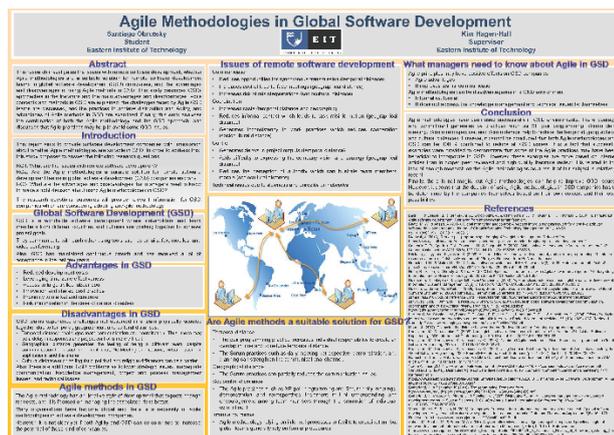
GSD is a worldwide software development where stakeholders and team members from different countries and cultures are working together to achieve project goals (Holmström, Fitzgerald, Ågerfalk, & Conchúir, 2006).

They communicate with each other using tools such as emails, fax, mobiles, and video conferencing (Yaseen, Ali, & Ullah, 2016).

Also, GSD has maintained continuous growth and has received a lot of acceptance in the last few years.

The advantages of GSD identified in the literature are:

- Reduced development costs (Agerfalk et al., 2005; Ågerfalk, Fitzgerald, Olsson, & Conchúir, 2008; Bhatti & Ahsan, 2017; Conchúir, Ågerfalk, Olsson, & Fitzgerald, 2009; Holmström et al., 2006; Shrivastava, 2010; Zahedi, Shahin, & Babar, 2016).
- Leveraging time-zone effectiveness (Agerfalk et al., 2005; Ågerfalk et al., 2008; Bhatti & Ahsan, 2017; Conchúir et al., 2009; Shrivastava, 2010; Zahedi et al., 2016).
- Access to large skilled labour pool (Ågerfalk et al., 2008; Bhatti & Ahsan, 2017; Conchúir et al., 2009; Holmström et al., 2006; Zahedi et al., 2016).
- Innovation and shared best practice (Ågerfalk et al., 2008; Conchúir et al., 2009).
- Proximity to market and customer (Agerfalk et al., 2005; Ågerfalk et al., 2008; Bhatti & Ahsan, 2017; Conchúir et al., 2009; Herbsleb & Moitra, 2001; Shrivastava, 2010; Zahedi et al., 2016).
- Risk minimisation in the case of natural disasters. (Shrivastava, 2010; Agerfalk et al., 2005).



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GSD teams experience challenges not observed in a team physically situated together due to temporal, geographical, and cultural distances (Holmström et al., 2006; Jan et al., 2016; Paasivaara et al., 2009; Yaseen et al., 2016; Zahedi et al., 2016).

Temporal distance challenges team communication and coordination. Thus, there may be a delay in responses and project control is more difficult.

Geographical distance generates the feeling of being a different team, despite communication tools such as e-mail, chat,

NetMeeting applications, virtual classroom applications, and the phone.

Cultural distance such as linguistic, political, and religious differences can be a barrier.

Additional GSD problems identified in the literature are: strategic issues, inadequate communication, knowledge management, project and process management issues, and technical issues (Shrivastava, 2010; Sutherland, Viktorov, Blount, & Puntikov, 2007; Herbsleb & Moitra, 2001).

### 3. AGILE METHODS IN GSD

The Agile methodology has an iterative style of development that expects change requests, and it is focused on managing the associated risks better.

Many organisations have become global and there is a necessity of Agile methodologies in software development companies.

However, it is not clear yet if both Agility and GSD can be combined to increase the potential of these kind of companies.

According to Holmström et al. (2006), Agile Methodologies can address common issues in Global Software Development projects as follows:

Temporal distance:

- The pair programming practice increases individual responsibility to create an overlap in time and to reduce temporal distance.
- The Scrum practices such as daily meeting, retrospective, demonstration, and planning can strengthen the communicational channel.

Geographical distance:

- Scrum practices can partially reduce communication issues.

Sociocultural distance:

- The Agile practices such as XP pair programming and Scrum daily meetings, demonstration and retrospectives increment mutual understanding and encouragement among team members through the promotion of individual commitment.

Informal vs. formal:

- Agile methodology relying on informal processes to facilitate coordination, but global teams generally rely on formal procedures (Ramesh et al., 2006; Shrivastava, 2010).

### 4. CONCLUSION

Agile methodologies have been used successfully in GSD environments. The encourage and commitment generates by practices such as XP pair programming, Scrum daily meeting, Scrum retrospective, and Scrum demos help to reduce the temporal, geographical and cultural distances. However, it cannot be concluded that both Agile methodologies and GSD can be 100% combined to reduce all GSD issues. It is a fact that successful examples were provided to demonstrate that some of the Agile practices may have been beneficial to incorporate in GSD. However, these examples are more based on internet articles than in proper peer-reviewed and high-quality literature review. It is related to the lack of enough research on the Agile methodologies as a result of this subject is relatively recent.

Finally, there is no magic solution, but Agile methodologies can help to improve GSD issues.

However, it seems that the decision of using Agile methodologies in GSD companies has to be determined by the companies themselves based on their own context and their own possibilities.

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