



# Obstacles of Innovation and Innovation Capabilities in Knowledge Intensive Business Service Sector in Palestine

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**Abstract:** This paper is one of the first to discuss obstacles of innovation in Palestine. We have empirically addressed the main obstacles or hampers of innovation and their influences on innovation capabilities in the knowledge intensive business service using a cross sectional data for a sample of 263 firms provided through a quantitative survey approach. Binary choice logit model has been employed to estimate the relationship between obstacles of innovation and the ability of firms to innovate. The model is run separately for every dependent variable (product, process, organizational and marketing). Each of the dependent variables has two possibilities; to innovate or not. The results show that the innovation obstacles are hampering the propensity of firms to innovate in different levels. Considering the different types of innovation that were assessed in this study, the cost factor (including lack of funds and lack of finance from outside the firm and the high innovation cost) is the factor with the greatest negative impact on the product and process of innovation as well as the organizational and marketing innovation, followed by the demand factor which was reflected by the weak competition and uncertainty and the impact of the prior innovation. On the other hand the knowledge factor had a positive impact on a number of firms that focus on organizational and marketing innovation which were able to overcome it and address it.

**Keywords:** Knowledge, Innovation, marketing Innovation.

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## **Introduction**

The last two decades has experienced a growth in the number of research papers that discuss the importance of the knowledge intensive business service (KIBS) sector in modern economies, and the increasing role that innovation can play to enhance the contribution of KIBS in GDP. However, in comparison to the manufacturing sector, service sector is still not studied enough by researchers and analysts of innovation and technological change; their future development has rarely been considered in terms of policies and roles in their respective innovation and productive systems (Muller & Doloreux, 2007), mainly in the developing countries.

Most of previous studies stress the close relationship between economic development and the growth of KIBS (Miles et al., 1995; Den Hertog, 2000; Schricke et al., 2012). Czarnitzki and Spielkamp (2003) denote that the importance of the KIBS roles as “bridges of knowledge” which are “connecting the manufacturing sector with science and customer”. This idea was also confirmed by Muller and Doloreux (2007) who emphasize the roles and functions of KIBS in creating and diffusing knowledge and fostering regions as innovation systems.

The Palestinian economy is considered a service economy in which the services sector constitutes the highest rate of the GDP and employment; it is considered a great opportunity to invest in. Palestine has limited natural resources and couldn't compete in mass-production; therefore it should recognize the potential for the service sector which has less restrictions and limitations.

Among the service activities, KIBS is considered one of the most innovative subsector which employs intensive knowledge and technology (mainly information and communication technology) in comparison with other services and also manufacturing sector. KIBS in Palestine is divided between ICT, technical engineering, legal services, real estate, consultancies, and financial services. These services are also considered as a complementary for other sectors, therefore it could contribute positively in fostering the growth of productivity of many other sectors and as a result the overall economic growth.

Regardless of the political instability and the strict constraints Israel imposes on the Palestinian economy, there are huge challenges to prompt the innovation capabilities in KIBS firms in Palestine, some are internal (for example, the lack of understanding of innovation, lack of resources and the availability of skills and expertise among employees), and others are external to the firm (for example, knowledge and technology infrastructure in the country, external fund from government). Innovation limitations or barriers also extend from cost factors, knowledge factors to market factors. Each of these barriers might hamper the ability of firms to produce innovation (product, process, organizational and marketing innovation).

In this work we will study to which level the barriers of innovation harm the innovation capabilities of firms in KIBS, i.e. the impact of innovation obstacles on the ability of firms to introduce innovation. In the first section we presented a literature review which includes a certain number of key theoretical and empirical arguments concerning the barriers of innovation and its impact on innovation behavior. In the second section, we introduced a descriptive statistics about KIBS sector in Palestine and the innovation capabilities or performance of the different KIBS activities. In section 3, we introduced the model and both dependent and independent variables with a descriptive analysis on each of them, in



addition to data sources and the analytical method. In the fourth section, we summarized the results of the empirical analysis and provided appropriate recommendations.

