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Criterion 3 - Research, Innovations and Extension

3.3.3 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during year

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Year of publication
32	Dr. Rahul Wagh	Agricultural Sector: Status, Challenges and its Role in Indian Economy		2018-2019
33	Prof. Kalpana Sayankar		Role of Human Resource in Imparting Training for Maintaining an ISO 9001:2015 System	2018-2019
34	Yadav Mayuri Ganesh		Artificial Sweetners Market Potential In Indian Market	2018-2019



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Book/Proceedings No.: 32

Agricultural Sector: Status, Challenges and its Role in Indian Economy

ISBN:6139453240

Dr. Rahul Wagh

Year of Publication:

2018-2019

Name of the publisher

Lambert Academic Publishing

Affiliating Institute:

Sinhgad Technical Education
Society's
**S.K.N. Sinhgad School of
Business Management**

Link:

<http://library.ediindia.ac.in:8181/xmlui/handle/123456789/9697>



Rahul Wagh

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Book/Proceedings No.: 33

Role of Human Resource in Imparting Training for Maintaining an ISO 9001:2015 System

Prof. Kalpana Sayankar

Year of Publication:

2018-2019

Name of the publisher
Zeal Institute of Management
and Computer Application
National Level Seminar

Affiliating Institute:
Sinhgad Technical Education
Society's
**S.K.N. Sinhgad School of
Business Management**

Link:

<https://zimca.in/national-seminar-2/>



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This is to certify that Mr./Ms./Dr. Kalpana Sayankar
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Book/Proceedings No.: 34

Artificial Sweeteners Market Potential In Indian Market

Yadav Mayuri Ganesh

Year of Publication:

2018-2019

Name of the publisher
International Journal Of
Advance and Innovative
Research
NATIONAL CONFERENCE
ON CHARTING
NATIONAL GROWTH:
SOCIO – ECONOMIC
CHALLENGES IN
MANUFACTURING &
SERVICE SECTOR

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<https://www.timsrmumbai.in/National-Conference-2018.html>

Proceedings of National Conference-2018 on 'Charting National Growth' Jointly organised
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THAKUR INSTITUTE OF MANAGEMENT STUDIES & RESEARCH

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National Conference on



Charting National Growth : Socio-economic Challenges in Manufacturing & Service Sector

22nd & 23rd March, 2018

CHARTING NATIONAL GROWTH: SOCIO-ECONOMIC CHALLENGES IN MANUFACTURING & SERVICE SECTOR

Conference Convener

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Editors

Dr. O.M.Ashtankar

Dr. Chitra Gounder

ISBN: 978-93-5288-701-9



978-93-5288-701-9

**THAKUR INSTITUTE OF MANAGEMENT STUDIES &
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First Published ,2018

ISBN: 978-93-5288-701-9



PUBLISHED IN INDIA

From Conveners' Desk.....

The greatest challenge that the humanity faces today is that we do not plan and carry out activities in a manner compatible with the Earth's resource systems. Despite the fact that the concept of sustainable growth has been developed and studied for several decades now, its practical application still seems limited and meaningful targets have not been met: Indeed we are still not operating sustainably. The time has come to rethink on our social & economic systems in order to make the usage of resources



Dr. Ramakumar Ambatipudi

efficient and equitable to all across the planet. This conference has achieved its objective of bringing together all the stakeholders for addressing the issues of how to face the global economic, social and environmental challenges for sustainability. Around 100 research scholars have contributed research papers on the theme. The deliberations in the conference have addressed the issues and problems and came up with the probable solutions. We are glad to present a compendium of the research papers presented in the conference in the form of 'Conference Proceedings' for the benefit of future researchers.

(Dr. Ramakumar Ambatipudi)
*Director- Thakur Institute of Management
Studies & Research, Mumbai*

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ARTIFICIAL SWEETENER MARKET POTENTIAL IN INDIAN MARKET

Ms. Mayuri G. Yadav,
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Management, Pune

Abstract:

Artificial sweeteners (A.S.) are defined as substances that are used in place of sweeteners and are derived from sugar or sugar alcohols. They may also be called sugar substitutes, nonnutritive sweeteners (NNS), and non-caloric sweeteners. All artificial sweeteners are chemically processed. They can be added to food and during preparation. Sugar substitutes can help people trying to lose weight. They provide sweetness to foods and drinks without adding extra calories. Using artificial sweeteners in place of sugar can also help prevent dental decay and aid in blood sugar control in people with diabetes. In India; you will find four main types of artificial sweeteners that are currently selling. They are known as Saccharine, Aspartame, Sucralose and Stevia.

