ICARDA
Science for Better Livelihoods in Dry Areas

6th International Date Palm Conference

SIXTH INTERNATIONAL DATE PALM CONFERENCE (SIDPC)

ADOPTION ASSESSMENT OF THE PROJECT INTRODUCED TECHNOLOGIES FOR DATE PALM FARMING SYSTEM IN THE SULTANATE OF OMAN

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SCOPE OF THE STUDY

- Study conducted in the framework of the "*Development of sustainable date palm production systems in the GCC countries*" - Aims to produce **new knowledge and practices** to improve date palm production systems in the Gulf Region.

- Activities include improving the productivity of cultivars, managing NR (land and water) for optimal performance, optimization the use of different inputs in the cropping process (fertilizers, pollinators, wastewater, etc.) and genetic diversity of the date palms.

- Optimizing use of limited resources for technology transfer in agricultural development.

- Economic assessment is a vital tool. It can enumerate the potential costs and value the anticipated benefits of a proposed program on target group livelihoods.

- Two promising technologies introduced through the ICARDA Date Palm Project: Liquid pollination (LP) & polycarbonate drying houses (PDH).

OBJECTIVES OF THE STUDY

- **First:** To evaluate Economically and compare:
  - Manual versus liquid pollination methods of date palm trees.
  - Polycarbonate drying house for date palm products (with vs without Gov subsidies).

- **Second:** to assess the rate and level of adoption of these technologies and identify main constraints that limit the adoption process in Oman through using ADOPT (Adoption and Diffusion Outcome Prediction Tool).

- **Last:** to draw recommendations to promote adoption, ensure scaling-up and widespread use of these technologies.

CONCEPTUAL FRAMEWORK

Data collection and analysis

1. Economic analysis: Rapid agro-economic survey was conducted on selected areas (farmers and extensionists).

2. Adoption: Focus groups discussions (FDG's)

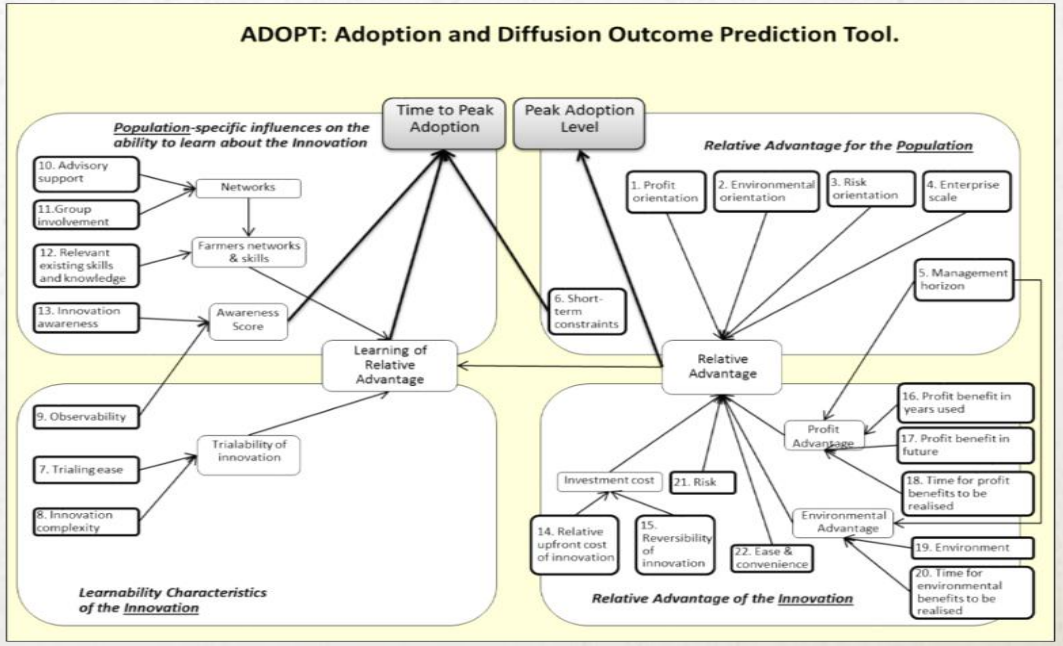
Methodological background

- Economic analysis:
  - CBA/Partial Budget Analysis was used as a decision tool after the computation of all cost and benefits were valued in local currency to obtain the Cost-Benefit Ratios (CBR) or net welfare.
  - NPV, IRR and Payback period Indicators
- Level of adoption/adoption determinants factors: ADOPT (Adoption and Diffusion Outcome Prediction Tool) was used:

- **Predict** the likely peak level of adoption of an innovation and the time taken to reach that peak.
- **Encourage** users to consider the factors that affect adoption at the time that projects are designed.
- **Engage** research, development and extension managers and practitioners by making adoptability knowledge and considerations more transparent and understandable.

