IDD Vision
The IDD to be recognized as a world class Outcome Management Journal/Periodical.

IDD Mission
"IDD’s Mission is to provide useful, timely and thought-provoking content in Outcome management driven disciplines that addresses a broad spectrum of practices for knowledge exchange among academicians, researchers and practitioners".

IDD Objectives
1. To bridge the gap between academicians and practitioners in the discipline of outcome management
2. To provide a platform to academic researchers and practitioners for disseminating their research work.
3. To promote adoption of innovative outcome management disciplines
4. To highlight challenges being faced by the outcome managers (practitioners)

IDD Scope
1. The IDD journal will cover application of the cross cutting themes of Outcome management disciplines. No other journal in the world is having such orientation.
2. IDD journal’s main emphasis is on applied research.
3. IDD journal will accommodate articles based on both qualitative and/or quantitative approaches. However, preference will be given to mixed methods and action research.
4. Geographical territory of our journal is the entire globe.
5. Our target audience includes academics and practitioners in outcome management.
Introduction of IOCOM

IOCOM is a not-for-profit corporation registered in Canada. It is an organization of professionals, academics and an alliance of international and national associations, societies and networks engaged in the discipline of outcome management.

IOCOM invites professionals and academics to create a forum for the exchange of useful and high-quality theories, methodologies and effective practices in outcome management drawn from all management disciplines. IOCOM encourages management practitioners contributing to outcome management in all fields to make use of our resources, to participate in our initiatives and to contribute to our goals as individuals or through outcome management organizations. We offer global linkages to outcome management professionals, organizations and networks about events and important initiatives, as well as opportunities for exchanging ideas, practices, and insights with peers throughout the world.

IOCOM’s Vision

To create a world where professionals, academia, organizations and networks with a focus and interest in effective outcome management, collaborate to strengthen the theory and practice of the discipline that benefits society.

IOCOM’s Mission

To promote outcome management in the world at large through multidisciplinary professional and academic collaboration and the quest for evidence in decision making for business and organizational viability.

IOCOM organizational and individual memberships are free and provide the benefits of professional connectivity worldwide. Please visit our web site at www.iocomsa.org and join IOCOM.

IOCOM Board of Directors

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Sandiran Premakanthan (Chair)</td>
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Please send your write-ups and comments to: editorsIDD@iocomsa.org
IOCOM Digest and Dialogue

Volume 3, Issue 3, Jul-Sep 2017

4 Message from the Chair/President

7 Editors’ Note

ARTICLES

8 Outstanding in her field: A new profile of Canadian agriculture
John Flanders

14 Sri Lanka’s 150-year-old tea industry in competitive crisis
Sandiran Premakanthan

23 Outcome management, agrarian change and small farmers in globalized India
K.N. Bhatt

28 Agriculture in a mountain economy, constraints and policy options: The Indian state of Uttarakhand
Ishwar Awasthi

33 The impact of agriculture subsidies on the yield and production of wheat crop in Pakistan
Atiq ur Rehman

39 Authors’ introduction

40 Call for articles
Message from the Chair/ President

It is my great pleasure to release this special issue that we have dedicated to agricultural outcome management and food security. Articles in this issue examine the importance of agricultural outcome management and its contribution to world food security.

The UN’s Agenda for Sustainable Development, approved in 2015 in New York, sets a ground-breaking new commitment for all countries: to end hunger and “all forms of malnutrition” by 2030. It will be a prodigious job. Globally, one in nine people in the world today, roughly 795 million, are undernourished. The food and agriculture sector offers key solutions for development and is central to the struggle to break the cycle of hunger and poverty.

Authors have been encouraged to write on various sub-themes, including agricultural policies, agricultural management services, food security and environment, gender in agriculture, trade in agricultural commodities, use of digital technology in agriculture, and land-grabbing security.

Other topics are the World Trade Organization (WTO) Agreement on Agriculture, and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), which is an international legal agreement among all member nations of the WTO.

Global Food Security Index (GFSI)

The Food and Agriculture Organization (FAO) of the United Nations defines food security as: "A condition in which all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” The Global Food Security Index, developed by the Economist Intelligence Unit (EIU) and sponsored by DuPont, considers three core pillars of food security—affordability, availability and quality and safety—across 113 countries. The index is a dynamic quantitative and qualitative benchmarking model, constructed from 28 unique indicators. It provides an objective framework for evaluating food security across a wide range of countries.

By creating a standardized metric around food security, the EIU seeks to empower users to explore the issues surrounding food security—including the rankings and results—and draw conclusions for policy, business operations and future research. It is an annual measure of the state of global food security.

While food security research is the focus of many organizations worldwide, this index is distinct for two reasons. First, the study looks beyond hunger to the underlying factors affecting food insecurity. Second, the study employs an adjustment factor for fluctuations in global food prices to examine the risk that countries face in the area of food affordability throughout the course of the year.
This framework is based on the internationally accepted definition established at the 1996 World Food Summit.

In 2015, UN member nations adopted the 2030 Agenda for Sustainable Development (http://www.un.org/sustainabledevelopment/) and its 17 Sustainable Development Goals for transforming our world. In 2016, the Paris Agreement on climate change entered into force, addressing the need to limit the rise of global temperatures.

It is an undivided, universal and inclusive call for nations to act to improve the lives of people everywhere. Led by the United Nations, governments, businesses and civil society together have started to mobilize resources and efforts to attain the sustainable development agenda by the target date. Some of these goals are:

**Sustainable Development Goal #2:** End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

**Sustainable Development Goal #12** addresses the issue of ensuring sustainable consumption and production patterns. While substantial environmental impacts from food occur in the production phase, such as agriculture and food processing, households influence these impacts through their dietary choices and habits. This consequently affects the environment through food-related energy consumption and waste generation. For example:

- 1.3 billion tons of food are wasted every year, while almost 1 billion people go undernourished and another 1 billion go hungry.
- Overconsumption of food is detrimental to our health and the environment.
- 2 billion people globally are overweight or obese.
- Land degradation, declining soil fertility, unsustainable water use, overfishing and marine environmental degradation are all lessening the ability of the natural resource base to supply food.
- The food sector accounts for roughly 30 per cent of the world’s total energy consumption and around 22 per cent of total greenhouse gas emissions.

International organizations, governments and non-governmental organizations (NGOs) all over the world are addressing hunger and related health issues.

**The Food and Agriculture Organization (FAO)**

The Food and Agriculture Organization (FAO) is a specialized agency of the United Nations that leads international efforts to defeat hunger.

FAO’s goal is to achieve food security for all and to make sure that people have regular access to enough high-quality food to lead active, healthy lives. With more than 194 member states, FAO
works in over 130 countries worldwide. FAO believes that everyone can play a part in ending hunger.

**World Food Programme (WFP)**

The World Food Programme is the leading humanitarian organization fighting hunger worldwide, delivering food assistance in emergencies and working with communities to improve nutrition and build resilience. WFP is assisting 80 million people in around 80 countries each year. The program is funded entirely by voluntary donations; in 2016, WFP raised US$5.9 billion.

