Comparative study on bakery and confectionery products

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Abstract

Bakery and confectionery is one of the important sections of kitchen department of a five star hotel which provides desserts & breads to all food outlets for the customers.
The aim of the study was to compare bakery & confectionery products prepared in five star hotels. The empirical research was conducted to compare controlled and standardized products. Purposive sampling method was used for collecting data. The outcome of the study is that standardized recipes are better than controlled recipes over all evaluating parameters.

Keywords

Baking, Bakery products, Flour confectionery products, Hotel

1. Introduction

Kitchen department plays very important role in five star hotels to provide food to their customers. Hotels have in house clients as well as walk in guests in their restaurants where they offer good dining experience. Kitchen department has different sections like Indian, Chinese, continental, Garde manger, pantry, bakery and confectionery section etc. The function of each section is varied. Bakery section supplies yeast leaven breads, puff pastry etc. and pastry sections supplies sweet items like cakes, mousse, soufflé etc to various outlets in hotel. Every hotel has collection of recipes which are generally different from other competing hotel. The attempt was made to compare standardized recipe with recipe used in five star hotels. None of the researches are conducted on comparison between bakery and confectionery products prepared in five star hotels.

Literature review

Maria Assunta Previtali, Marcella Mastromatteo, Pasquale De Vita,Donatella Bianca Maria Ficco, Amalia Conte and Matteo Alessandro De Nobile (2014), studied the characterization of functional bread based on wholemeal durum wheat flour enriched with lentil flour was investigated to find a good balance between the nutritional and organoleptic properties of the final product. In particular, the effect of different percentage of lentil flour (10%, 20% and 25%) and the type and amount of structuring agents (carboxymethyl cellulose, guar seed flour, pectin and tapioca starch) were studied by assessing the sensorial, textural and nutritional properties of the functional bread. Results showed that the increase in the lentil flour at 20% and 25% negatively affected the dough texture and the sensorial quality of the bread. The screening of different hydrocolloids on the bread sample enriched with 25% of legume flour highlighted that the guar seed flour at concentration of 2% allowed obtaining the best results in terms of sensory properties.

Vignali and Andrea Volpi (2013),studied cooking process for the preparation of sweet bakery products, such as Panettone, a typical Italian seasonal dessert. This study is aimed at evaluating the features of the finished product leaving the oven chamber using the Design of Experiments technique. Four features of the product like "water activity", "humidity", "pH" and "sensorial judge" have been explained as functions of independent variables: recipe of the dough, affecting the dough strength and cooking process parameters, such as time, temperature and oven chamber configuration. A two-level, complete four-factor design has been used to carry out the experiments; consequently the analysis of variance has pointed out the effects of main factors and some of their interaction effects; multiple regression analysis was also carried out to explain the variability and to predict the process. The model can be profitably adopted in order to adjust the cooking process parameters in accordance to the dough recipe or the boundary cooking conditions.

Dr. A. Martin David, R. Kalyan Kumar, G. Dharakeswari (2013), -studied the consumer preference towards bakery products and to analyzed the perception of consumers towards the bakery and bakery products. The present study has been confined to Study consumption pattern of bakery products. The study will cover only from the point of consumers from southern region of Tamil Nadu. The present study is an empirical research based on survey method. The

researchers have collected primary data by comprehensive interview schedule and Secondary data have been collected from websites, books and journals. This study was carried out for a period of two months. The data which were collected from the respondents were analysed by using percentage analysis. Five point scales that are Likert's scale analysis, weighted average ranking and chi-square test are used.

Yung Shin Shyu, Wen Chieh Sung, Ming Hsu Chang & Jean Yu Hwang (2008), studied four baking products (bun bread, toast, pound cake, and sponge cake) baked in a far infrared oven as well as in an electric oven to evaluate the effects of far-infrared radiation on qualities of baking products, including texture, volume, staling rate, and sensory evaluation. When the pound cake was baked in a far infrared oven, the batter temperature increased faster than pound cake baked in an electric oven. The hardness of sponge cake baked in a far-infrared oven after 7 days storage is softer than that of a sponge cake baked in an electric oven. There are no significant differences in the volume, water activity, staling rate, or sensory scores of baking products between these two types of baking ovens.