### **Literature review**

Many articles have clarified the reasons of innovation barriers and their impact on innovation capabilities for both developed and underdeveloped countries. The estimates of the effects of obstacles on the propensity to innovate are often unsatisfactory. Against the most indicated assumption of the negative impact of innovation obstacles on the ability of firms to present innovation, some researchers found a positive impact. Baldwin and Lin (2002) and Tourigny and Le (2004) explained the significantly positive coefficient associated with the variable obstacles of innovation. According to them, the obstacles of innovation indicate how successfully a firm can overcome these obstacles, which means that the innovation barriers motivate firms to introduce more efforts to overcome these barriers and so increase their innovative capabilities. Savignac (2008) explained the unexpected positive coefficient from the combination of two sources of bias: the endogeneity of obstacles due to unobserved factors affecting both obstacles and the propensity to innovate has to be dealt with, and the inclusion of firms which are not involved in innovation in the sample of interest, i.e. the sample of interest should only include the firms that are involved in innovation and that we label innovation willing firms.

Revealed and deterring barriers were studied by D'Este et al (2012). Data from the 4th UK community innovation survey was used to investigate the relationship between firms' engagement in innovation and their assessment of the barriers to innovation. The study reveals that in the cases of cost and market barriers, the relationship between assessment of the barriers and engagement in innovation activities is characterized by a non-linear relationship. Plotnikova et al. (2015) study the causes of innovative resistance and the parameters of existing barriers. Obstacles to investment into innovations are divided into 3 main groups; the group determined by the state action and infrastructure; the group depending on the form of activity support; and the group connected with education and management. The study shows that there are no signs of reducing the barriers to be an efficient investment activity of the state. All the groups are characterized by the presence of parameters of an attribute appearance, but their change is not enough for a successful investment activity

The barriers to innovation that influence the innovation capability of Portuguese industrial firms have been studied by Silvia (1999). The data used in this study were collected by the OCT and the population includes all the industrial firms with less than 20 employees. Many variables or factors such as the high economic risk, high cost of innovation, lack of financing and others are examined. He found that firms which innovate have more perception of the barriers to innovation. The majority of the variables associated with the barriers to innovation show a negative impact on the innovation capabilities of Portuguese industrial firms.

According to Cordeiro and Vieira (2012) about the barriers to innovation in SME's .Amongst these barriers were economic climate, the limitation of monetary resources, the reduced risk-taking culture, the mechanical performances, the routine and cemented processes to change, and the high costs.

Obstacles to innovation faced by French manufacturing firms have been investigated by Galia and Legros (2004). The paper used the data from the second French community innovation survey (CIS2), and it focused on the obstacles of innovation in both the postponed



and abandoned projects. Possible interrelationships and commentaries between obstacles to innovation are studied as well. They found that the firms postponing projects are more prone to face obstacles linked to economic risk, lack of skilled personnel, innovation costs, lack of customer responsiveness, lack of information on technologies and organizational rigidities, whereas firms that abandoned projects tend to be more subject to economic barriers than to organizational ones.

The impact of hampering innovation factors on innovation performance for European countries were studied by Sipos et al. (2013). They analyzed the impact of hampering innovation factors on innovative performance both within innovative and non-innovative firms. They group the European surveyed countries in four main categories, pointing out the countries' innovative performance perspectives. The study revealed that for innovative companies there is a very strong negative correlation between the lack of information on markets and the innovative performance. The lack of information on technology affected the innovation activities; markets dominated by established companies were a highly important hampering innovation factor only for a relative small share of innovative companies belonging to countries with high innovative performance. A larger share of innovative companies from countries with weaker innovative performance blamed the difficulty in finding cooperation partners for innovation as being a highly important factor of hampering their innovation activities, and in the innovative enterprises' case, the innovative performances obtained were influenced by the lack of qualified personnel.

Karahan and Karhan (2013) tried to determine the activities of Turkish entrepreneur in making innovation, improving new product and process and using new technologies and obstacles that they come across. The effects of innovation and the factors that prevent firms to innovate are both explained in the study. It revealed that the most important tools for innovation are research-development activities; the industrial sector is more advanced than the service sector and innovations in both the industrial sector and the service sector were mostly made in product innovations.