Source: http://aciar.gov.au/files/node/13992/adopt_a_tool_for_evaluating_adoptability_of_agric_94588.pdf

	Benefit-cost analysis of technologies using Partial Budget Analysis							
		Without technology				With technology option		
1	Costs	A	B	C	Costs	D	E	F
2	Inputs	Quantity	Unit price	Total	Inputs	Quantity	Unit price	Total
3	seeds				seeds			
4	fert				fert			
5	pesticides				pesticides			
6	labor				labor			
7	fuel				fuel			
8	machiney				machiney			
9	Total	XX	XX	XX	Total	XX	XX	XX
10								
11	Revenue				Revenue			
12	Main product				Main product			
13	Secondary product				Secondary product			
14	Total revenue	XX	XX	XX	Total revenue	XX	XX	XX
15								
16	Indicators							
17	Net returns			C14-C9				F14-F9
18	% change in NR							(F17-C17)/C17
19	% change in TC							(F9-C9)/C9
20	IRR							Change NR/Change in TC
21	Benefit-cost Ratio			C14/C9				F14/F9



RESULTS & DISCUSSION – LP Technology

Advantages of using liquid pollination

- Saves time and effort (reducing labor cost and improving the effectiveness and productivity of the labor used);
- Reduces the quantity of pollen needed; pollen costs, and labor;
- Reduces the risk low fruit set by pollinating during the peak period of flowering;
- Improves the quality of the fruits and consequently the profitability of the varieties intended for export;
- Improves the fruit setting percentage;
- Contributes to reducing harvesting losses;
- Reduces the risk of climbing accidents to laborers.

