

○ **FEATURE
ARTICLE**





FEATURE ARTICLE

IMPACT EVALUATION OF IMDA'S iSPRINT SCHEME

INTRODUCTION

The iSPRINT scheme administered by IMDA helps local SMEs defray the costs of automating their business functions through information technology.

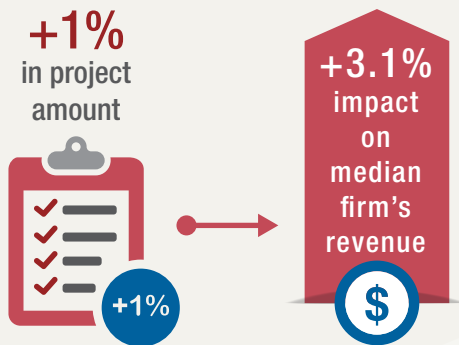
It covers both pre-approved packaged solutions that are ready to use and customised solutions that are tailored to firms' needs.

Examples of solutions covered under iSPRINT

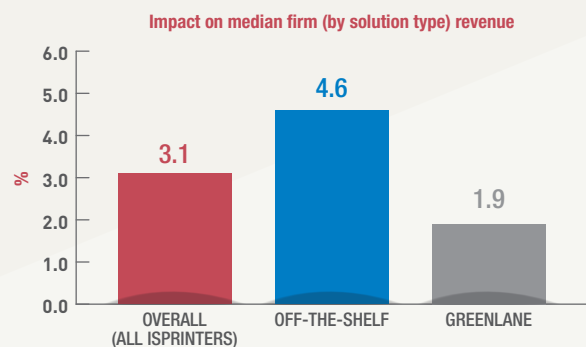


FINDINGS

Finding 1: On average, for every 1% increase in the project amount, the impact on firms' revenue was 0.03%. For the median firm based on revenue size, this translates to a 3.1% increase in its revenue after adopting solutions under iSPRINT.



Findings 2: On average, for every 1% increase in the project amount, firms' revenue increased by 0.05% for off-the-shelf solutions and 0.02% for greenlane solutions. For the median firm by revenue for each solution type, this translates to a revenue impact of 4.6% and 1.9% respectively.



POLICY TAKEAWAY



The iSPRINT scheme has been effective in helping firms raise their revenue through the automation of their business functions, particularly for the firms that implemented off-the-shelf and greenlane solutions. Going forward, IMDA will continue to support our SMEs through the enhanced iSPRINT scheme.

EXECUTIVE SUMMARY

- The iSPRINT is a financial assistance scheme administered by IMDA that aims to help local small- and medium-sized enterprises (SMEs)¹ defray the costs of automating their business functions through information technology. Under the scheme, IMDA provides funding support to local SMEs for the first-time automation of each business function. This study evaluates the impact of the scheme on the revenue performance of firms that participated in the scheme.
- Our findings show that the iSPRINT scheme has a positive impact on the revenue of firms that adopted solutions under the scheme. For example, for the median firm based on revenue size², its revenue was found to be 3.1 per cent higher after adopting iSPRINT solutions. By solution type, off-the-shelf solutions and sector-focused solutions were found to have increased the revenue of the median firm for that solution type by 4.6 per cent and 1.9 per cent respectively.

The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry (MTI) or the Government of Singapore.³

INTRODUCTION

The iSPRINT is a financial assistance scheme administered by the Infocomm Media Development Authority (IMDA) that aims to help local small- and medium-sized enterprises (SMEs) defray the costs of automating their business functions through information technology. Under the scheme, IMDA provides funding support to local SMEs for the first-time automation of each business function. The funding support covers both pre-approved packaged solutions that are ready to use and customised solutions that are tailored to the firms' needs. For packaged solutions, which comprise off-the-shelf and sector-focused (or greenlane) solutions⁴, the iSPRINT scheme defrays up to 70 per cent of the qualifying project cost.⁵ For customised solutions, the grant quantum is determined on a case-by-case basis.

From the launch of the iSPRINT scheme in March 2010 to end-2013,⁶ a total of 4,153 firms had implemented 4,439 solutions under the iSPRINT scheme. Of the solutions taken up, the majority were off-the-shelf types (Exhibit 1).

¹ Local SME is defined to have at least 30 per cent local shareholding, and not more than S\$100 million in group annual sales turnover or not more than 200 employees under the group.