Simona Man, Adriana Păucean, Sevastiţa Muste, Anamaria Pop (2014), Studied on the formulation and quality characteristics of gluten free muffins, This study was carried out to use blends of rice flour (RF), soy flour (SF), corn starch (CS) for production of gluten-free muffins suitable for patients with celiac disease. The gluten-free muffins were prepared from the RF/SF/CS blends and evaluated for the physico-chemical and sensory properties. The purpose of this study is to optimize the muffin's formulation using different proportions of gluten-free flours. Thus, were tested three different recipes (T1,T2,T3), all three containing the same amount of rice flour (RF), but different proportions of soybean flour (SF) and corn starch (CS) so: T1 – RF:SF:CS (80:20:0), T2 – RF:SF:CS (80:10:10), and T3 – RF:SF:CS (80:0:20) other ingredients were unchanged in all three cases. The muffins prepared from the blends of 80% rice flour and 20% soybean [T1– RF:SF:CS (80:20:0)], contains the highest amounts of protein and obtained the highest global score, being the most preferred by consumers.

H. Adegoke Bakare, Oluwatooyin F. Osundahunsi, Mojisola O. Adegunwa & Joseph O. Olusanya (2014), declared that wheat flour was replaced with cassava flour (30 to 100%) to produce cake. Composition and pasting properties of the flours and their composite flour blends

were determined. Baking and sensory qualities of the resulting cake samples were evaluated. Protein starch and fiber contents of the cassava and wheat flours were 1.5; 71.50; 1.94% and 10.9; 69.89; 2.81% respectively, which significantly influenced their pasting and baking characteristics and also reflected in their composite blends. Peak, holding, breakdown and final viscosities of the blends ranges from 90.1 to 121.1; 51.6 to 82.7; 38.21 to 42.62; and 93.4 to 125.8 Rapid Visco Unit (RVU) respectively. Specific volume decreased from 1.49 to 1.18 ml/g. Cake of comparable qualities with that obtained from wheat were obtained within 40% substitution level.

Objectives

To describe attributes of bakery and confectionery products

To evaluate difference between controlled and standardized products

To test hypotheses using statistical techniques

2. Research methodology

The research design was empirical and probability sampling technique was used for collection of data. The researcher had visited hotels to collect recipe from 5 five star hotels i.e. Four points by Sheraton, Sun N Sand, Radisson Blu, The Pride Hotel & Holiday Inn Hotel. Recipes collected from hotels were considered as controlled products. Panel of six judges was formed for sensory evaluation of bakery & confectionery preparations. Panel comprised of one Sous pastry chef from four points by Sheraton hotel, one head of department, one bakery faculty, one cookery faculty, one housekeeping faculty & one food & beverage faculty was selected for the purpose. They were briefed about all the products. Separate table were set for each panelist with crockery, tissue paper & glass of water. Set of questionnaire was given to them. Panelists were not allowed to discuss during evaluation. One by one all twenty products were offered to all six judges for sensory evaluation. Evaluators tick marked in the respective column according to their opinion. All the pages of questionnaire were verified to make sure that all questionnaires were attempted. Primary data was collected through questionnaire which was given to all evaluators and observation method was used for preparation of recipes. Secondary data was collected from books, research journals and websites

3. Result and discussions

Total score of each product was obtained after feeding data from the questionnaire & it was analyzed as below:

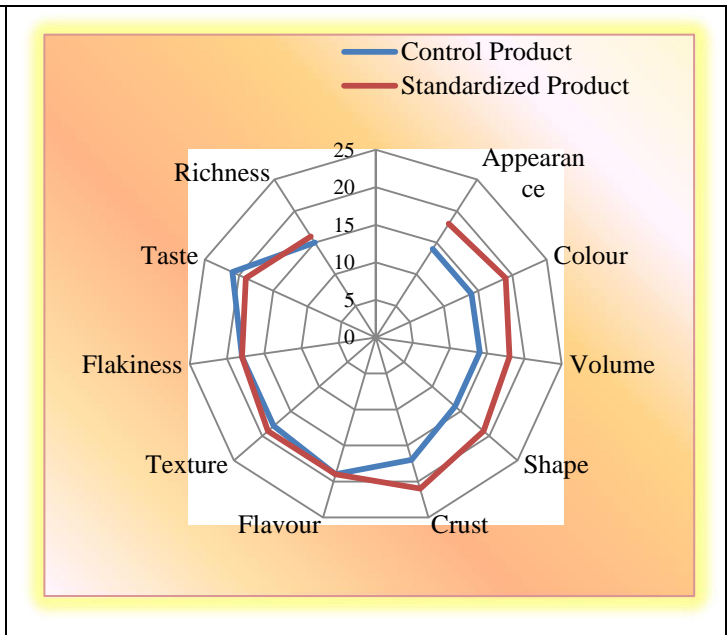| Score of croissant		
Parameter	**Control Product**	**Standardized Product**
Appearance	14	18
Colour	14	19
Volume	14	18
Shape	14	19
Crust	17	21
Flavour	19	19
Texture	18	19
Flakiness	18	18
Taste	21	19
Richness	15	16
Total	**164**	**186**

Table and Graph no.1: Sensory evaluation of croissants per parameter

While evaluating croissants across the parameters, the difference between control product and standardized product is seen in volume, colour, shape and appearance which are better in standardized product. But both the products have similar flavour and flakiness. When standardized croissants is compared with control croissants, standardized croissants has scored more points than control croissant so we can conclude that standardized product is better than the control product

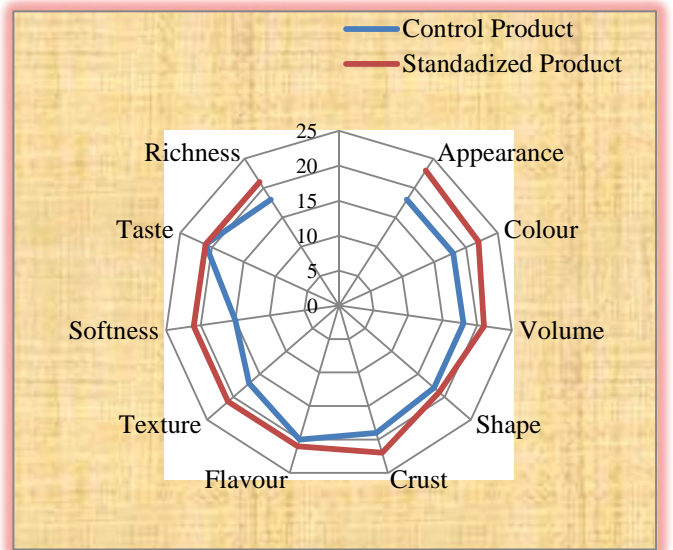| Score of bread roll		
Parameter	**Control Product**	**Standardized Product**
Appearance	18	23
Colour	18	22
Volume	18	21
Shape	18	19
Crust	19	22
Flavour	20	21
Texture	17	21
Softness	15	21
Taste	21	21
Richness	18	21
Total	**182**	**212**

Table and Graph no.2: Sensory evaluation of Bread Rolls per parameter

While evaluating bread roll, the difference between control product and standardized product is seen in texture, colour, softness and appearance. But both the products are similar in taste. When standardized bread roll is compared with control bread roll, standardized bread roll has scored more points than control bread roll so we can conclude that standardized product is better than the control product