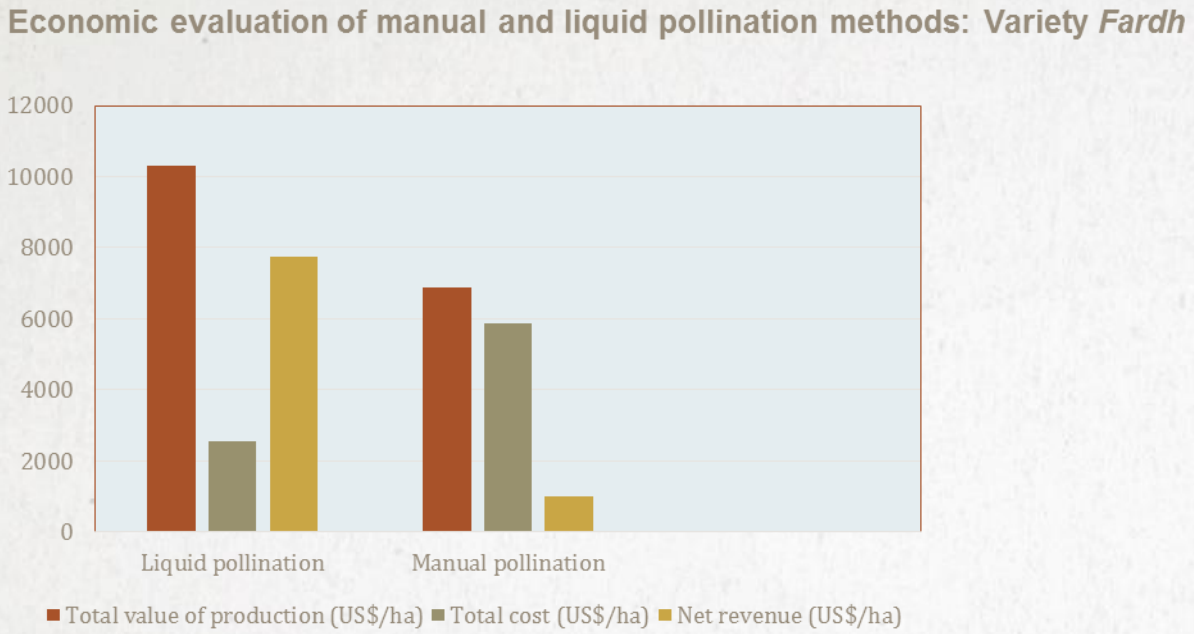
RESULTS & DISCUSSION – LP Technology

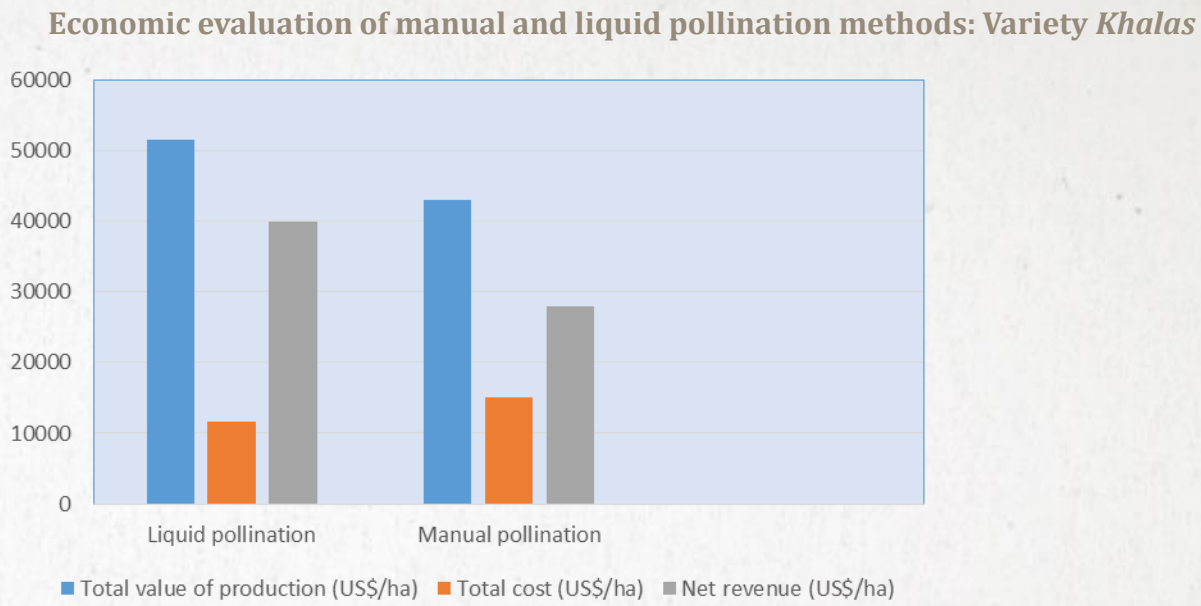
Constraints to using liquid pollination

- No interest from the younger generation in date palm production;
- The pollination extraction device is expensive (around US$ 9000), which small-scale farmers cannot afford;
- Limited number of date palm trees per farmer (the investment in the pollination extraction device is not profitable – cooperatives and or farmers' organizations);
- Resistance of farmers to adopting the new technology and to changing their practices (farmers are accustomed to the old technology of hand pollination);
- Lack of specialized extension for the date palm & difficulty of extension (limited number of extension staff with massive responsibilities).

RESULTS & DISCUSSION – LP Technology

Economic comparison and evaluation of manual and liquid pollination methods of date palm trees





Economic Indicators:

Change in net revenue/ha: + 100%

Change in pollination cost/ha: - 89.05%

Change in total cost/ha: - 56.48%

Financial Indicators:

IRR = 12.04

BCR (LP) = 4.03

BCR (MP) = 1.17

Economic Indicators:

Change in net revenue/ha: + 42.60%

Change in pollination cost/ha: - 89.05%

Change in total cost/ha: - 22.10%

Financial Indicators:

IRR = 1.92

BCR (LP) = 3.41

BCR (MP) = 1.86

RESULTS & DISCUSSION – PDH Technology

Advantages vs constraints of using polycarbonate drying houses

Advantages (+)

- Improves the quality of the fruits, especially in humid areas;
- Avoids the contamination of dates by insects, birds, dust, and rain;
- Accelerates the drying rate and reduces the loss rate;
- Could be used for other purposes (e.g. drying other products, such as fish).

Constraints (-)

- High initial investment cost (subsidized by the government!!!);
- Concerns over the impact of heat on the quality of product (transfer of the plastic material);
- Farmers lack knowledge on the maintenance of the system;
- Not profitable for date palm growers with very small holdings (cooperatives).