Hadjimanolis (1999) conducted a study that concentrates on the barriers to innovation in less developed countries. A cross-sectional approach was used to determine any variations in innovation performance and characteristics caused by industrial sector specific factors. Five industrial sectors were chosen, a questionnaire and interviews were conducted. Internal and external variables were included in the study. The study has revealed a number of barriers to innovation as perceived by the managers. Also some weaknesses in the socio-economic context such as financing new product development or local construction of machinery, shortage of specialized technical labor and weakness in the supply of technical services were pointed out. Athanasios and Dickson (2001) also analyzed the concept of the national innovation policy (NIP) and put forward arguments supporting the need for a NIP for small developing countries like Cyprus. A large purposive sample of 140 Cypriot firms was compiled for a survey of owner/managers' attitudes toward NIP, including five industrial sectors chosen. The study found an ambivalent attitude towards NIP and inefficiency in design and implementation of innovation policy measures.

In Palestine, there is no considerable literature on innovation; only some reports and short articles published by private firms and non-government organizations which describe the reality and challenges of innovation in the Palestinian areas. For example, Mercy Corps (2013) mentioned that the uniqueness of the Palestinian context creates a challenge



for innovation development, reflecting from the developing countries obstacles. It also emphasizes that the affordability and accessibility to the technical skills required for the innovation development and R&D are considered main causes for the lack of these skills and expertise. Another report developed by solution for development consulting for PITA (2012) mentioned that the main obstacles to sectoral growth of ICT sector in Palestine was the low market demand and lack of skills required for new product development, the weak ecosystem for entrepreneurs and innovation, limited access to external markets and small domestic market, and limited access to finance.

### **The nature of KIBS sector and its innovation performance**

KIBS sector are classified into 14 activities (see table 1 below). Here is a short description about each of them. The computer networking and the computer software and programming sectors are part of the ICT sector, which grew steadily in the last two decades. Table 1 shows that 16.7% of the KIBS firms work in the computer software and programming sector. . Building services and technical engineering and design are also considered overlapped sectors with 15.6% and 16% of sample size respectively. Almost 13% of the firms provide marketing and advertising services, and 12.5% provide training services Management consultant sector include 24 firms (9.1%), and stands for companies providing management solutions, research and assessments. Telecommunication firms are represented by only 20 firms (7.6%) in the sample, and mainly include the only landline firm in Palestine (Palestinian telecommunication “PalTel”) and other internet service providers. Around 5% of firms are providing R&D which is an important input for innovation. Accounting and bookkeeping and other financial services, represent 3.8% and 1.5% of the KIBS firms in the sample respectively. Only 2.7% of the KIBS firms work in the legal services, 2% providing temporary labour recruitments, and only one company (less than 1%) reported working in the environmental services.

**Table 1: The classification of KIBS firms in Palestine**

KIBS areas	Number of firms	percentage
Computer networks/telematics (e.g. on-line databases)	34	12.9
Computer software & programs	43	16.3
Telecommunications	20	7.6
Management consultancy	24	9.1
Accounting and bookkeeping	10	3.8
Building services	41	15.6
Technical engineering service & design	44	16.7
Temporary labour recruitment services	5	1.9
Legal services	7	2.7
Environmental services	1	0.4
Financial services (e.g. securities and stock-market-related activities);	4	1.5
R&D consultancy and “high-tech boutiques”	14	5.3
Marketing/advertising	34	12.9
Training centers	33	12.5

Table 2 shows the innovation output (product, process, marketing, organizational) for the 14 KIBS subsectors. Regarding technological innovation (product and process innovation), we find that telecommunication and technical engineering service & design firms are the most innovative. This might be explained by the high financial and technical capabilities of these firms, and the availability of skills and technologies needed for such innovation. The innovation capabilities of marketing and advertising firms are consistent with the simple nature of product innovation in this sector. Firms in accounting and bookkeeping, labor requirement services, legal services, environmental service, R&D services, and training sector have no technological innovation output. These sectors are considered new and very small sectors with low employment of knowledge and technology.

Computer networks/telematics, computer software & programs, and marketing sectors perform better than other KIBS sectors in regards with non-technological innovation (marketing and organizational innovation). This might be explained by the low cost and the non-technical competences and skills that are required for such innovation. Also, the workers in computer sector (software, hardware, and networks) are considered high skills labor with high level of knowledge and competences. Similar to technological innovation, most firms in accounting and bookkeeping, labor requirement services, legal services, environmental service, R&D services, and training sector never implemented marketing and organizational innovation in 2014 and 2015.