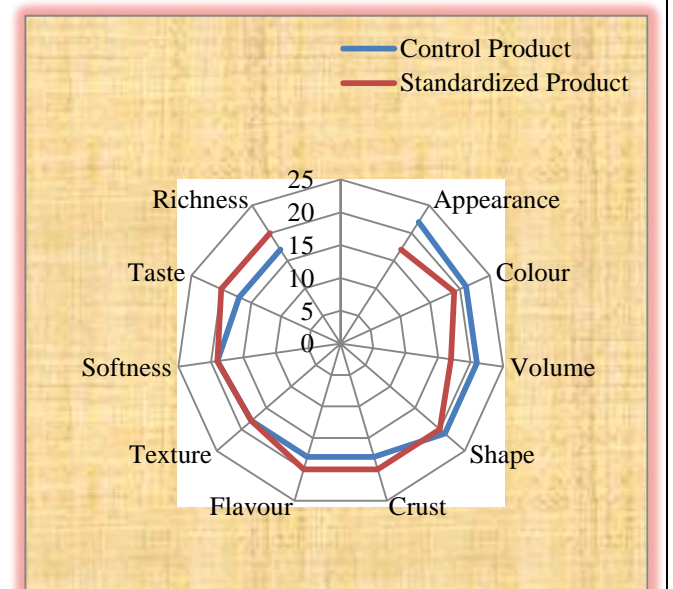| Score		
Parameter	**Control Product**	**Standardized Product**
Appearance	22	17
Colour	21	19
Volume	21	17
Shape	21	20
Crust	18	20
Flavour	18	20
Texture	18	18
Softness	19	19
Taste	17	20
Richness	17	20
Total	**192**	**190**

Table and Graph no. 3:Sensory evaluation of Brioche per parameter

While evaluating brioche, the difference between control product and standardized product is seen in volume, colour, taste and appearance. But both the products are similar in softness, shape and texture. When standardized brioche is compared with control brioche, control brioche has scored more points than standardized brioche so we can conclude that control product is better than the standardized product

Score of doughnut		
Parameter	**Control Product**	**Standardized Product**
Appearance	23	22
Colour	23	20
Volume	24	21
Shape	20	22
Crust	21	22
Flavour	21	22
Texture	23	23
Softness	23	22
Taste	22	23
Richness	21	23
Total	**221**	**220**

Table and Graph no.4: Sensory evaluation of Doughnut per parameter

While evaluating doughnut, the difference between control product and standardized product is seen crust and volume. But both the products are similar in texture, crust, appearance & softness. When standardized doughnut is compared with control doughnut, control doughnut has scored more points than standardized doughnut so we can conclude that control product is better than the standardized product

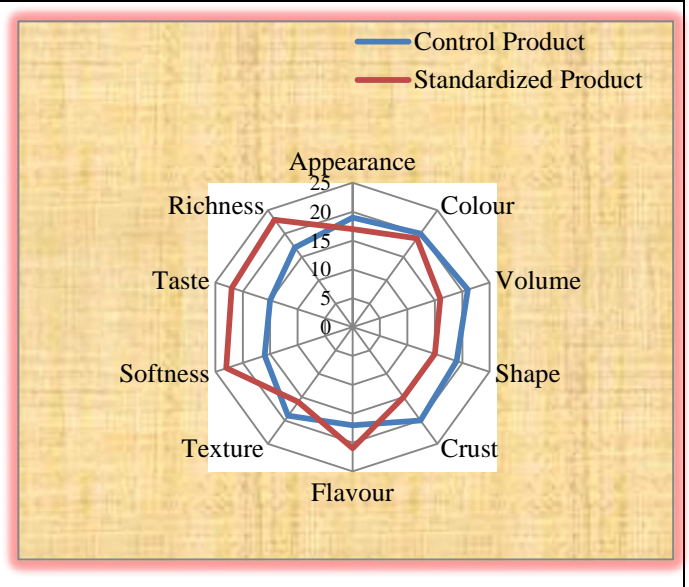| Score Chritsmas Stollen		
Parameter	**Control Product**	**Standardized Product**
Appearance	19	17
Colour	20	19
Volume	21	16
Shape	19	15
Crust	20	15
Flavour	17	21
Texture	19	16
Dry fruit content	16	23
Taste	15	22
Richness	17	23
Total	**183**	**187**