RESULTS & DISCUSSION – PDH Technology

Economic evaluation of a polycarbonate drying house for date palm products

Economic and financial analysis of a polycarbonate drying house

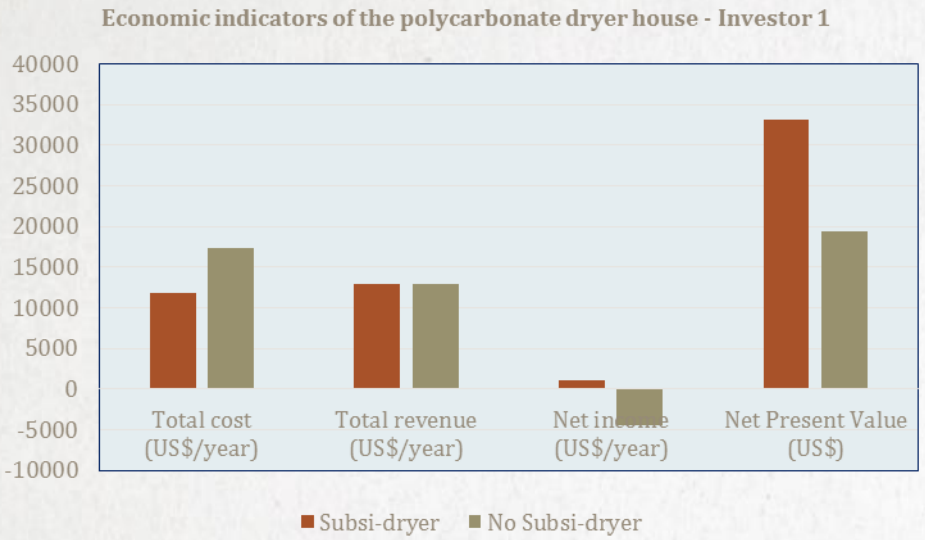
Estimated capital cost for polycarbonate dryer house for dates

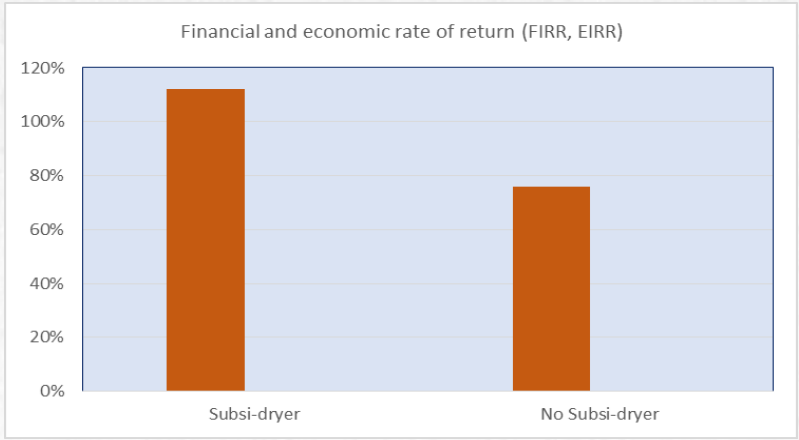
	Farmer 1 (Small drying house) **Capacity of dryer: 3000 kg/year**		**Farmer 2 (Large drying house)** **Capacity of dryer: 6000 kg/year**	
	With subsidies (OMR / US$)	Without subsidies (OMR / US$)	With subsidies (OMR / US$)	Without subsidies (OMR / US$)
Total Capital Cost (OMR) **Total Capital Cost (US$)**	1000 2600	3000 7800	2700 7020	4700 12220

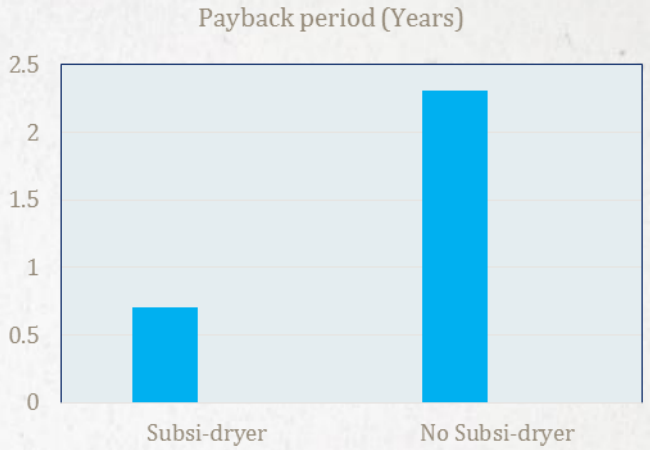
Note: The governmental subsidy for this type of drying house is around 2000 OMR (5200 US$)

RESULTS & DISCUSSION – PDH Technology

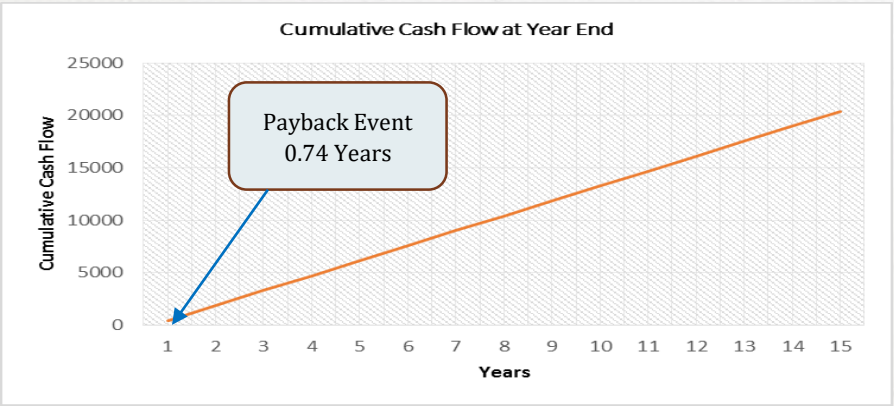
Economic evaluation of PDH: Scenario I – Large PDH