² The median firm here refers to the median firm by revenue out of all firms that took up solutions under iSPRINT. For the median firm analysis for the different solution types, the median firm for a particular solution type refers to the median firm by revenue out of the firms that took up that particular solution.

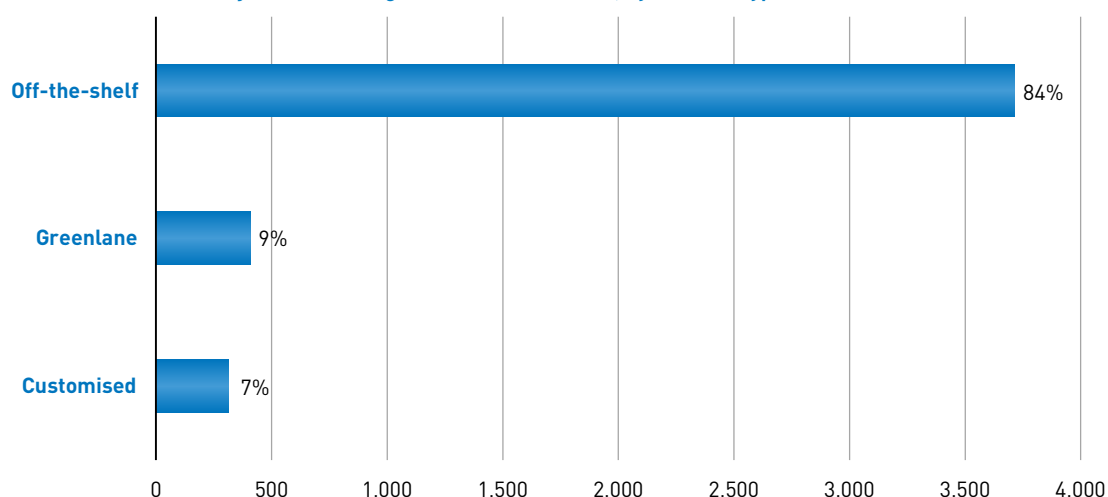
³ We would like to thank Ms Yong Yik Wei, Mr Kenneth Yeow and Dr Andy Feng for their useful suggestions and comments. We are also grateful to IMDA for their inputs to this study. All remaining errors belong to the authors.

⁴ The difference between off-the-shelf and greenlane solutions is that off-the-shelf solutions are more generic solutions, whereas greenlane solutions are sector-type solutions which have been converted from pilot to proven solutions for mass market deployment. Examples of off-the-shelf solutions are accounting, point-of-sales and customer relationship management, while examples of greenlane solutions are fleet management, healthcare management and retail management.

⁵ SMEs can make multiple applications, but funding per SME per corporate lifetime is capped at S\$20,000.

⁶ The ICT for Productivity and Growth (IPG) programme has been incorporated into iSPRINT to become Enhanced iSPRINT starting from August 2014. However, the Enhanced iSPRINT scheme is not included in this study as firm-level data from 2014 onwards is not available at the time of study.

Exhibit 1: Number of Projects Benefitting from iSPRINT Scheme, by Solution Type



Note: The percentage represents the share of each solution type out of the total number of projects supported under the iSPRINT scheme.

This study seeks to evaluate the impact of the iSPRINT scheme on firms' revenue performance. Apart from quantifying the overall impact of the iSPRINT scheme, the study also examines whether the effectiveness of the scheme varies across different solution types.

LITERATURE REVIEW

In the literature, a key issue when evaluating the impact of firm-level assistance programmes is the self-selection of firms into programmes. Unlike in a randomised control trial (RCT) set-up, participation in such programmes is often not random, with firms' participation being dependent on firm characteristics, including those that are unobservable in the data such as the presence of good managers, among others. A naive comparison of the outcomes of firms that participated in a programme with those that did not would then lead to biased results, as the estimated impact could be measuring differences in the unobserved characteristics of the two groups of firms instead of the causal impact of the programme (i.e., selection bias).

Using various econometric methods to overcome selection bias,⁷ studies have found mixed results in terms of the impact of firm-level assistance programmes on SMEs. For example, based on two overseas studies – one in the United Kingdom (UK) and the other in New Zealand – that evaluated the impact of grants and advisory services provided to SMEs on their sales, the UK study⁸ found no impact whereas the New Zealand study⁹ found an impact of up to 20 per cent. In Singapore, a MTI study¹⁰ in 2015 found that SPRING's Capability Development Grant scheme had a positive impact on the revenue of firms that participated in the scheme.