Table and Graph no.5: Sensory evaluation of Christmas Stollen per parameter

While evaluating Christmas stollen across the parameters, the difference between control product and standardized product is seen in all the parameters but standardized product excels in taste & richness. Whereas control product seems better in volume & shape. When standardized Christmas stollen is compared with control Christmas stollen, standardized Christmas stollen has scored more points than control Christmas stollen so we can conclude that standardized product is better than the control product

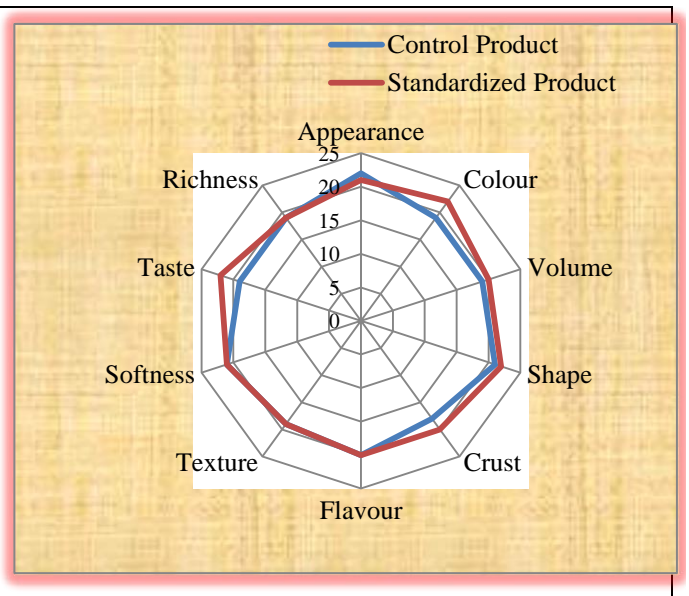| Score of Black Forest Gateau		
Parameter	**Control Product**	**Standardized Product**
Appearance	22	21
Colour	19	22
Volume	19	20
Shape	21	22
Layering	18	20
Flavour	20	20
Texture	19	19
Decoration	21	21
Taste	19	22
Richness	19	19
Total	**197**	**206**

Table and Graph no.6: Sensory evaluation of Black Forest Gateau per parameter

While evaluating black forest gateau across the parameters, the difference between control product and standardized product is seen in volume, colour, softness and appearance which are better in standardized product. But both the products are similar in taste. When standardized black forest gateau is compared with control black forest gateau, standardized black forest gateau has scored more points than control black forest gateau so we can concluded that standardized product is better than the control product.

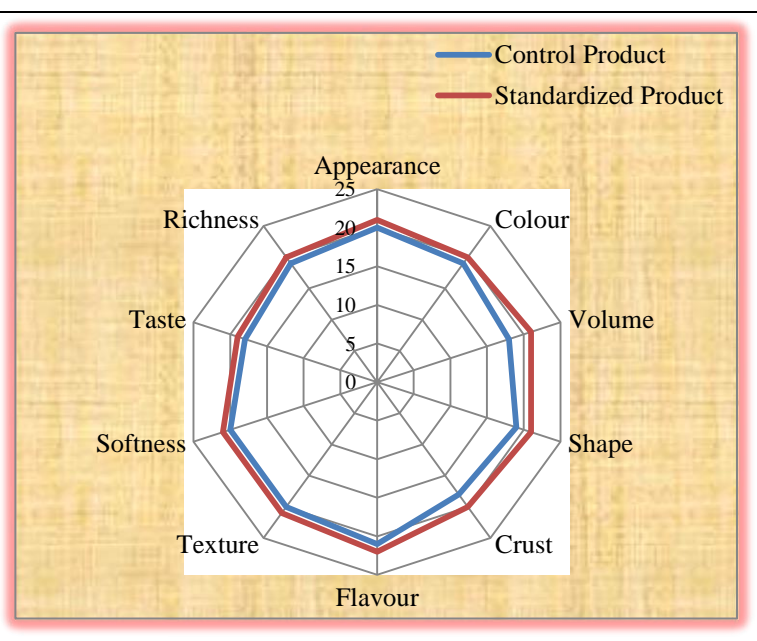| Score of Pineapple Gateau		
Parameter	**Control product**	**Standardized product**
Appearance	20	21
Colour	19	20
Volume	18	21
Shape	19	21
Layering	18	20
Flavour	21	22
Texture	20	21
Decoration	20	21
Taste	18	19
Richness	19	20
Total	192	206