In this issue, I have written an article entitled “Sri Lanka’s 150-year-old Tea Industry in Competitive Crisis”. The article examines Ceylon’s tea export performance and competitiveness in the world market and provides a brief history. The industry was pioneered by British-born James Taylor who first planted tea at Ceylon’s first tea estate, Loolecondera in 1867. There are four other scholarly articles: from India, Malaysia and Canada for your reading pleasure.

The editorial team is always open to suggestions for improving the quality of the IDD. We encourage all of you to write articles for future issues.

**Chair/President**

_Sandiran Premakanthan_
Editors’ Note

The third and last issue of 2017 is before you. The theme of the issue is “Agricultural Outcome Management”. It contains five articles. Some articles are country case studies and others are broad.

We hope that you will find the articles very useful and relevant. The articles have highlighted many policy issues which are expected to initiate policy debates at a global level. Agriculture matters a lot to the livelihood of millions of people living in the rural areas especially in developing countries. Development of agriculture is a key to the achievement of elimination of poverty from the face of the earth. The task is very challenging but doable. China has provided strong evidence that through development of agriculture millions of people can be rescued from the trap of the vicious circle of poverty.

We ask you to widely circulate this issue in your social and professional circles and provide your comments and suggestions on the policies as well as on the quality and contents of this e-journal.

The theme of the next issue will be “Leadership and Managing People”. Please submit your articles as per details on Page 40.

Editors

Atiq ur Rehman, John Flanders, and Susanne Moehlenbeck
Outstanding in her field: A new profile of Canadian agriculture

John Flanders

Margaret Van Camp is typical of the nearly 78,000 women who operate a farm in Canada these days. On the homestead, she owns a broiler chicken operation near Toronto, in the province of Ontario; off the farm, she is a senior editor for a group of agricultural magazines in Canada.

Ms Van Camp, who holds a bachelor’s degree in animal sciences, says technological advancements are making farms more female friendly.

“It’s brains over brawn today,” she told a journalist from a Canadian farm publication. In her case, automated systems in her broiler chicken operation allow time for her editing assignments.

Ms Van Camp notes how modern agriculture is more data driven, and adds: “Women tend to be really good at managing people and systems.”

Just-released data from Canada’s 2016 Census of Agriculture show the nation had 271,935 farm operators in 2016; some seven in 10 (71.3%) were men. However, the proportion of female farm operators increased from 27.4% in 2011 to 28.7% in 2016, continuing a 25-year upward trend.

During this five-year period, the proportion of farm operations with male operators only fell from 61.4% to 60.1%. On the other hand, the proportion with female operators only increased from 5.6% to 7.2%. Twenty-five years ago, just 3.9% of operations had only female operators.

Glimmer of hope

The increase in young female farmers offers a glimmer of hope in what some see as an otherwise troubling snapshot of Canadian agriculture.

The Census of Agriculture, conducted every five years, provides comprehensive information on topics such as crop area, number of livestock, weeks of farm labour,
number and value of farm machinery, farm expenses and receipts, and land management practices.

Data released in May 2017 illustrate several worrying trends in the nation’s agricultural system. For example:

- The census enumerated 193,492 agricultural operations, down 5.9% from 2011; the 271,935 farm operators represented a 7.5% decline.

- Nearly half (44.4%) of all farm operators reported doing some off-farm work, usually to supplement their income; 30% said they work at least 30 hours a week off-farm.

- Canadian farmers are graying. During the past five years, their average age rose from 54.0 to 55.0. Farmers aged 55 to 59 accounted for the largest share.

- Only one in every 12 farm operators had a formal succession plan laying out how to transfer their farm operation to the next generation. Unfortunately, one succession strategy that continues to gain steam is consolidation, with the average farm increasing in size to 820 acres in 2016.

- Farm profits remained unchanged. In 2015, gross farm receipts totalled $69.4 billion, while operating expenses hit $57.5 billion. On average, for every dollar in receipts, farms incurred 83 cents in expenses for an expense-to-receipt ratio of 0.83. Rounded to the nearest cent, the ratio was unchanged from five years earlier. (All figures are in Canadian dollars.)

Thankfully, all the news wasn’t worrisome. For the first time in 25 years, the number of new farmers aged 34 and under rose slightly: from 24,120 in 2011 to 24,850 in 2016.

The age category 34 and under was still dominated by men. However, between 2011 and 2016, the number of farms with only male operators in that age group rose 24.4%, while the number with only female operators more than doubled.

In other words, both men and women are taking over agricultural operations from their retiring counterparts.

**Farming operations getting larger and using more available land**

While there are fewer agricultural operations and farm operators, agricultural operations are getting larger and using more of Canada’s available agricultural land to grow crops.
In 1971, Canada’s 366,110 agricultural operations covered 169.7 million acres, with an average farm size of 463 acres.

By 2016, the number of agricultural operations had declined 47.1% to 193,492, while the total farm area fell 6.4% to 158.7 million acres. However, the average farm size had increased to 820 acres.

Despite the drop in total farm area, cropland acreage hit 93.4 million acres in 2016, a record high in the census. Cropland accounted for 58.8% of total farm area as farmers switched from livestock production to crops.

**Crop sector: Nearly one-third of farm operations in oilseeds, grain**

Oilseed and grain-type farms remained the most common type of farm in 2016 and beef-type farms second most common. In 2015, oilseeds and grains brought farmers $26.2 billion in gross receipts, 37.8% of total receipts, the largest share.

Canada’s 63,628 oilseed and grain-type farms accounted for one-third (32.9%) of Canadian agricultural operations in 2016, compared with 30.0% five years earlier. In large part, this was due to the amount of arable land available in the three Prairie Provinces – Manitoba, Saskatchewan and Alberta.

Between 2011 and 2016, the area of oilseeds and pulses combined increased 27.4% to 38.3 million acres, the fastest growth rate of all crops.

Oilseeds are soybeans, canola, mustard seed, sunflowers and flaxseed. Pulses include dry field peas, chickpeas, lentils, dry white beans and other dry beans. These crops are important for Canadian farmers because of the potential for export to countries such as China, Japan, Mexico and India.

**Spring wheat no longer king of crops in Canada**

In 1981, spring wheat was king in Canada, with by far the largest acreage. By 2011, it had been knocked off its throne by canola, which jumped from seventh place. In 2016, canola was again the largest crop.

During the past 35 years, Canadian farmers shifted production, responding to a variety of factors, such as domestic or international demand, profitability and development of higher yielding varieties.

Crops such as spring wheat (excluding durum), barley and oats have become less popular, while farmers are planting more and more oilseeds and pulses.
Between 1981 and 2016, the total area of oilseeds increased nearly five-fold, while the total area of pulses was 21 times larger. At the same time, the acreage of all wheat (spring wheat, durum wheat and winter wheat) tumbled 23.8%. (Spring wheat is used to make bread, while durum is used to make pasta.)