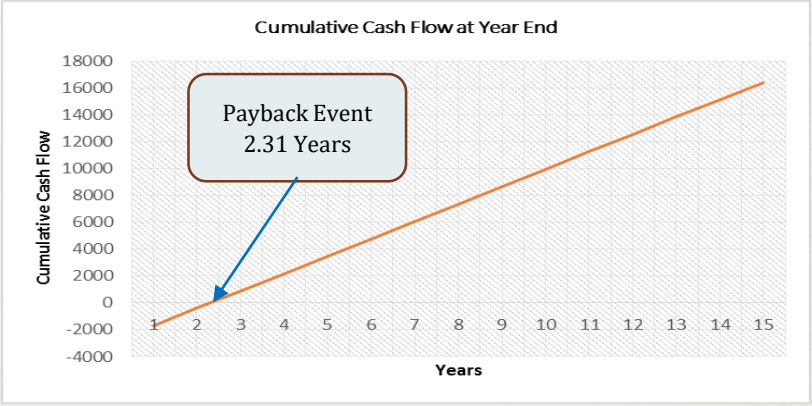




Cumulative cash flow at year end – Subsidized dryer

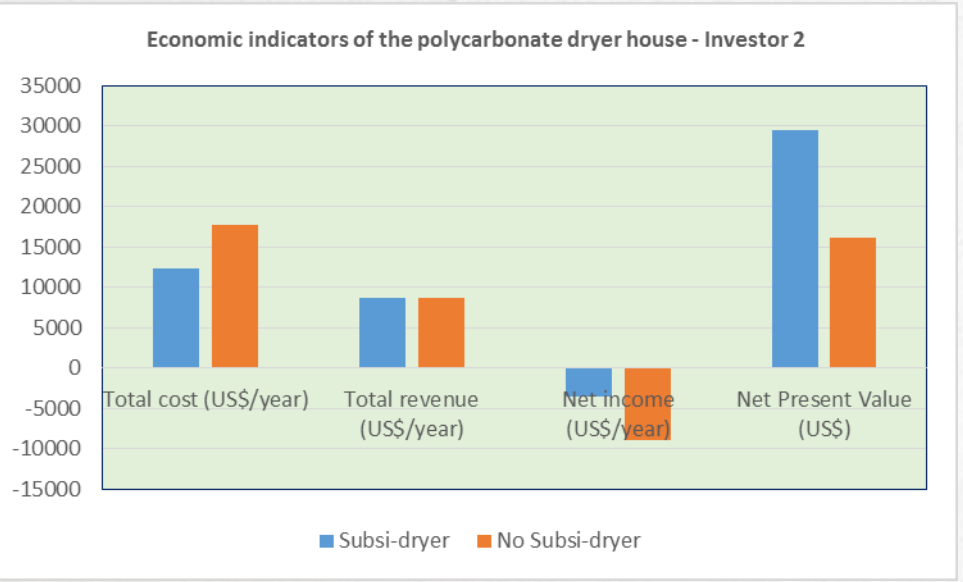


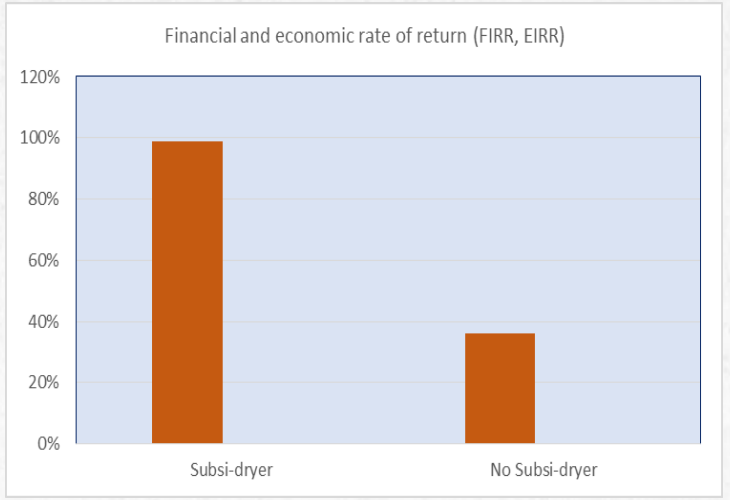
Cumulative cash flow at year end – Not subsidized dryer