Table and Graph no.7: Sensory evaluation of Pineapple Gateau per parameter

While evaluating pineapple gateau across the parameters, the difference between control product and standardized product is seen in volume, colour, softness and appearance which are better in standardized product. But both the products are similar in taste. When standardized pineapple gateau is compared with control pineapple gateau, standardized pineapple gateau has scored more points than control pineapple gateau so we can conclude that standardized product is better than the control product

	Score	
Parameter	**Control Product**	**Standardized Product**
Appearance	23	20
Colour	22	23
Volume	23	22
Shape	23	23
Layering	21	23
Flavour	22	23
Texture	19	24
Decoration	21	22
Taste	23	23
Richness	20	23
Total	217	226

Table and Graph no.8: Sensory evaluation of Linzer torte per parameter

While evaluating Linzer torte across the parameters, the difference between control product and standardized product is seen in texture and appearance which are better in standardized product. But both the products are similar in taste & shape. When standardized Linzer torte is compared with control Linzer torte, standardized Linzer torte has scored more points than control Linzer torte so we can conclude that standardized product is better than the control product

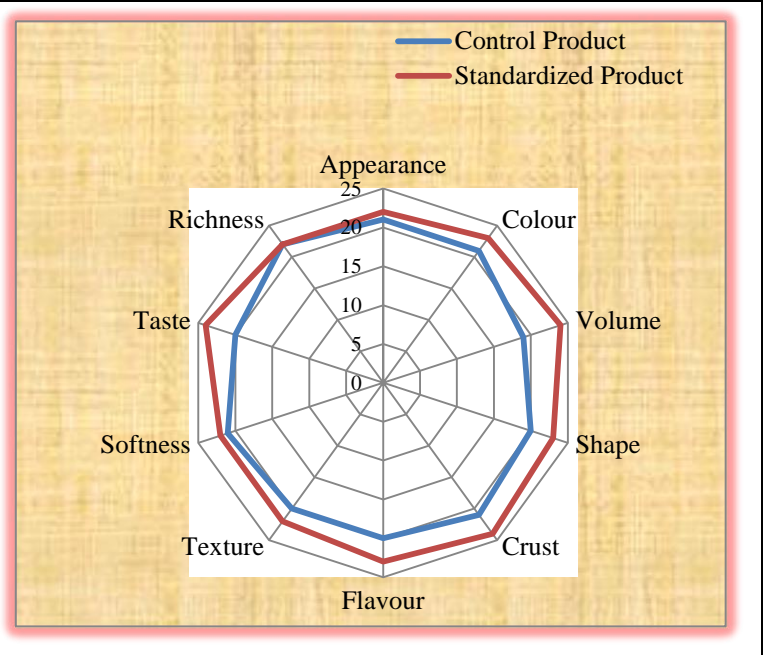| Score of Éclair		
Parameter	**Control Product**	**Standardized Product**
Appearance	21	22
Colour	21	23
Volume	19	24
Shape	20	23
Layering	21	24
Flavour	20	23
Texture	20	22
Decoration	21	22
Taste	20	24
Richness	22	22
Total	205	229

Table and Graph no.9: Sensory evaluation of Éclair per parameter

While evaluating éclair across the parameters, the difference between control product and standardized product is seen in volume and taste which are better in standardized product. But both the products were almost similar in rest of the parameters. When standardized éclair is compared with control éclair, standardized éclair has scored more points than control éclair so we can conclude that standardized product is better than the control product