The most recent data available from the UN’s Food and Agriculture Organization identified Canada as the world’s largest producer of canola and lentils in 2014, and the seventh-largest producer of soybeans.

**Rankings of principal field crops, Canada, 1981 and 2016**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Field Crop</th>
<th>Acres 1981</th>
<th>Rank</th>
<th>Field Crop</th>
<th>Acres 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spring wheat (excluding durum)</td>
<td>25,748,008</td>
<td>1</td>
<td>Canola (rapeseed)</td>
<td>20,606,778</td>
</tr>
<tr>
<td>2</td>
<td>Barley</td>
<td>13,484,516</td>
<td>2</td>
<td>Spring wheat (excluding durum)</td>
<td>15,693,427</td>
</tr>
<tr>
<td>3</td>
<td>All other tame hay</td>
<td>6,353,498</td>
<td>3</td>
<td>Alfalfa and alfalfa mixtures</td>
<td>9,276,755</td>
</tr>
<tr>
<td>4</td>
<td>Alfalfa and alfalfa mixtures</td>
<td>6,287,122</td>
<td>4</td>
<td>Barley</td>
<td>6,696,068</td>
</tr>
<tr>
<td>5</td>
<td>Oats</td>
<td>5,002,978</td>
<td>5</td>
<td>Durum wheat</td>
<td>6,062,953</td>
</tr>
<tr>
<td>6</td>
<td>Durum wheat</td>
<td>4,207,429</td>
<td>6</td>
<td>Soybeans</td>
<td>5,615,864</td>
</tr>
<tr>
<td>7</td>
<td>Canola (rapeseed)</td>
<td>3,471,547</td>
<td>7</td>
<td>Lentils</td>
<td>5,584,808</td>
</tr>
</tbody>
</table>

**Canola strengthens its lead as Canada’s largest crop**

Canola is a variety of rapeseed developed in Canada in the 1970s to minimize compounds that are undesirable in an edible oil. Since the Census of Agriculture first began following the crop in 1956, the area planted to rapeseed, and later canola, has expanded steadily. Canola production is concentrated in the Prairie Provinces.

Between 2011 and 2016, the gap between canola and spring wheat widened. Canola accounted for 22.2% of the total field crop area in Canada in 2016, while spring wheat, excluding durum, declined to 16.9%.

Farm operators have leveraged improvements in seed varieties and crop management to increase the average yield of canola. Between 1981 and 2016, it surged from 23.5 bushels an acre to 42.3.

Canada exported 10.5 billion kilograms of canola in 2016 worth $5.6 billion. Its largest customers for canola seeds were China, Japan and Mexico.
Between 2011 and 2016, Canadian exports of canola seeds to the world increased 33.7%. Exports to China alone rose 165.6%. The United States was the largest export market for Canadian refined canola (rapeseed) oil.

**Soybeans move to Canada’s west**

In 2016, soybeans were the sixth-largest field crop in Canada, accounting for 6.1% of Canada’s total field crop area. The development of varieties that mature earlier and tolerate cooler climates expanded the geographic range of soybean production.

Between 2011 and 2016, soybean acreage increased 41.9% to 5.6 million acres. The eastern Canadian province of Ontario had the largest soybean acreage with 2.8 million acres in 2016, just under half of the nation’s total.

But recently developed soybean varieties are able to perform well in locations where previously soil and climate conditions limited growth. As a result, the soybean growing area expanded westward to the Prairie Provinces.

Between 1981 and 2016, the estimated production of soybeans in Canada increased 10-fold to 6.5 million metric tons.

Canada exported 4.4 billion kilograms of soybeans in 2016 worth nearly $2.5 billion. China was the largest importer of Canadian soybeans followed by Japan and the Netherlands.

**Canada’s pulse crops winding up on Asian dinner plates**

Farmers roared into pulse crops, particularly lentils and dry field peas, thanks to a huge export demand. In addition, pulses are beneficial in crop rotation as they add nitrogen to the soil and break pest cycles. Much of Canada’s pulse production winds up on dinner plates in Asian homes.

Between 2011 and 2016, the total pulse area in Canada nearly doubled to 10.5 million acres. The acreage in lentils more than doubled to 5.6 million acres, the fastest increase of any field crop. Dry field peas rose from 1.9 million acres to 4.3 million, the second-biggest gain.

In 2016, Canada exported 2.0 billion kilograms of lentils and 3.1 billion kilograms of dry field peas. India was the largest customer for both.

With large export markets in western and southern Asia, primarily India, the increase in the quantity of exported lentils was in line with the growth in lentil acreage. The quantity of
lentils exported by Canada in 2016 was more than 13 times higher than it was a quarter century earlier.

Reference
Sri Lanka’s 150-year-old tea industry in competitive crisis

Sandiran Premakanthan

Introduction

“Tea is a cup of life.” -- Author unknown

One hundred and fifty years ago, an enterprising Scot named James Taylor started the first commercial planting of tea in what was then Ceylon after a devastating blight had swept through the island’s coffee plantations.

In 1867, Taylor was given the task of growing tea on just 19 acres of land at the country’s first tea estate, Looecondera, in Kandy, the nation’s hill-country capital.

The estate’s tea plantations soon spawned a tea factory, and the nation’s tea industry has been growing ever since. Today, Ceylon is known as Sri Lanka. Its Ceylon tea is world renowned for its high-quality, aroma and taste. As many as 28 different grades of Ceylon tea are produced at plantations across the island.

Sri Lanka is the world’s fourth largest tea producer. Tea exports are one of its most important sources of foreign exchange. In 2013, they accounted for 2 per cent of its gross domestic product (GDP) and contributed more than US$1.5 billion to the country’s economy. The industry employs over 1 million people.

But as the industry celebrates its 150th anniversary, it is in crisis. It suffers from high production and labour costs, as well as labour shortages and competition from other countries. Sri Lanka’s share of world production and its share of world exports are gradually decreasing, costing the island nation a competitive edge in the global tea market.

This article examines the history of the tea industry in Sri Lanka and its rise as one of the nation’s main source of exports and foreign exchange. It also assesses the current competitive crisis situation of the industry and mitigation strategies to regain its place on the world stage.

Sri Lanka: Pearl of the Indian Ocean

Sri Lanka is a sovereign island nation southeast of India. A former British colony, it is known as the pearl of the Indian Ocean. Sri Lanka gained independence on February 4, 1948. The country remained a Dominion of the British Empire until 1972 when it became the Democratic Socialist Republic of Sri Lanka within the Commonwealth of Nations. A 25-year-long civil war ended in 2009.

Sri Lanka is a lower middle-income country of 21.2 million people with per capita GDP in 2016 of US$3,835. It is a diverse multicultural country of about 28,800 square miles. Sri Lanka is home to many religions, ethnic groups and languages. It has an elected president and a Westminster-style parliamentary democracy.

Source: Google images

Since the civil war ended, the economy has grown at an annual average pace of 6.2 per cent, reflecting a peace dividend and a commitment to reconstruction and growth, according to the World Bank.