India is the second largest manufacturer of sugar and its largest consumer in the world – much of it being used in sweetmeats. . India has the without doubt of being called the diabetic capital of the world – but also the capital of obesity and heart diseases. According to a recent report of CDC(Center for Disease Control and Prevention), more than 36% of the adult population in the India, which is more than one-fourth of the population, is suffering from obesity. Moreover, increasing prevalence of the obesity related problems such as stroke, type 2 diabetes, cancer, and heart attack is expected to fuel demand for consumption of food products with low calories and sugar content. In order to expand their customer base, the leading companies are focusing on making range of sugar-free food products including bakery products, ice creams, and beverages

Online study carried out for the artificial sweetener people are now aware of thing that sugar is harmful for the health of human being. More people are ready to give up the sugar and ready to adopt the low calorie intake. Study also suggest that more health conscious and ready to give up traditional sugar from their diet. This proves that India in near future will be the biggest market for sugar substitutes. The Artificial Sweetener market value categorized under healthcare products is about Rs. 1350 cr. Per annum. About 21 brands are available in the market as per the market research carried out. Sugar Free is currently the clear market leader in the sweetener category with over 40 % market share. The current market size is not very remarkable but future is likely to be attractive. Indian Pharmaceutical major, Alkem Laboratories Ltd started manufacturing sugar replacement sucralose for in all the foods applications like Bakery, Confectionery, Dairy products, Ready to Eat Packed foods, Fruits & Vegetable products - Juices,

Jams, Sauces, Ketchups, Syrups, Jellies etc. An another Indian pharmaceutical company has completed a new sucralose facility and is ready to begin production of the popular sweetener sucralose

Key words-Artificial sweeteners, non-caloric sweeteners,Stevia

Introduction

After 1991 when India adopted liberisation, Privatization and Globalization the changing lifestyles, rising disposable incomes and hectic lifestyles of the increasing working population drove the Indians towards convenience foods, baked foods, sugar confectionery items and beverages. However, the craving to consume animal products (meat and dairy products), sugar and fatty foods has increased the number of obese people, and diabetics. India is the second largest manufacturer of sugar and its largest consumer in the world – much of it being used in sweetmeats. Sweetmeats being an integral part of the “Indian Thali” become inevitable at times. Our cultural and religious feelings also force us to take ‘Prasad” which is typically loaded with sugar and fats. But increasingly, the massive intake of sugar-based products is being associated not only with diabetes. India has the without doubt of being called the diabetic capital of the world – but also the capital of obesity and heart diseases.

India has now accorded itself with the diabetic nation tag. As per 2017 data, it was observed that the females accounted for a upper percentage in the diabetic segment when compared to males. The main reason was that of more Indian women being either obese/overweight. This has escalated the calorie consciousness among the consumers and not only the diabetic and overweight segment are preferring artificial/sugar substitute sweeteners, a bulk of the health and fitness conscious Indians are going for artificial sweeteners.

Artificial sweeteners (A.S.) are defined as substances that are used in place of sweeteners and are derived from sugar or sugar alcohols. They are also called as sugar substitutes, non-caloric sweeteners and nonnutritive sweeteners. The sugar substitutes are seen as an alternative option for people trying to lose weight, without altering the sweetness or adding extra calories. People with blood sugar and tooth decay problems also seem to use artificial sweeteners. The most usually used artificial sweeteners in the Indian market are Aspartame, Acesulfame potassium, Sucralose, Saccharin. The use of artificial sweeteners in different food applications is regulated by Food Safety and Standard Authority of India (FSSAI). Increasing use of sugar substitutes by the confectionery players in acceptance to consumer demand is driving the market. Artificial sweeteners which come under the ‘bulk sweeteners’ category include sucrose, fructose, lactose and others.

In India, you will find four main types of artificial sweeteners that are currently selling. They are known as Saccharine, Aspartame, Sucralose and Stevia. Let us take a brief look at each of these sweeteners:

Saccharine -This sold under the brand names Sweet n Low or Sugar Free. It is an organic molecule derived from petroleum and is almost 300 times sweeter than regular sweetener. Saccharine is not affected by heat and so has the prime advantages as it can be used easily in sugar free cakes and other sweetmeats. It contains no calories at all and is very effective in controlling blood sugar levels. Saccharine was stated to be a potential 'carcinogen'. Lots of studies conducted on male lab rats confirmed that saccharine does rise chances of bladder cancer.