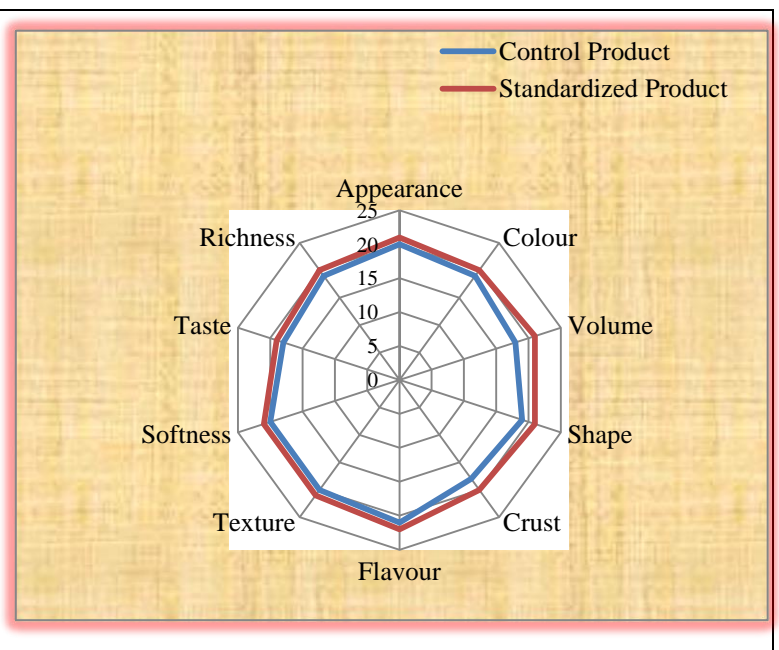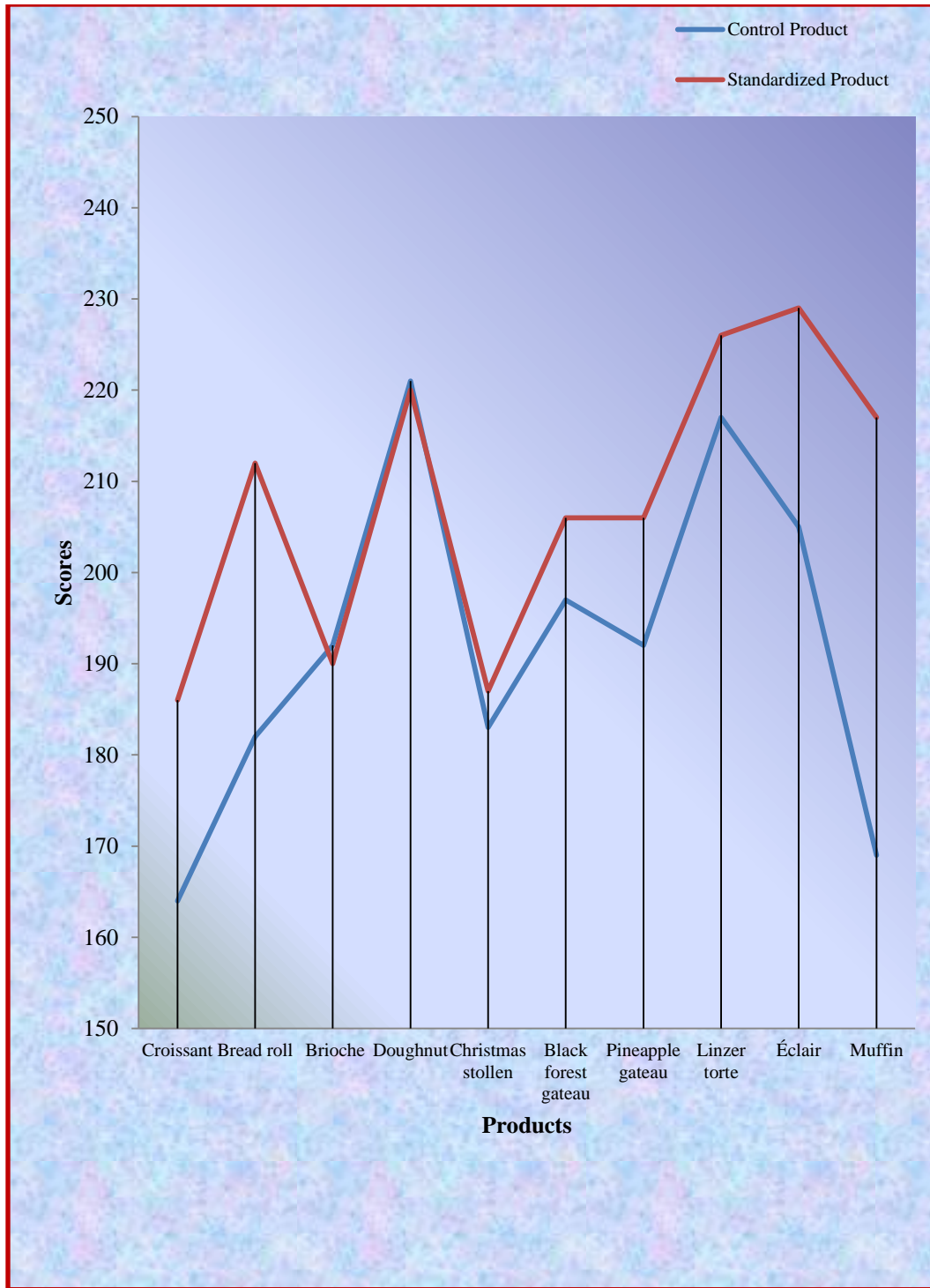| Score		
Parameter	**Control Product**	**Standardized Product**
Appearance	18	20
Colour	22	21
Volume	17	22
Shape	19	22
Layering	16	22
Flavour	14	21
Texture	14	22
Decoration	19	21
Taste	16	24
Richness	14	22
Total	169	217