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In 2014, Sri Lanka had the fastest-growing economy in South Asia, the World Bank reported. However, there have been signs of a slowdown in the last three years. Currently, 30 per cent of its workforce is in primary agriculture. Sri Lanka passed most of its Millennium Development Goals (MDGs) and economic growth has benefited the poorest in society. Unemployment is low, at 4.4 per cent.

Celebrating 150 years of Ceylon tea

Coincidentally, Sri Lanka’s tea industry has celebrated its sesquicentennial at the same time as Canada has been staging a year-long celebration of the 150th anniversary of Confederation. In 1867, the British North America Act was given royal assent by Queen Victoria, creating the Dominion of Canada.

In Sri Lanka, a number of events marked the occasion. In January, the celebrations began with the unveiling of James Taylor’s monument acknowledging him as the "Father of Ceylon Tea" at the Sri Lanka Tea Board’s premises.

On July 6, 2017, the Global Ceylon Tea Party was held. This was a unique 24-hour tea party at 5.00 p.m. in every time zone from east to west across the world, beginning in Fiji.

Other events included a charity auction of tea and tea memorabilia. On July 20, 2017, the tea industry released a publication on its history containing beautiful illustrations of Sri Lanka’s tea country.

The grand finale was the tea convention of August 9-11, 2017, attended by overseas delegates. Eminent global speakers discussed topics ranging from tea to motivation, packaging and mechanisation, aimed at empowering the future of the tea industry in Sri Lanka.

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3 http://www.historyofceylontea.com/150-years-history-of-ceylon-tea
4 http://www.historyofceylontea.com/150-years-history-of-ceylon-tea/tea-board-events.html
Unique characteristics of tea plantations in Sri Lanka

According to the Sri Lanka Tea Board, most tea plantation workers are fourth generation immigrant Indian Tamils. Colonial British plantation owners brought workers as a cheap workforce from South India in the 1850s to work on the tea estates.

Plantations are not just economic and commercial production units. Rather, they are social institutions that control the lives of their resident work force, places where people are born, live, breed and die. The plantation is an ecosystem of employment and healthy living services, such as housing, water, gardens, welfare, temples, cemeteries, laundries, hair cutting establishments and many other facilities that affect the daily lives of workers.

While estates differ, labour unions have fought to make living conditions better. Workers can grow their own vegetables, while daycare and primary school facilities are available for their children.

However, the rate of malnutrition among children on the estates is around 43 per cent, significantly higher than the national average of 10 per cent. Low birth weight and malnutrition in both mother and baby lead to cognitive disability and slow physical growth.
Hierarchical organizational structure

The plantations are characterised by a rigid hierarchical organizational structure, divided into five strata: the owner, management, staff, sub-staff and workers. The plantations’ social structure consists of management, staff and labour. The three social categories found in the hierarchical occupational structure can be differentiated by five main characteristics:

- first, they live segregated under different housing conditions;
- second, they are differentiated in terms of income and economic conditions;
- third, management and staff are paid monthly while labourers are paid daily; and
- fourth, management is exclusively male, and fifth, management is provided with an official vehicle.


Ceylon tea, inherently, has been Sri Lanka’s most important agricultural commodity. Ceylon tea has become one of the top five export earners for the country. Sri Lanka is the world’s fourth largest exporter of tea, behind China, India and Kenya.

Tea accounts for 17 per cent of Sri Lanka’s exports. Today, Sri Lanka produces 350 million kilograms annually. The largest importer of Ceylon tea is Russia and other members of the Commonwealth of Independent States. Iran, Iraq and Syria have been some of the biggest consumers of Sri Lankan tea.

According to the Tea Board, conflict in these areas has put a strain on Sri Lanka’s industry. China’s recent economic troubles, as well as low oil prices in another large importer, the United Arab Emirates (UAE), mean that tea exports could decline.

Export Performance – Ceylon Tea Sector – 2007 – 2017 / October

Value in US$ Million

Major Markets – Ceylon Tea Sector – 2016

Value in US$ Million

Source: Sri Lanka Export Development Board
Many analysts observe, however, that there is significant growth in tea consumption in large markets such as the United States. Health-conscious American consumers are looking for better alternatives to sugary fizzy drinks and young, wealthy millennials are showing interest in speciality teas. There is also growing demand for "ready-to-drink" tea products.

### Sri Lanka tea plantations facing major challenges

Tea is the most widely consumed beverage in the world after water. However, market analysts think that the drink, which is the mainstay of many cultures, is subject to the same volatile market forces as oil or gold.

A Sunday Times article of January 15, 2017, reported that the Sri Lankan tea industry faces several major challenges. Evidence from Tea Research Institute (TRI) studies on the Sri Lankan tea industry also identified several problems. These include the high cost of production due to lower labour and land productivity, and lack of trained and inflexible workforce; lower replanting rates; the lack of high yielding varieties; and a stagnant area of tea cultivation. There

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is also a shortage of labour willing to work in the industry because of migration from the plantations.

As a result, Sri Lanka’s share of world production and its share of world exports are gradually declining. These contribute to a loss of competitive edge in the global tea market.

**Labour costs**

Women plantation workers collect the top tiers of the leaves and the most delicate shoots, which are used to make white and green Ceylon tea. The availability of labour to hand-pick this delicate tea adds to the high-end value of the market.

Women must collect 18kg of delicate tea leaves to receive their daily pay of $5. Anything less than 18kg reduces their wage to $3 or below. Each additional kg over the 18kg weight is priced at 20 rupees (about 14 cents). It is very hard work.

Men earn the same daily rate of $5, but collect only 14 kg of tea. They are expected to contribute to the maintenance of the estate.

In 2009, the unions joined to demand higher wages, and the average salary doubled. Labour costs constitute 67 per cent to 70 per cent of the cost of production of a kilogram of tea. An increase in labour wages of a single rupee would increase the production cost of tea by a minimum of Sri Lankan Rupees 7 (Rs) 0.60 per kg.

The high labour cost is due mainly to work norms such as plucking, pruning, draining, fertilizer use and planting being below the acceptable standards of performance for these activities. Currently, even the average price of tea in auctions has fallen below the average cost of production.

**Global market competitive threats**

With the entry of Kenya in the 1970s, Sri Lanka lost its competitive edge in the world market. Kenya’s entry was facilitated by the events in Sri Lanka, the nationalization of plantations. This resulted in British investors leaving Sri Lanka to exploit incentives provided by the Kenyan government to boost the tea industry.

Kenya now enjoys a significant portion of the global tea production and global tea exports thanks to its relatively strong international marketing mechanisms led by multinational companies. Kenya gained its market share at the expense of other major players, such as Sri Lanka and India.

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7 Exchange Rate 1 Sri Lankan Rupee LKR equals 0.0065 USD
The Sri Lankan government attempted to increase competitiveness through different strategies and policies, such as subsidies for fertilizer, replanting, new planting and infilling.

**Conclusion: Crisis mitigation strategies**

Considering the crisis in the tea plantations, the situation calls for a number of responses. Experts say the key should be a restructuring strategy that would act to recover Sri Lanka’s leadership in the world market.