**Table 2: innovation performance of KIBS firms**

KIBS activities	Number of firms			
	Product innovation	Process innovation	Marketing innovation	Organizational innovation
Computer networks/telematics (e.g. on-line databases)	1	1	16	10
Computer software & programs	1	1	12	6
Telecommunications	3	3	9	5
Management consultancy	1	1	2	2
Accounting and bookkeeping	0	0	1	0
Building services	2	1	2	2
Technical engineering service & design	6	3	2	3
Temporary labour recruitment services	0	0	0	0
Legal services	0	0	0	0
Environmental services	0	0	0	0
Financial services (e.g. securities and stock-market-related activities);	0	0	0	0
R&D consultancy and "high-tech boutiques"	0	0	2	1
Marketing/advertising	3	3	10	8
Training centers	0	0	0	0



### Empirical model, data and estimation method

As we mentioned earlier, we will use the data about innovation and obstacles of innovation in KIBS in Palestine in order to explore the impact of innovation obstacles on the ability of firms to introduce four types of innovations (product, process, organizational and market innovation). We will take into account the fact that obstacles of innovation are divided into three set of factors: demand, knowledge and cost factors. Before we estimate the impact of obstacles of innovation on innovation capabilities, we will provide a descriptive view of the data set and the survey characteristics, and some descriptive statistics about the dependent and independent variables used in the model.

#### 3.1 Data

The data was collected using a survey for 400 firms in KIBS sector from a total of 1500 KIBS firms in Palestine, with a response rate of about 65% or 263 firms. The sample was geographically limited with firms in the West Bank and not in the Gaza Strip and Jerusalem due to the constraints imposed by Israel on implementing surveys in Jerusalem and the Siege imposed against Gaza limiting the data collecting from there. Also the reality of KIBS in Gaza is very poor due to 10 years of siege and three successive wars. The innovation behavior of the firms in both 2014 and 2015 was surveyed .

#### 3.2 Dependent variable

Our goal is to measure the effect of hampers of innovation on the ability of firms to introduce innovation. Obstacles of innovation therefore will be our independent variable, and innovation output is the dependent variable. We use the innovation output index where a firm's innovation output is represented by four dummy variables. Each of these variables is equal to one if the firm introduced a product, process, market or organizational innovation. This taxonomy of innovation output is based on the classification of innovation output used in the community innovation survey (CIS) which measures the performance of innovation in Norway and Iceland.

Table 3 shows the percentage of firms introducing different types of innovation. We find a very weak innovation performance in KIBS firms in Palestine, where only 15 firms from 263 (5.3%) introduce product innovation, 10 firms (3.8%) introduce process innovation, 38 (14.4%) introduce marketing innovation and 25 firms (9.5%) introduce organizational innovation. This reflects the reality of business firms in Palestine which are mainly small; less than 10 employees with a low ability to introduce new services.

We find that the percentage of firms implement non-technological innovation is the highest in comparison with technological innovation. This is consistent with the fact that non-technological activities are the most important innovation activities in service sector and mainly in KIBS.

**Table 3: innovation output in KIBS firms in 2014, 2015**

	Number of firms	Percentage
Product innovation	14	5.3%
Process innovation	10	3.8%
Marketing innovation	38	14.4%
Organizational innovation	25	9.5%

### 3.3 Independent variable

Obstacles of innovation are our main independent variable. They are divided into three factors: cost factor, knowledge factor and demand factor, where each factor includes a set of indicators (see table 4 below). Table 4 shows that knowledge factor represented by technology infrastructure (62%) and knowledge base (62%) are the most important hampers of innovation in Palestine. This might be explained by the weak technology infrastructure and the very small size of ICT sector and very low investment in this sector due to the political situation in the Palestinian areas. Cost factor represented by the high cost of innovation (61%) and lack of fund from outside the firm (60.1%) are also among the most important hampers of innovation. This might be explained by the fact that most of KIBS firms (more than 85%) in Palestine are considered small firms; they have less than 20 employees (see table below) and might not be able to provide or to allocate money for innovation. Most of the firms denote that many of the innovative KIBS do not exist in the market (only 27% find that there is no need for innovation due to prior innovations. This attitude is considered an obstacle for innovation).