Aspartame -This sold under the brand name Equal and Sugar Free Gold is pocket friendly for the user. It is a combination of amino acids – aspartic acid and phenylalanine with menthol. Aspartame is about 180 times sweeter than natural sugar. This sweetener has slow onset as well as longer taste, which is sometimes not favored by users. One gram of aspartame is equal to 4 calories. Yet, because we use a very lesser quantity to sweeten our tea and coffee, the calories amount to almost nothing. Even with all these benefits, aspartame has been linked to cardiovascular diseases.

Stevia – This is unique, it cannot be termed as an 'artificial' sweetener because it is in fact a herb, which makes it an organic sweetener. Sold commonly as brand names BeStevia, Sunova and Steviolcal, These sweeteners have been recognized as safe. It is 250 to even 300 times sweeter than sugar; however it leaves a bitter after-taste in the mouth. It is free of calories and a healthy substitute to sugar. Some people have reported feeling nauseous and swollen after using stevia.

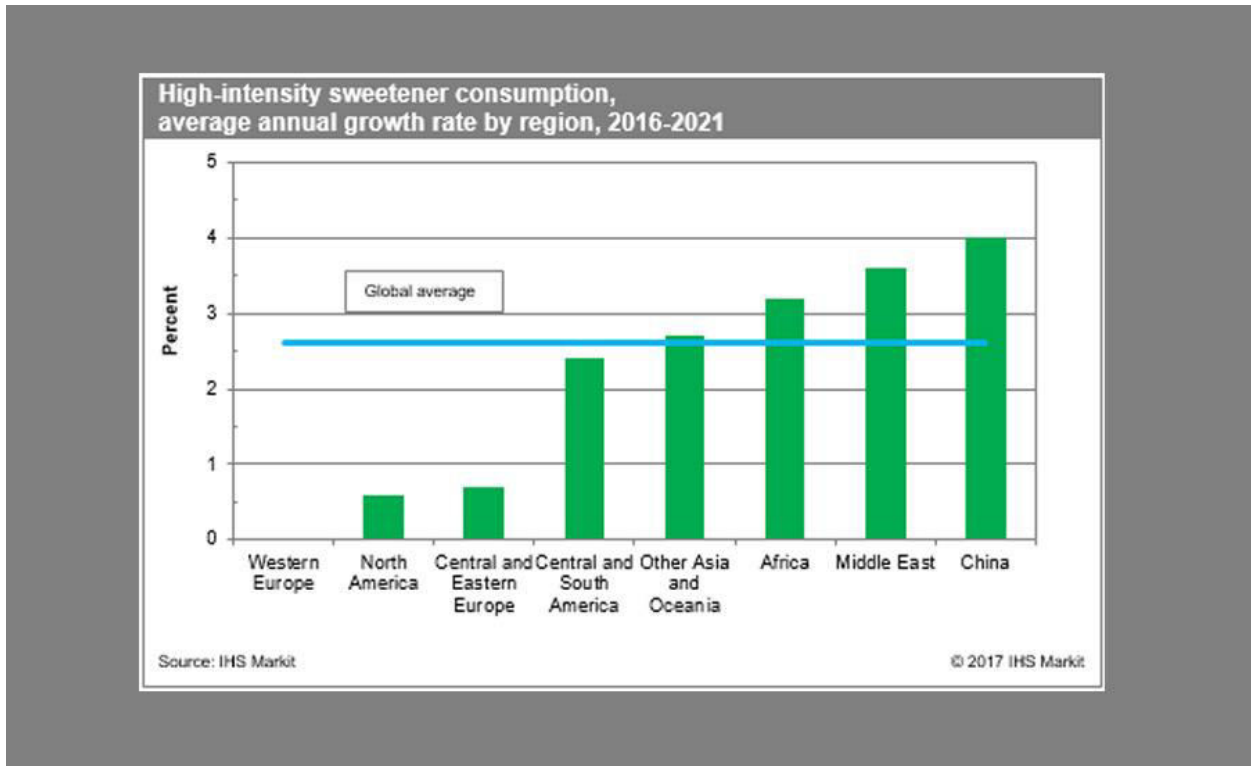
Sucralose – This is heat stable sweetener, many doctors and scientists believe that Sucralose is the finest sweetener in the market. Existing as Splenda and Sugar Free Natura in India, It is almost 600 times sweeter than regular sugar, and comes from sugar cane extracts. Sucralose is calories less, so it effective for those looking to lose weight

Rationale for feasting of artificial sweetener:

- Artificial sweeteners help diminish calorie (energy) intake and support weight loss. Social and health concerns relating to obesity is driving the consumption of artificial sweetener
- Sugar substitutes are considered to be tooth friendly and stops tooth decay
- The occurrence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000, 3.2% in 2010 and 4.4% in 2030. The total number of people with diabetes is projected to rise from 171 million in year 2000 to 380 million in 2030. People with diabetes have difficulty in

controlling their blood sugar levels. By restraining their sugar intake with artificial sweeteners, they can enjoy a varied diet while carefully controlling their sugar intake.