Recommendations for such a strategy would include changes in ownership to integrate international investments and strengthened marketing chains to penetrate Western European markets.

Most importantly, experts call for increased agricultural productivity using government subsidies to keep pace with tea producing nations. This would be vital to reduce costs of production. Factories could be modernized through joint venture capital investments and the use of alternative energy sources.

Sri Lanka’s tea industry could also exploit the market niche in the growing demand for "ready-to-drink" tea products in North America by the manufacture and of sale of value-added teas in comparison to bulk tea sales at auctions. As noted earlier, bulk tea prices at auctions are below the cost of production.

As English actor and playwright Arthur Wing Pinero put it: “Where there's tea there's hope.” Sri Lanka might keep that in mind.
Outcome management, agrarian change and small farmers in globalized India

K.N. Bhatt

Introduction

Indian agriculture is a home for small farmers. They cultivate 44 per cent of operated land and constitute 85 per cent of total holdings as counted in the Agricultural Census 2008-09. Their numbers are on the rise as population increases and holdings get fragmented: 70 per cent of holdings were small, covering 21 per cent of operated land in the count of 1970-71.

Opinion is divided on whether small farmers are viable and could survive in the new liberal economic environment, which includes supermarkets for agricultural commodities. The home for small farmers has in recent years witnessed “depeasantization”, which could be worrisome for some and inevitable for others. Small farmers are vulnerable given first of all their size, all the more, a reducing size.

Outcome management, farm size and productivity

The relationship between farm size and productivity could be inverse, positive or scale neutral. The implications of each are different. Those who empirically establish an inverse relationship argue that there should be more small farms in the future on grounds for efficiency and growth, and hence they advocate for policies that support land reforms and land ceilings.

Assuming that technology is neutral to scale, policies are recommended for increasing access to resource base and support services to small farmers that substantially affect productivity of small farmers. It is argued that they could use available resources with them more intensively and judiciously. Another argument in their favour is that capital cost to the economy will be less if the choice is for small farms.

While not refuting the empirical evidence of higher productivity in small farms, some argue that this happens because low levels of technology are used by all farmers and with advances in technology the inverse relationship would disappear.

On the other hand some research reports small scale farming to be inefficient in India by factoring in supervision costs, risks, credit market imperfections and scale-economies associated with mechanizations. Besides, in the long run the small farms may witness a decline in productivity resulting from intensive cultivation and inability of the small farmer to replenish the soils due to lack of capability to invest, which is directly related to incomes of small farms.
Thus, at the small farm level, the productivity has increased and so has the cost of cultivation. The income gains of productivity do not offset the increase in costs as much that farms move beyond the poverty line. There are other reasons for low incomes as well, such as indebtedness.

**Indebtedness a result of price shocks or susceptibility to weather conditions**

The indebtedness of many small farmers is a result of price shocks or susceptibility to weather conditions: seasonal droughts and/or floods. Among the fallouts of indebtedness for a sustained period is a desire to exit agriculture, being forced to sell or lease out land or even commit suicide.

In an NSSO 2003 study, 40 per cent of farmers expressed their desire to leave farming. The process of depeasantization in a state like Punjab known to be as agriculturally rich began since early 1990s and gathered momentum since 2000. It is reported that more than 2 lakh (0.2 million) small and marginal farmers have left farming in the state due to economic distress. These trends are important to track to understand the small farmers and what happens to them.

First, the gains from Green Revolution started receding in the 1990s. Second, structural problems continue to burden small farmers more than large farmers: access to institutional credit is limited and there remains high reliance on moneylenders; restricted access to technology, extension services and skills; lesser gain from public irrigation and electricity; near absence of tenancy reforms and, lesser bargaining power; and skewed access to public goods, such as public irrigation and electricity, markets and institutions.

Third, with agriculture becoming more market oriented since the late 1980s increasing imperfections and volatility in input and output markets have enhanced the vulnerability of small farmers, affecting profitability.

**Effects of globalization: Unanswered questions**

The World Bank is generally of the view that the emerging new markets provide big opportunities for even the small farmers. This view is elaborated in development literature in a producer centric manner with the small farmer in the nucleus facing a number of challenges or barriers to modern markets.

This approach to development leads to conclusions such as proposing policies to the government to facilitate market access for small farmers, formation of farmers groups, ensuring infrastructure and providing essential services. The expected return is that the small farmer would be expected to join the Super Market Chain.
At the same time there is increasing evidence that Super Market procurement models could have a negative impact on the small farmers, even in the developed countries. This evidence is provided by investigative reports commissioned by the EU Parliament and the US Department of Agriculture and International Lead Agencies. Super Markets are known to impose their supply chain requirements on to suppliers and to dictate terms and demand.

In countries where Super Market concentration is high, a food producer may not be able to sell outside the Super Market value chain. Super Markets operate on a low profit margin, which would require keeping prices low for the consumer, increasing the quality of goods sold and pushing down costs.

Small farmers would need strong linkages and reliable access to a range of resources and services is crucial if they are to survive in increasingly competitive globalized agri-food markets. Farmers organizations backed up by strong national policies may play a significant role in both service provision and advocacy.

**The other side of the story: Multi-diversified farming**

The other side of the story is that almost all the small farmers in India practice multi-diversified farming and grow a number of crops even on small and fragmented plots. Many of them undertake crop and livestock farming in a symbiotic manner. But this kind of farming does not necessarily yield enough returns for the sustenance and upward movement of small farm families. Land cannot be successfully cultivated unless it provides adequate return.

Therefore, sustainability of a farming system requires that it is economically viable, technically feasible, environmentaly sound, socially acceptable, administratively manageable and politically desirable.

Access to a resource base and support services substantially affects the productivity of small farmers, even though the technology is neutral to scale. There is enough scope for improvement of small farmers as they use the available resources with them more intensively and judiciously.

The former prime minister of India, Choudhary Charan Singh, clearly indicated that if a crowded, capital-scarce country like India has a choice between a single 100-acre farm and 40 farms, each 2.5 acres, the capital cost to the national economy will be less if a country chooses the small farms.

Therefore, small bio-diverse farms based on internal inputs are the only promise for increasing agricultural productivity while the industrial model of high external inputs imposed on small farmers might lead to increased indebtedness and suicides. These claims have to be empirically
established and have not been so far because these experiments are sparse and have not been achieved on a large scale so far.

**Engaging small farmers: Rural service hubs**

In the last decade or so in some regions, markets have started engaging small farmers through various interventions including rural service hubs, parts of value chain or contract farming. The government has suggested Group Approaches including companies. Banks are also considering Self Help Groups (SHGs) among other options.

Supermarkets expect strict standards, quality, timelines of supply, ability to adjust to changed demand, which small farmers, mostly uneducated, may find difficult to meet. Several crucial questions need exploration and policy initiatives.