**Table 4: obstacles of innovation in KIBS in Palestine in 2014, 2015**

Obstacles of innovation		
Cost factor	Lack of funds within your enterprise	35%
	Lack of finance from sources outside your enterprise	60.1%
	Innovation costs too high	61%
Knowledge factor	Lack of qualified personnel	33.5%
	Lack of information on technology	36.9%
	Lack of information on markets	36.1%
	Lack of technology infrastructure in Palestine	62%
	Lack of knowledge base in Palestine	62%
Demand factor	Difficulty in finding cooperation partners for innovation	53%
	No need due to prior innovations	27.8%
	Weak of competition	57%
	Uncertain demand for innovative goods or services	55%

In addition to the obstacles of innovation, the model includes a set of control variables: age of firm, firm size, and if firm export or not. Firm size is considered one of the key control factors, and it is measured by number of workers. As we have mentioned previously, table 5 below shows that around 85.2% of firms employ less than 20 employees, while only less than 1% employ more than 100 employees. This definitely shows that Palestinian KIBS sector is considered a small or medium sector. Most of empirical studies find a positive relationship between firm size and innovation performance.

**Table 5: Number of workers in KIBS in Palestine**

Number of workers	Frequency	Percent
1- 20	224	85.2
21- 50	21	8.0
51- 100	16	6.1
More than 100	2	.8





Firm age is another control variable which might affect innovation performance of KIBS. Old firms might have more experience and market share that might reflect on the financial capabilities and innovation. Data shows that only 20% of KIBS was existing before the Oslo agreement in 1993 which means that KIBS in Palestine is considered a modern sector. The last control variable is the export. Firms which export their services might have more ability and propensity to innovate due to high competition in the international market and also the fluctuation of revenues from out of Palestinian market.

### **Discussion of the results of the empirical analysis**

In this section we present and discuss the results of our empirical investigation, i.e. the impact of innovation obstacles on the innovation performance of KIBS firms in Palestine. Binary choice logit model is employed to estimate the relationship. The model is run separately for every dependent variable (product, process, organizational and marketing). Each dependent variable has two possibilities; to innovate or not.

Table 6 presents the results of model estimation. It shows that in case of product innovation, the cost factor is the most important obstacles to innovation. This conclusion supports what we have mentioned previously: more than 60% of KIBS firms in Palestine find that high innovation cost and lack of external fund are limiting their innovation capabilities or hampering them to do innovation. Demand factors represented by weak completion and uncertain demand for innovative products negatively impact the ability of firms to do innovation. This might be embedded to the uncertainty that generally exist in the Palestinian economy due to the political instability and high fluctuation in income and employment. More than 200 thousand public employees haven't received their salaries along six months in 2014 because of the punishments Israel imposed against Palestine by not transferring the tariff taxes which they collect in behalf of the Palestinian side as signed in Paris agreement; the economic part of Oslo agreement.

A similar result for process innovation is obtained. Cost factor is the most significant hamper of process innovation followed by the demand factor. This confirms what we have mentioned previously that the demand for technological innovation (product and process innovation) is low due to the high related cost, mainly the high percentage of Palestinian new services coming through imports, mainly from Israel. According to Palestinian Central Bureau of Statistics around 80% of Palestinian imports come through Israel. Imports through Israel is considered costly due to the low income and the high ratio of unemployment in Palestine in comparison with that in Israel. This reality affects the demand for product and process innovation negatively.

The knowledge factor is not significant as a hamper of innovation in both product and process innovation. This might be explained by the low ratio of product and process innovation in KIBS firms and (as a result) the decrease of demand for related knowledge and technologies. Also, the service sector in Palestine is still considered new and new product development is growing slowly. The significance of the knowledge factor in marketing and organizational innovation confirms this result.

None of the control variables has significant impact on product and process innovation. This might be justified for the age variable knowing that most of KIBS are considered new as we have mentioned previously; there is no age advantage that might be present in case of product and process innovation. Data shows that only two firms among the KIBS firms

established before 1993 have product innovation. Large firms have no advantage on small firms regarding product and process innovation. This result contradicts many of the studies which give significant and positive advantage for large firms regarding innovation. The insignificant impact of export on product innovation might be explained by the low ratio of exports in the KIBS sector; only 14% of KIBS export their products, only 1% of exporting firms (only 3 firms) have product innovation, and less than 1% of exporting firms (only one firm) have process innovation.