- Also, some sugar alternatives do release energy, but are metabolized more slowly, allowing blood sugar levels to remain more stable over time.
- People with reactive hypoglycemia will produce an excess of insulin after rapidly absorbing glucose into the bloodstream. This causes their blood glucose levels to drop below the optimum level required for proper physiological function. As a result, like diabetics, they must avoid consumption of high-glycemic foods and often prefer artificial sweeteners as an alternative.



Regional consumption - Low calorie sweetener

Sr. No.	Region	MS%	Value (in Mill \$)
1	America	53	530
2	Europe 21 210	21	210
3	Asia 19 190	19	190
4	Rest of the World	07%	70

Source: Artificial Sweeteners Market: Food and Beverage Industry to Dominate the Global Market in Terms of Revenue: Global Industry Analysis (2012 - 2016) and Opportunity Assessment (2017 - 2026)

Above chart shows global consumption of artificial sweetener worldwide with region in the year 2016-2017 china and Middle East countries are largest consumer of artificial sweetener.

Current Indian market overview

The artificial sweetener market stands at around 200 crores and is clocking double digit growth rates. However, the current category growth rates are no indicator of the potential growth of the industry as till last year the category was administered by numerous restrictions on use of low calorie sweeteners in products other than sugar replacements among others which affected growth of this category.

Indian Artificial Sweeteners Market: Dynamics

Growth of the Indian artificial sweeteners market is mainly bound to various micro-economic and macro-economic factors. The report states that the Indian artificial sweeteners market is significantly driven by increasing preference for healthy food products. Growing health concerns among customers has led to surge in demand for fat-free, sugar-free, and diabetes friendly food products. Prevalence of various diseases such as diabetes and obesity is further expected to contribute towards growth of the Indian artificial sweeteners market significantly. According to a recent report of CDC, more than 36% of the adult population in the India, which is more than one-fourth of the population, is suffering from obesity. Moreover, increasing prevalence of the obesity related problems such as stroke, type 2 diabetes, cancer, and heart attack is expected to fuel demand for consumption of food products with low calories and sugar content.

In order to expand their customer base, the leading companies are focusing on offering range of sugar-free food products including bakery products, ice creams, and beverages. In addition, increasing demand for confectionery products among the diabetic population has led the manufacturers to opt for alternatives such as artificial sweeteners. Neotame, Saccharin, Sucralose, and Aspartame are some of the most widely used artificial sweeteners for production of diabetic friendly and sugar-free food products. Surge in demand for artificial sweeteners in the food industry will continue to reflect positively towards growth of the Indian artificial sweeteners market.

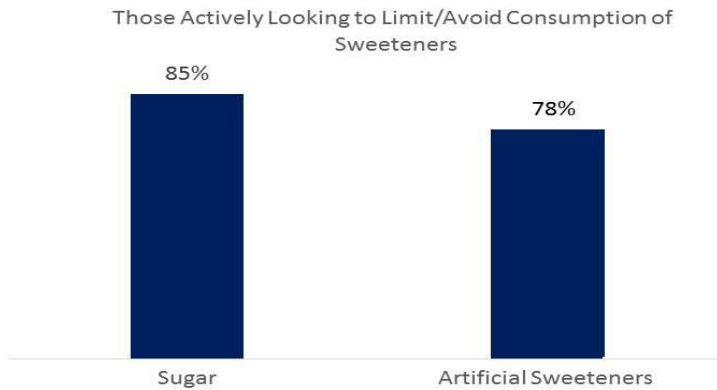
Market driving factors in India

The Artificial sweetener business has evolved hastily over the last 15 years. Whether this evolution has been in response to market forces or is more a case of 'technology push' is,



Study also suggest that more health conscious and ready to give up traditional sugar from their diet. This proves that India in near future will be the biggest market for sugar substitutes.

Indian consumers are looking to cut back on their consumption of sugar & artificial sweeteners



Source: PureCircle Proprietary Research, India 2016

Do you actively try to limit the amount of sugar/artificial sweeteners in the foods and beverages that you consume each day?