Are small farmers of India sufficiently capitalized and educated to meet the expectations of supermarkets and hence sustain development? Or as International Food Policy Research Institute (IFPRI) suggests that policy makers need to consider whether there are social reasons to support small farmers? Or should the policy agenda involve social safety needs and facilitate good exits from farming for small farmers?

The second crucial question is the traditional small farmers, who grow mainly for subsistence, perhaps environment friendly, uses organic manure, own seeds still there? Are these possibilities for its existence? Is it possible that control over land, water and agricultural bio-diversity lies with decentralized agricultural communities that are able to control their livelihood, food and their natural resources?

Finally, how does agricultural policy relate to ecological security, food security and agricultural security to the small farmers? What could the traditional small farmer and modern small farmer learn from one another? Are small farmers prepared for supermarkets? Can small farmers have food sovereignty?

The questions involve several concerns. They include small farmer and agrarian structure, poverty, depeasantization, crop mix and farm size productivity of small farmers, small hubs, value chain, credit, producer associations, control of agricultural community over land, water and agricultural bio-diversity, and so on.

**Conclusion**

The modern history of Indian agriculture is the history of adopting modern scientific and technological practices emanating from a centralized knowledge system, which subsequently lead to centralized management of input supply, agricultural products and their distribution.
A subsidy regime and excessive government interventions in input and product markets have been key to establishing the highly expensive and ecologically disastrous agricultural production regime in place. The regime has created areas of abundance and scarcity.

The food security bill is an outcome of these historical processes demanding a universal entitlement to all citizens of the country and for a centralized state to be duty bound to do this. Given the challenge to the environment and resources, it is argued that there is an emergent need to consider a U-turn in agricultural policies to adopt a crop mix that is suitable to the environment and is near to the indigenous knowledge systems; ensuring sustainable food sovereignty in today’s globalized India.

But this requires decentralized thinking and action, for which neither the governments nor the civil society advocating for food security are prepared.

Agriculture in a mountain economy, constraints and policy options: The Indian state of Uttarakhand

Ishwar Awasthi

Introduction

Mountain habitats share certain similar bio-climatic features and concerns across the world, whether they are the Alps mountain regions of European countries, or Andean mountain ranges in the South America, or Hindu Kush Himalayan region countries in the South Asia.

These relate primarily to the changing mountain environment due to degradation of resources owing to their excessive use. This has resulted in a reduction in biomass production, marginalization and low human welfare. Many of these mountain regions are prone to natural hazards (Li Tianchi et.al. 2001). Human conflict and wars were also concentrated in many of the poor regions (Libiszewski and Bachler, 1997), making the life of the mountain people more vulnerable.

In India, mountain regions cover 11 states; Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya and Karbi Anglong and North Cachar districts of Assam. These states are located in the world’s youngest mountain range and are susceptible to landslides, earthquakes, rainstorms and cloudbursts.

The fragility and other associated mountain conditions make these Himalayan states vulnerable to various disasters. Disasters are direct manifestations of neglecting the mountain perspective in development. This has had adverse implications for the ecology, environment and development.

Mountain agriculture includes all land-based activities, such as crop farming, horticulture, animal husbandry and forestry carried out in an integrated manner. Over the years, there have been changes in land use, cropping patterns, input use, production, and livestock composition because of an increasing population, accessibility (transport and communication), state interventions and market network.

The increasing pressure of population has led to extensive use of land resources in marginal and forest lands, thereby straining the existing land resource with adverse effects on ecology. Despite the intensification of production with expansion of the cropped area, food grain production is not enough to meet the growing demands of population; therefore, people have to resort to multiple strategies to eke out a living.

Mountain agriculture is thus becoming more and more unsustainable due to fragmentation of landholdings, displacement of marginalized farmers, landlessness, and natural disaster.
accompanied by the ever increasing burden of a younger population. This article examines the case of one mountain economy of India, namely the tiny state of Uttarakhand.

**Uttarakhand: mountains, land of Gods and pilgrimage centre**

Uttarakhand, a state in northern India crossed by the Himalayas, has a population of just over 10 million, according to 2011 Census. It is known for its Hindu pilgrimage sites and known for its natural beauty of the Himalayas. The state's forested Jim Corbett National Park shelters Bengal tigers and other native wildlife.

The state's economy is one of the fastest growing in recent times. Agriculture is the most significant sector in Uttarakhand. Rice, soybeans, wheat, groundnuts, pulses, coarse cereals and oil seeds are predominant crops. Apples, pears, oranges, peaches, plums and litchis are widely grown and are an important part of the food industry.

The Uttarakhand economy has increasingly been confronted with challenges and problems of concern to sustainable livelihoods, mountain agriculture, persistent poverty, fragile environment and female drudgery. Traditionally, hill people have been meeting their food and other non-food requirements through crop cultivation, livestock rearing and collection of forest produce.

A growing population, along with rising aspirations of people due to expansion of development activities and better livelihood options, has led to increasing pressure on land and other limited traditional resources. Scarce cultivable land has become further fragmented with the increase in population; people are hard pressed to look for alternative livelihood strategies.

**Alternative strategies have limitations**

The alternative strategies consisted of extension of cultivation on hitherto uncultivated marginal land (though limited), improvement in quality of livestock, and diversification of agriculture into high-value crops, such as horticulture and non-food crops for the market. But these coping strategies have limitations to provide food security to the people on a sustainable basis.

Limited resources, low bargaining strength, lack of appropriate institutional mechanism for access to market, credit and other inputs have severely restricted expansion of livelihood opportunities. The mountain agriculture, therefore, could not ensure food security and instead increased the vulnerability of the people.

Also, over the years pressure on land has resulted in degradation of pastures and erosion of common grazing land. Horticulture (fruits and vegetables) has potential for high returns but technological and other constraints have severely restricted the scope of expansion. The agriculture is largely traditional with little diversification to potential areas according to its land capability. Improvements in agricultural technology elsewhere did not much help the hill economy because of problems associated with hill specificities.
Diversification limited to pockets of the economy

However, there has been some diversification from cereal growing to horticulture (mainly fruits and vegetables) over time. Yet, this was limited to certain pockets of the economies that are generally well connected to road transport.

Overall, there has been insufficient food supply within the mountain region to the region became more dependent on food imports from outside. The preconditions of agriculture growth, which critically depends on the intensification of resource use, input absorption capacity, infrastructural back up and economies of scale, do not exist in the hill region due to conditions of fragility and marginality.

Also, relatively low accessibility results in limited mobility and high cost of inputs, which severely restricts the possibility of promoting staple or chief commodities and exploiting other niche products in the region. This in turn inhibits trade and specialization to grow for market principally because there are no surpluses and the hill specificities do not permit trade to develop in a wider scale. In any case, trade in the region is minimal for the market primarily because of subsistence nature of economy.

The manufacturing base, in any case, is miniscule in these areas; no large industries can be set up in the hilly region due to fragility, lack of transportation network (rail), markets, power and economies of scale.

Village and household industries based on livestock, food processing and natural resource have been promoted. However, this could not generate self-reinforcing and self-sustaining forces due to small scale operations, little quantity, dispersed production and lack of access to appropriate institutions. Over time, the base of these industries has weakened and deteriorated.