Regarding marketing and organizational innovations, table 6 shows a negative impact for both cost and demand factor, where the cost factor seems to be more hampering innovation in comparison with demand factor. While, the knowledge factor indicates an unexpected result through its positive impact on the innovation capabilities of KIBS firms. This might be explained by what Tourigny and Le (2004) found that obstacles of innovation indicate how successfully a firm can overcome these obstacles. In other words, the lack of knowledge base and technology infrastructure in Palestine, and the lack of qualified personnel and information on technology push firms to overcome these obstacles by finding innovative solutions for their marketing practices. Also, non-technological innovation (marketing and organizational innovation) in Palestine does not require heavy technologies or high developed knowledge and technology infrastructure. It depends mainly on using some new skills and experiences that might be obtained by simple and low cost tools and approaches.

**Table 6: The impact of obstacles of innovation on innovation activities in KIBS firms**

	Dependent variable			
	Product innovation	Process innovation	Marketing innovation	Organizational innovation
Cost factor	-2.149**	-2.31*	-2.249***	-1.94**
Knowledge factor	-1.35	-1.77	3.75***	2.89**
Demand factor	-0.857**	-0.789*	-0.685**	-0.84**
Size	0.76	0.892	1.76**	1.93**
Ln(age)	-0.361	-0.835	-0.303	-0.66*
Export	0.728	-0.408	-0.334	-1.54
Constant	-1.615	-0.327	-4.56**	-1.69
Nagelkerke R2	0.166	0.185	0.219	0.201
Ominibus test	14.5**	15.3**	30.6***	22.7***
Sample size	263	263	263	263

\*\*\* sig at 0.01      \*\* sig at 0.05      \* sig at 0.10

Regarding control variables, we find that firm size positively impacts marketing and organizational innovation. This is consistent with literatures which stress that large firms are more able to produce new innovation output. In Palestine large firms in KIBS are mainly represented by the two telecommunication companies (PalTel group and Wataniya), and some IT firms, which have more capabilities in innovating new marketing solutions and new strategies, plans and administrative competences. Old firms have a disadvantage in organizational innovation, which might be explained by the novelty of KIBS sector and the fact that most of the innovative firms in telecommunication and IT are modern firm instituted after Oslo Agreement and the establishment of the Palestinian Authority.



## Conclusion

In view of the limited previous research and the analysis of the results generated through this study, there is a significant association between innovation performance and the obstacles of innovation facing KIBS firm in Palestine. This study finds an evidence that most of the obstacles of innovation restrict the innovation capabilities of KIBS firms at different levels, considering the different types of innovation that were included in this study (product, process, organizational and marketing). The cost factor (including lack of funds and lack of finance from outside the firm and the increasing of innovation cost) is the factor with the greatest negative impact on the four types of innovation output (product and process innovation as well as the organizational and marketing innovation), followed by the demand factor which was reflected by the weak competition and uncertainty and impact of the prior innovation. On the other hand the knowledge factor has a positive impact on the innovation capabilities of KIBS firms for both organizational and marketing innovation. This might be explained by the fact that lack of knowledge base and technology infrastructure in Palestine push firms to overcome these obstacles by finding innovative solutions for their marketing practices.

Knowing the complexity of the Palestinian context and the potential of innovation in the Palestinian economy, different actors can unlock this potential and contribute to the innovation development in Palestine:

- 1) The Palestinian Authority could create a better enabling environment through facilitating the import of innovation from foreign countries and also encouraging the companies for more innovation through incentives and more safe space with minimal risks from their side
- 2) The Palestinian Authority could also contribute to minimize the cost factor impact on the organizations by facilitating better infrastructure, investing more in research and providing support or incentives for innovative firms. In addition to that, more privet public partnerships could have greater impact on different levels.
- 3) The firms could also invest in non-technological innovation with a longer term change, like market and organizational innovation which will have an impact on the product and process innovation on the longer-term
- 4) Firms could benchmark innovation from other Semi-cultural firms with similar context, in addition to creating the demand for innovation as much as possible.
- 5) Firms could create partnership for technological innovation that could minimize the risk and maximize the impact.
- 6) Creating the awareness of the innovation contribution to the organizational performance and economy will attract the investors and different actors to address the challenges and tackle these obstacles.



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