DATA AND EMPIRICAL METHODOLOGY

This study uses an anonymised dataset that tracks individual firms annually from 2007 to 2013. The dataset contains firm-level characteristics, such as the age of the firm, the sector in which the firm operates in, the total remuneration paid to the firm's employees, and the cost of new assets acquired by the firm during the year. The dataset also includes data pertaining to IMDA's iSPRINT scheme, such as the type of solution implemented by the firm, the year in which the solution was implemented, the grant amount disbursed and the project cost.

⁷ See Angrist and Pischke (2009) for a formal discussion of the selection problem and econometric methods to overcome it.

⁸ See Mole et al (2008) for details.

⁹ See Morris & Stevens (2009) for details.

¹⁰ See Chua et al (2015) for details.

Based on the data, a comparison of the firms that implemented iSPRINT solutions with those that did not shows that the former's characteristics were statistically different from the latter's. By regressing firm characteristics on the iSPRINT status of the firms (i.e., whether they implemented iSPRINT solutions and if so, the type of iSPRINT solution implemented), we find that firms that implemented iSPRINT solutions had higher revenue, value-added (VA), gross profits¹¹ and total remuneration on average as compared to firms that did not (Exhibit 2). By solution type, firms that adopted customised solutions had the highest averages for these characteristics, followed by those that adopted greenlane and off-the-shelf solutions respectively. In terms of firm's age, firms that adopted off-the-shelf solutions were on average younger than the firms that did not implement iSPRINT solutions. The converse was true for firms that adopted customised and greenlane solutions. Given that iSPRINT firms are inherently different from non-iSPRINT firms, this analysis suggests that using the latter as a control group to evaluate the outcome of the iSPRINT scheme would lead to biased results.¹²

Exhibit 2: Characteristics of iSPRINT Firms Compared to Non-iSPRINT Firms

Dependent variable	Average by group			
	Non-iSPRINT firms	iSPRINT firms		
		Off-the-shelf	Greenlane	Customised
Revenue (S\$ 'mil)	7.1	7.6**	10.1***	12.1***
Value-added (S\$ 'mil) ²	2.1	(insignificant)	3.5***	4.5***
Gross profits (S\$ 'mil)	1.0	(insignificant)	1.9***	2.4***
Remuneration (S\$ 'mil)	0.9	1.0***	1.3***	1.8***
Age (in years)	9.1	7.2***	10.7***	12.0***

*, ** and *** indicate significance at the 90%, 95%, and 99% levels, respectively

Notes:

1. We controlled for industry which the firm is in in the regressions.
2. Value-added refers to the sum of gross profits and total remuneration.

To overcome this selection bias, we restrict our sample to the 4,153 firms that had implemented solutions under the iSPRINT scheme between 2010 and 2013. We then exploit differences in the timing of when these firms took up the solutions to evaluate the impact of the iSPRINT scheme on their revenue. This empirical strategy essentially uses the firms that adopted solutions under the iSPRINT scheme at a later time as the control group for those that did so earlier. By comparing changes in the revenue of the firms after they had implemented the solutions, with the changes experienced by firms in the control group in the same period, we are able to isolate the causal impact of the iSPRINT scheme.

In order to ensure that other firm- and industry-level differences that could affect firms' revenue are controlled for in our analysis, we also include firm fixed-effects and industry-level linear time trends in our regression. The former would help to remove the effect of time-invariant firm-level characteristics (including unobservable characteristics) on the revenue of firms, while the latter would account for variations in revenue trends that might have arisen due to industry-wide trends across time.

The regression specification used to tease out the causal impact of the iSPRINT scheme on firms' revenue is thus as follows:

$$Y_{ijt} = \beta_0 + \beta_1 \text{iSPRINT}_{it} + \gamma_t + \gamma_t^* \alpha_j + \delta_i + X_{it} + \varepsilon_{ijt} \quad (1)$$

Where:

Y_{ijt} is the log revenue of firm i , in industry j , at time t ;

iSPRINT_{it} is the log dollar amount, taking on the value of the project cost from the year that firm i took up its first solution. If the firm took up two solutions, the variable will take on the value of the sum of the two project costs from the year that it took up the second solution, etc;

¹¹ Gross profits refers to revenue less the cost of goods sold.

¹² We tried using different propensity score matching methods on the observable data to derive a control group of firms from among those that did not implement iSPRINT solutions. However, the results did not pass parallel trends tests, suggesting that there were unobservable factors that were driving the behaviour of firms.