From long-term perspective, traditional agriculture with its low productive base and rudimentary industrial activities does not seem to be a viable and/or sustainable option for providing employment and livelihood to the burgeoning labor force. This precisely makes a strong case for diversification within the agriculture sector according to its potential land capability and also for promoting other non-farm pursuits.

Diversification strategy and policy implications

Traditional hill agricultural practices have become increasingly uneconomical; therefore, there is a need for diversification from field crops to horticulture and non-food crops that have enormous potential for improvement in livelihoods and income generation. Area studies have also indicated that there has been a substantial transfer of area from cereal production to vegetable production with greater advantages to the farmers in terms of income and employment.

From the long-term perspective, this shift from low-value field crops to high-value added horticultural crops seems to be most obvious and strategic option in the region. However, lack of proper institutional mechanisms, such as credit, processing, storage, post-harvesting technologies and marketing network, have severely hampered the systemic growth of this sector in Uttarakhand.
If all these services are efficiently organized with the necessary institutional backup, horticulture can generate significant employment and earning opportunities in the region. In certain parts, particularly in the lower and middle Himalayas, it offers significant scope for development and could even become a lead sector. Establishment of linkages from growers to local processing and to large plants (within and outside region) is most crucial for sustainable growth of horticulture.

Enterprise-based activities, based on local resources, are critical for generating sustainable employment and for enhancing income levels, which in turn can help in improving the living standard of the people. With appropriate policy interventions, it is possible to develop enterprise-based activities that would provide higher income through processing and value addition, and help develop upstream and downstream linkages necessary to generate internal momentum of growth.

**Development of appropriate educational and skill structure**

In spite of a relatively distinct resource base and potential for the development of numerous non-farm activities and enterprises in the state, its potential has not been fully exploited to the extent its resource base permits within the constraints of fragile environment. There is a need for converting these physical resources into outcomes in terms of enterprises with value addition activities, capacity building and human resource development.

Transformation from the physical into real resource base would generate demand for numerous types of new skills and competencies, which would ultimately create employment and incomes in the productive activities. For this, the education system has to be made relevant. This would require revamping the existing educational system towards meeting the requirements of the emerging skill structure. Relevance implies a correspondence between the nature of skills required by the enterprises and the type of skills provided by the educational and training institutions.

The policy message seems fairly straightforward. Efforts to improve relevant marketable skills are important to promote employment into high income. The importance of an enhanced rural skill base for development of the rural non-farm sector is incontrovertible.

**Strategy: mountain areas should focus on niche products**

A substantively large majority of enterprises appears to be dominated by trade and household manufacturing activities with narrow profile of activities. This kind of enterprise-based activity has limited product lines, carried out on a small scale with little surplus for reinvestment (Papola, 2000). There are sizeable constraints in terms of scale and efficiency that result in weak linkage effects. Entrepreneurial activities suffer from numerous internal and external constraints.

But over the years, these enterprises are languishing and operating at a low equilibrium trap with little product diversification and surplus. The major reasons for sickness of these enterprises can be attributed to both the supply and demand side aspects.
We submit that mountain areas should primarily focus on niche products in which the region has comparative advantage rather than producing those products for which it does not have distinct advantage in terms of product and price competitiveness. However, there is a need for evolving special policies and support mechanisms to promote the micro and small enterprises, taking into account the diversity and constraints within the regions.

It is, therefore, necessary to formulate a mountain perspective framework that incorporates growth with equity and that addresses issues such as mountain agriculture, persistent poverty, sustainable livelihood, environment sustainability and gender dimension. Such perspectives would call for an integrated approach to development in which the mountain specificities would dovetail adequately to achieve the desired objectives.

References


Impact of agriculture subsidies on yield and production of the wheat crop in Pakistan

Atiq ur Rehman

Background

More than 60 per cent of Pakistan’s population lives in rural areas (GoP, 2017a). The agriculture sector is their major source of livelihood and employment. However, rural areas and the agriculture sector have clear disadvantages over urban centres and other sectors of the economy.

These disadvantages include a lack of infrastructure and access to markets; lower levels of education, skills and information; inadequate financial resources; high risks (such as the vagaries of weather); and low rates of return on investment. These furnish a strong rationale for providing protection to the agriculture sector.

Protection for agriculture comes in many forms. Commonly used instruments of protection include subsidies on agricultural inputs and guaranteed higher prices on outputs. Agricultural input subsidies in Pakistan began in the second half of the 1950s (Niaz, 1984), peaked in the 1960s, experienced cuts in the 1970s and 1980s and were subject to phasing out in the 1990s and 2000s. Phasing out the subsidies was in line with the global agenda of deregulation, liberalization, privatization and globalization. However, some subsidies have survived the onslaught of such trends.

At present, agricultural subsidies are available in many forms in Pakistan. Leading the list are support prices for crops, such as wheat. The support price of wheat has been continually revised upward (see Figure 1). The second form of subsidy is in the form of discounted prices of fertilizers. During 2016-17, a subsidy of Rs. 300 was given on every 50 kg bag of DAP – phosphate fertilizer -- and Rs. 156 on every 50 kg bag of urea – nitrogenous fertilizer (GoP, 2017b, p. 26).

A third form is the availability of concessional loans, while a fourth is the waiver in taxes. For example, the General Sales Tax (GST) levied on tractors is just 5 per cent, whereas the GST on other types of machines is 17 per cent. During 2016-17, the rate of GST on urea (fertilizer) was also reduced from 17 per cent to 5 per cent (GoP, 2017b, p. 26).
Figure 1 Wheat support price (Rs/40 kg) (Source: GoP, 2017b)

A question arises: how are these subsidies benefiting small and marginalized farmers? This article attempts to answer this question.

For the purposes of this study, we will analyze the impact of two subsidies, or interventions, on wheat production: support prices and discounted fertilizer prices.

Wheat occupies a central position in agricultural policies of the government. Wheat is a staple food in Pakistan, South Asia’s second biggest economy, which has a population of over 207 million people (GoP, 2017a). It constitutes roughly 60 per cent of the daily diet of the average Pakistani; per capita consumption averages about 125 kg (PARC, n.d.). In 2016-17, production reached 25.75 million tonnes (GoP, 2017).

**Conceptual framework of the study**

The theory of change (TOC) suggests that behind every development intervention, there is a theory that outlines the sequence of the events generated by the intervention. According to Rogers (2014), TOC “explains how activities are understood to produce a series of results that contribute to achieving the final intended impacts”.

In simple words, TOC describes how inputs would trigger activities, which in turn would produce outputs, which in turn would lead to outcomes and finally how outcomes would produce the desired impact.

By using the TOC, results of the subsidies can be evaluated at three levels, that is, output level, outcome level and impact level. Evaluation at level 1 can be made through measuring the influence of support prices on the level of inputs use (for example, fertilizer off-take). Level 2 evaluation can be undertaken by examining the impact of inputs on wheat yield and production.
Level 3 evaluation can involve assessing the impact on the income and livelihood of farmers. This study restricts analysis to level 1 and level 2.