10 ©PURECIRCLE LIMITED 2015



.Online study carried out for the artificial sweetener people are now aware of thing that sugar is harmful for the health of human being. More people are ready to give up the sugar and ready to adopt the low calorie intake

Healthcare product portfolio:

The Artificial Sweetener market value categorized under healthcare products is about Rs. 1350 cr. Per annum Artificial Sweetener market includes three major categories

Sr. No.	Artificial Sweeteners	Market share%	Growth
1	Aspartame	42	Negative
2	Saccharin	28	not significant
3	Sucralose	30	Highly positive

1. About 21 brands are available in the market as per the market research carried out
2. Sugar Free is currently the clear market leader in the sweetener category with over 40 % market share. It covers both Aspartame and Sucralose category
3. Saccharin market showing no significant change in its market size
4. Aspartame is showing negative growth as side effects of this sweetener are clear visible.
5. Sucralose has been showing very good acceptance in market and enjoying highest growth among artificial sweeteners
6. Over 10 brands available in the sucralose category in Indian market

Market Potential for Artificial Sweetener with different Usage

The Confectionary and the Soft Drink Sector:

The soft drink manufacturers have introduced several health drinks and many food supplementary beverages, especially for the diabetics. Growing awareness towards sugar substitute products will give steady growth to artificial sweetener.

Household Usage of Artificial Sweetener:

Artificial Sweetener can be used in most of the typical Indian dishes like Chakkara pongal, Payasam, Ravaa laddoo, Sauces, Jams, Juices, Pickles, Tea, Coffee, and even herbal tea. As growing health conscious and diabetic people require low calorie from their intake without hampering original sweet taste and this suggest that India is prominent and promising market for artificial sweetener.

The Bakery and the Beverage Industry:

The bakery industry too holds a stand to bring an impact by the usage of Artificial Sweetener. All cooked and baked food items like puddings, desserts can be sweetened with only very small quantities of Artificial Sweetener. This industry also in growing stage and they are also attracting diabetic and health conscious people by providing them low calorie product by using artificial sweetener.

Its Medicinal Property:

Artificial sweetener is such a versatile sugar with incredible sweetness that it can be safely used in herbal medicines, tonics, for diabetics and also in the daily usage products like mouth washes, tooth's pastes. In case of mouthwashes and toothpaste, the artificial sweetener can be used, because of its anti-fungal and anti-bacterial property.

With its medical usage artificial sweetener will have growing demand from pharmaceutical company.

FINDINGS:

1. The study carried out from secondary data suggest that India in near future will be the biggest market for sugar substitutes.
2. Sugar Free is currently the clear market leader in the sweetener category with over 40 % market share.
3. The current market size for artificial sweetener is not very remarkable but future is likely to be attractive.
- 4 According to a recent report of CDC(Center for Disease Control and Prevention), more than 36% of the adult population in the India, which is more than one-fourth of the population, is suffering from obesity
- 5 Increasing prevalence of the obesity related problems such as stroke, type 2 diabetes, cancer, and heart attack is expected to fuel demand for consumption of food products with low calories and sugar content.
- 6 The artificial sweetener market stands at around 200 crores and is clocking double digit growth rates.
- 7 Cost of the sugar substitute/ artificial sweetener is biggest obstacle that prevents people from adopting the low calorie intake. But increase in household income will definitely help that more and more people will buy it for their health.
- 8 Side effects of the artificial sweetener are in minds of customer but new sucralose have reduced the side effects. That should be convey to the market by manufacturer.

CONCLUSION

In response to increasing demand for higher taste, low-calorie, sugar-free food products, the number of food stuffs comprising artificial low calorie sweeteners has grown markedly in recent years. In terms of artificial sweetener usage, beverages dairy products diet soft drinks and foodstuffs are demonstrating the growing market for the sugar substitute industry. Rendering to the primary and secondary market data sucralose is the choice of artificial sweetener, and growing with excellent speed.

Changing life style, people with increasing calorie consciousness and increasing Indian diabetic population are the reason to more and more consumers are either losing their sweetening behaviors or are turning to artificial sweeteners. Artificial sweeteners are becoming a huge business in India with high-profile promotional campaigns indulging the health-consciousness to choose substitutes for sugar. Brands such as Equal, a global product from Chicago-based Merisant, Sweetex from Boots Piramal, Sugar Free TM from Zydus Cadila and Zero and elata from Alembic are widespread in India.

Indian market of artificial sweeteners looks very eye-catching and likely to take up good growth in terms of volume and value near future. The current market size is not very noteworthy but future is likely to be attractive. Indian Pharmaceutical major, Alkem Laboratories Ltd started manufacturing sugar replacement sucralose for in all the foods applications like Bakery, Confectionery, Dairy products, Ready to Eat Packed foods, Fruits & Vegetable products - Juices, Jams, Sauces, Ketchups, Syrups, Jellies etc. An another Indian pharmaceutical company has completed a new sucralose facility and is ready to begin production of the popular sweetener sucralose

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