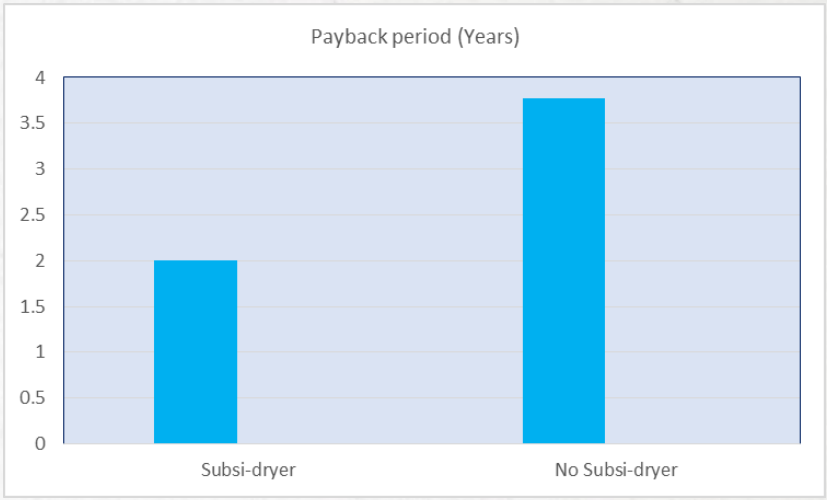


RESULTS & DISCUSSION – PDH Technology

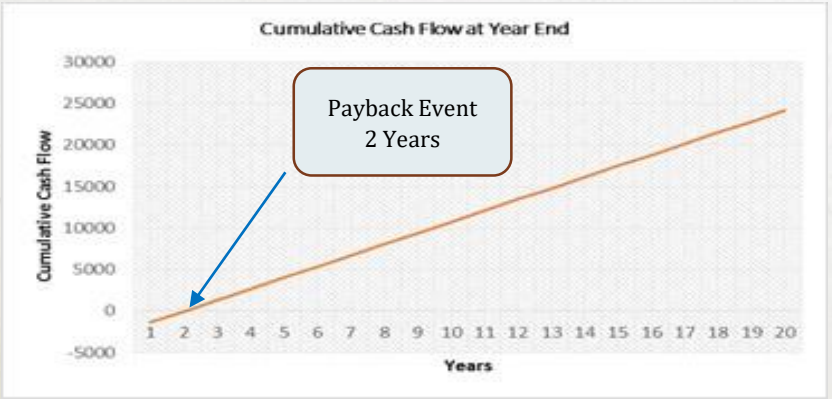
Economic evaluation of PDH: Scenario II – Large PDH