The following hypotheses were framed to guide the study:

**H1.** Increase in the wheat support price positively impacts the average yield of the wheat crop in Pakistan.

**H2.** Increase in wheat support price positively impacts the total production of the wheat crop.

**H3.** Increase in fertilizer prices negatively affects the fertilizer off-take.

**H4.** Increase in the fertilizer off-take positively affects the average yield of the wheat crop.

**H5.** Increase in the fertilizer off-take positively affects the total production of wheat crop.

**Methodological consideration**

The study is explanatory in nature, as it involves testing causal relationships. The framework of the study included evaluating the impact of subsidies at output and outcome levels. This study examined a number of variables: wheat support price, fertilizer prices (DAP and urea), fertilizer off-take, general price index, wheat yield and wheat production. Data for all these variables covered a period of 17 years from 2000-01 to 2016-17. Source of the data is the Pakistan Economic Survey 2016-2017 (see GoP, 2017b). Since data on wheat and fertilizer prices were available in nominal form, we adjusted nominal prices for each year of each commodity (that is, fertilizer and wheat) with the general price index of the respective years. Since the Government of Pakistan in 2011-12 changed the base year of the general price index to 2007-08 (making 2007-08 equivalent to 100), price index values for the previous years were adjusted accordingly.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) v. 23. Statistical tests used in the analysis include correlation analysis and regression analysis.

**Results and discussion**

**Impact of wheat support price on wheat yield (H1)**

Results of the correlation analysis show that wheat support prices and wheat yield are strongly correlated, $r(17) = .59$, $p < .05$. Similarly, the support price of wheat also significantly predicts wheat yield, $b = 1.069$, $t(16) = 2.827$, $p < .05$. Besides, the support price explains a significant proportion of variance in wheat yield, $R^2 = .590$, $F(1, 15) = 7.99$, $p < .05$.

Hence, hypothesis H1 is accepted. It implies that an increase in the wheat support price positively and significantly impacts the average yield of Pakistan’s wheat crop.
Since the unit of wheat yield was kg per hectare and that of the support price as rupees (in real terms), this implies that every rupee (Rs. 110.68 = US$ 1.00, as of 23rd December, 2017 as per http://www.xe.com) increase in the support price (in real terms) results in 1.069 kg in wheat yield per hectare.

The average price of wheat in the international market is Rs. 24/kg (derived from wheat prices data provided by FAO on http://www.fao.org/giews/food-prices/international-prices/en/). Hence, wheat support price intervention is economically feasible. In other words, wheat support price is an effective policy instrument.

**Impact of wheat support price on wheat production (H2)**

Correlation analysis indicates that wheat support prices and wheat production were strongly correlated, $r(17) = .70$, $p < .01$. Regression analysis provides further insights. The support price of wheat significantly predicts wheat production, $b = 17.12$, $t(16) = 3.796$, $p < .001$. The support price also explains a significant proportion of variance in wheat production, $R^2 = .49$, $F(1, 15) = 14.411$, $p < .01$.

Hence, we accept the hypothesis H2 and conclude that an increase in the wheat support price produces a positive impact on wheat production in the country.

Since the unit of wheat production is denominated in thousand tons (‘000) and the unit of support price is rupees (in real terms), this implies that every rupee increase in the support price (in real terms) results in 17,120 tons in wheat production in Pakistan.

**Impact of fertilizer prices on the fertilizer off-take**

A correlation analysis between fertilizer prices (real prices) and fertilizer off-take does not support hypothesis H3; in fact, the results are quite strange. For example, in the case of urea, the correlation between the price of urea (real) and nitrogen off-take was found positive and marginally significant ($r(17) = .470$, $p = .057$). This implies that if fertilizer prices increase, its off-take also tends to increase. This is obviously unrealistic and irrational. Hence, we conclude that a subsidy on fertilizer prices is not likely to be an effective policy instrument.

A review of the fertilizer market indicates that due to too-much regulations, the market is highly distorted. Despite an enormous amount of support to the fertilizer industry, fertilizer prices are still far too high.

For example, the price of urea in Pakistan is 163 per cent higher than that in India and 30.16 per cent higher than that in Bangladesh (The Nation, 2017). Since the fertilizer market is heavily controlled in Pakistan, fertilizer subsidies can only benefit the fertilizer industry; they are unlikely to trickle down to farmers.
**Impact of fertilizer off-take on wheat yield (H4)**
There is strong evidence that fertilizer off-take has a significant effect on wheat yield. A correlation analysis reveals that fertilizer off-take and wheat yield are strongly correlated $r(17) = .722$, $p < .001$. The regression analysis shows that fertilizer off-take significantly predicts wheat yield, $b = .233$, $t(16) = 2.170$, $p < .05$. Fertilizer off-take also explains a significant proportion of variance in wheat yield, $R^2 = .239$, $F(1, 15) = 4.707$, $p < .05$. Hence, we accept the hypothesis H4 and conclude that fertilizer off-take positively affects wheat yield in Pakistan.

**Impact of fertilizer off-take on wheat production (H5)**
Results of the correlation analysis reveal that fertilizer off-take and total size of wheat production in the country are strongly correlated $r(17) = .808$, $p < .001$. The regression analysis provides further insights. Findings indicate that fertilizer off-take significantly predicts wheat production, $b = 3.374$, $t(16) = 2.391$, $p < .05$. Fertilizer off-take also explains a significant proportion of variance in wheat production, $R^2 = .276$, $F(1, 15) = 5.719$, $p < .05$. Hence, we accept the hypothesis H5 and conclude that fertilizer off-take positively affects wheat production in the country.

**Conclusion, issues and recommendations**
The basic objective of this study was to investigate the impact on wheat production in Pakistan of two forms of agricultural subsidies: those on fertilizer prices and those on wheat output prices.

The results provide strong evidence that an increase in the support price of wheat positively affects wheat yield and production. Any incentive given to the farmers in the form of support prices will boost wheat production and will lead to improvements in the state of food security in the country.

Wheat is a primary staple food item in Pakistan. Hence, an adequate availability of wheat is crucial for achieving and sustaining the state of food security in the country. Fertilizer off-take has a significant influence on wheat yield and production. Policy options for increasing fertilizer off-take are: 1) subsidizing the prices of fertilizer products; and 2) boosting profitability of farmers through enhancing output prices of wheat.

However, there is no evidence that any waiver in fertilizer prices will have a positive effect on the fertilizer off-take in the country. It raises the possibility of exploitation by the fertilizer industry. Secondly, it is also a source of concern that agro-chemicals are posing serious threats to the environment and sustainability. Hence, there remains no reason for providing incentives on fertilizer prices.
This discussion leads to a recommendation that any incentives provided to the fertilizer industry should be withdrawn and diverted to farmers in the form of further increases in support prices. This measure will further boost wheat yield and wheat production in the country.

**References**


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