γ_t is a vector of year dummies that captures effects that are common to all firms in the specific year;

$\gamma_t * \alpha_j$ is a vector of year dummies interacted with industry dummies to capture industry-wide trends across time;

δ_i denotes the firm time-invariant fixed-effects;

X_{it} denotes the other firm characteristics, including firm's age, total remuneration, cost of new assets acquired during the year, etc; and

ϵ_{ijt} is the error term that is assumed to be uncorrelated with the independent variables.

The coefficient of interest is β_1 . It measures the average change in the revenue of firms in percentage terms for every one per cent increase in the project amount. We use the cost of the iSPRINT project as the treatment variable rather than the grant amount, as it is more reflective of the quality of the solution that the firm has taken up.

To further investigate if the impact of the iSPRINT scheme differs across solution types, we run a similar regression specification as equation (1), except that the treatment variable $iSPRINT_{it}$ is replaced with individual treatment variables that denote the specific solution type that the firm adopted:

$$Y_{ijt} = \beta_0 + \beta_1 OTS_{it} + \beta_2 GREEN_{it} + \beta_3 CUS_{it} + \gamma_t + \gamma_t * \alpha_j + \delta_i + X_{it} + \epsilon_{ijt} \quad (2)$$

Where:

OTS_{it} is a treatment variable that takes on the value of the project cost from the year that firm i took up an off-the-shelf solution. If the firm took up two off-the shelf solutions, the variable will take on the value of the sum of the two project costs from the year that it took up the second solution, etc. If the firm took up another type of solution, the variable will take on a value of 0;

$GREEN_{it}$ and CUS_{it} are treatment variables that are similarly defined as OTS_{it} , except that they are for firms that took up a greenlane solution and a customised solution respectively; and

All other variables are as defined in equation (1).

RESULTS AND DISCUSSION

Our findings suggest that participation in the iSPRINT scheme has a statistically significant positive impact on the revenue of firms (Exhibit 3). We find that for every one per cent increase in the project amount, the impact on firms' revenue was 0.03 per cent on average. For the median firm based on revenue size, this translates to a 3.1 per cent increase in its revenue following the adoption of solutions under the iSPRINT scheme.

Exhibit 3: Regression Results

Dependent variable: Log(revenue)	
iSPRINT _{it} (β_1)	0.031***
Year effects	Yes
Industry*year interaction	Yes
Firm-fixed effects	Yes
R-squared	0.40
Number of observations	17,452

*, ** and *** indicate significance at the 90%, 95%, and 99% level, respectively

In terms of the impact by solution type, we find that off-the-shelf and greenlane solutions have a positive impact on firms' revenue, although the magnitude of the impact varied (Exhibit 4). Specifically, for every one per cent increase in the project amount, firms' revenue increased by 0.05 per cent on average for off-the-shelf solutions and 0.02 per cent on average for greenlane solutions. For the median firm by revenue for each solution type¹³, this translates to a revenue impact of 4.6 per cent and 1.9 per cent for off-the-shelf and greenlane solutions respectively.

Exhibit 4: Impact of Different iSPRINT Solution Types on Firms' Revenue

Dependent variable: Log(revenue)	
Off-the-shelf (β_1)	0.046***
Greenlane (β_2)	0.019*
Customised (β_3) [^]	0.002
Year effects	Yes
Industry*year interaction	Yes
Firm-fixed effects	Yes
R-squared	0.40
Number of observations	17,452

*, ** and *** indicate significance at the 90%, 95%, and 99% level, respectively

Note: [^]Customised solutions did not show statistical significance even at the 90% significance level. Possible reasons for this finding are the potentially longer time taken for customised solutions to become fully operational, as well as the smaller number of projects involving customised solutions during the period of analysis.

CONCLUSION

Our study finds that the iSPRINT scheme has been effective in helping local SMEs raise their revenue through the automation of their business functions, particularly for the firms that implemented off-the-shelf and greenlane solutions. Going forward, IMDA will continue to support our SMEs through the enhanced iSPRINT scheme.

Contributed by:

Melinda Poh, Economist
Economics Division
Ministry of Trade and Industry

Li Shan, Economist
Economics Division
Ministry of Trade and Industry

¹³ For the median firm analysis for the different solution types, the median firm for a particular solution type refers to the median firm by revenue out of the firms that took up that particular solution.

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