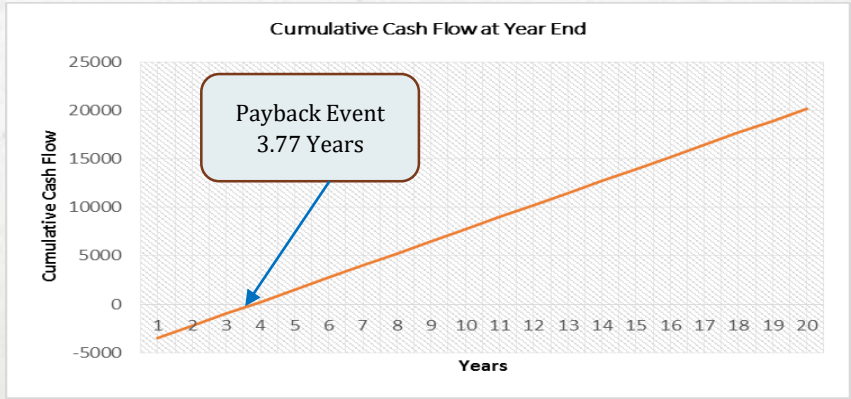




Cumulative cash flow at year end – Subsidized dryer



Cumulative cash flow at year end – Not subsidized dryer

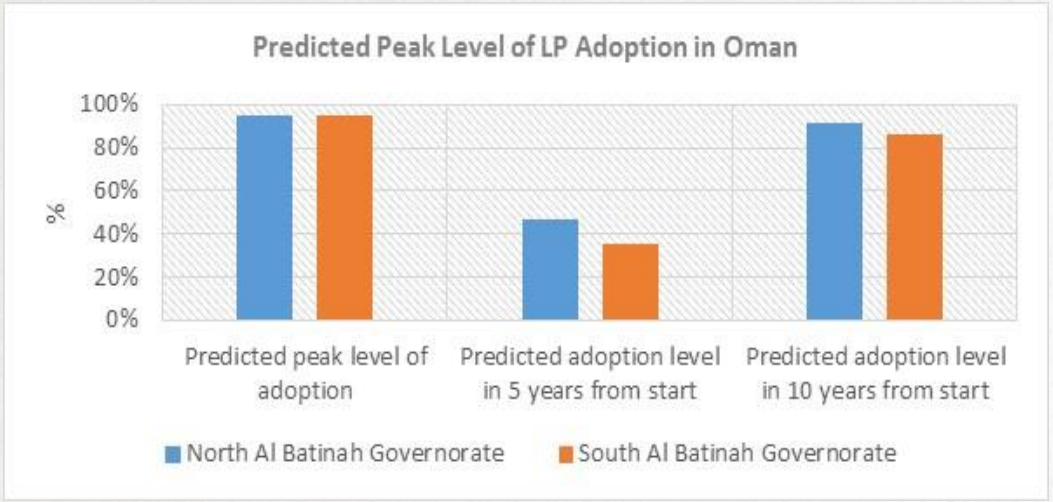


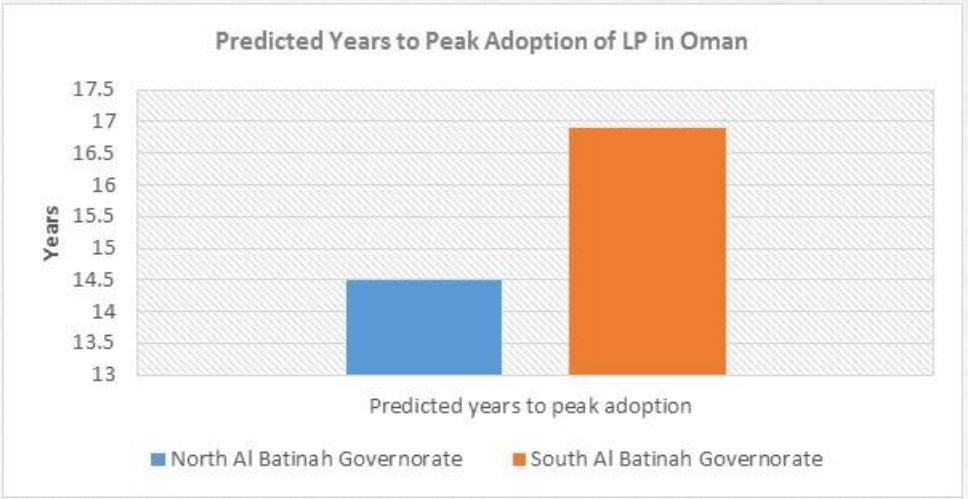
ADOPT
Adoption and Diffusion Outcome Prediction Tool

RESULTS & DISCUSSION

Adoption levels and factors affecting the adoption of LP in Oman

Predicted Adoption Levels, Years to Peak Adoption and Factors Affecting the Adoption of Liquid Pollination (LP) Technology in Oman





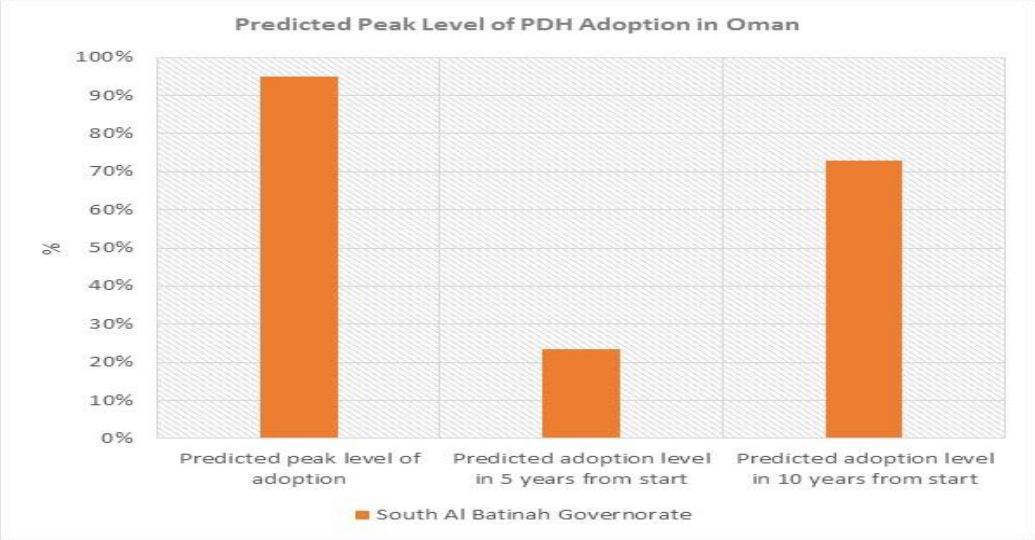
Factors Affecting the Adoption of Liquid Pollination (LP) Technology:

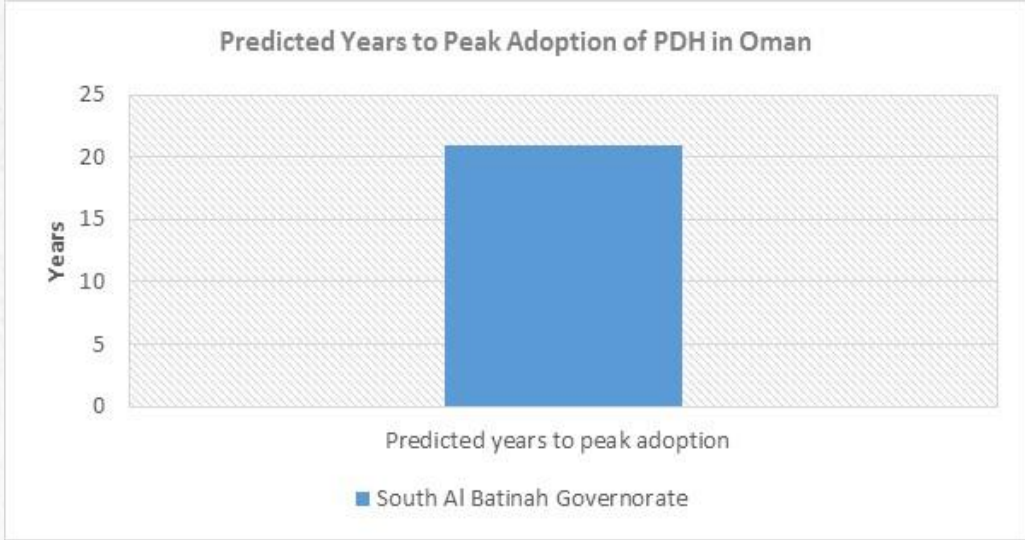
- Technical assistance (advisory services);
- Substantial new skills and knowledge;
- Short term financial constraints;
- Triability of the innovation (LP Technology).

RESULTS & DISCUSSION

Adoption levels and factors affecting the adoption of PDH in Oman

Predicted Adoption Levels and Factors Affecting the Adoption of Polycarbonate Drying House (PDH) Technology in Oman





Factors Affecting the Adoption of Polycarbonate Drying House (PDH) Technology in Oman:

- Perception and evaluation of the PDH technique;
- Specialized extension advisory services;
- Size of the up-front cost of the investment;
- Know-how on the management of the PDH technology.

CONCLUDING REMARKS AND POLICY IMPLICATIONS

Liquid pollination technology

- Clear evidence on the **economic profitability** of liquid pollination technology over manual pollination.
- The **characteristics of the technology** is a determinant on its **level to peak adoption** and on the **time to peak** the corresponding adoption level (**95% after 15 years**).
- To accelerate the adoption process and scaling-up the use of LP technology:
  - Development of an agricultural management program for date palm tree services, the application of quality control measures, and an increase in capacity building to reduce the cost of production;
  - Creation, promotion and monitoring of private companies to carry out and monitor the liquid pollination operations;
  - Enhancing the extension services (more and specialized extension agents) and the development of an effective extension service for Omani date palm growers;
  - Enhancing the awareness of date palm growers regarding the profitability of using this technology in comparison to the manual pollination method.

CONCLUDING REMARKS AND POLICY IMPLICATIONS

Polycarbonate drying houses technology

- **High profitability** of the polycarbonate drying system, even when it is not subsidized by the Government;
- Investment is **usually acceptable and profitable** (NPV is positive and PBP is short);
- IRR was higher than the current interest rate in Oman: This should **encourage both date palm growers and investors to invest** in polycarbonate drying houses;
- To accelerate the adoption process and scaling-up the use of PDH technology:
  - Need for a greater political and institutional inputs into PDH projects;
  - Need to design and develop alternative policy instruments (other than subsidies) and institutions for extension, technical assistance, training, and credit services that will facilitate adoption of this technology;
  - In Oman (and GCC countries), increasing farmers' knowledge and perception of the merits of polycarbonate drying houses (and their uses for other products) through better access to technical information, extension, and training will help them to develop a positive economic assessment of the technology;
  - Polycarbonate drying houses projects should be targeted at areas with high levels of date production.

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THANK YOU

QUESTIONS !!!

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