Table and Graph no.10: Sensory evaluation of Muffin per parameter

While evaluating muffin across the parameters, the difference between control product and standardized product is seen in all the parameters which are better in standardized product. When standardized muffin is compared with control muffin, standardized muffin has scored more points than control muffin so we can conclude that standardized product is better than the control product.

Comparison of control products & standardized products

S. No.	Name of recipe	Control Product	Standardized Product
1	Croissants	164	186
2	Bread rolls	182	212
3	Brioche	192	190
4	Doughnut	221	220
5	Christmas stollen	183	187
6	Black forest gateau	197	206
7	Pineapple gateau	192	206
8	Linzer torte	217	226
9	Éclair	205	229
10	Muffin	169	217

Table no.11: Comparison of total score on various dimensions of recipe

Graph no.11: Comparison of total score on various dimensions of recipe

Graph shows that standardized products are better than control products except brioche & doughnut over the total score on various dimensions of recipes

Plotting of Difference

S. no.	Name	Difference
1	Croissants	22
2	Bread rolls	30
3	Brioche	-2
4	Doughnut	-1
5	Christmas stollen	4
6	Black forest gateau	9
7	Pineapple gateaux	14
8	Linzer torte	9
9	Éclair	24
10	Muffin	48

Table no.12: Score of standardized product minus score of control product

Brioche has minus 2 score & doughnut has minus 1 score & rest of standardized products have plus scores when control products scores are subtracted from the standardized products scores.

Hypothesis Testing

H_0: There is no significant difference between the total score of the control product.

H_1: There is significant difference between the total score of the control product.

H_0: There is no significant difference between the total score of standardised product.

H_1: There is significant difference between the total score of standardised product.

H_0: There is no relation between the total score of the control product and standardised product.

H_1: There is anrelation between the total score of the control product and standardised product.

We generally use t-test for difference between means. But in this case we have 10x2 that is 20 values. Do these values differ significantly?

We have score of 10 products. They have different score. They have different variances. The same products are repeated. Hence it becomes two factor analyses of 10 recipes. The investigator decided to use ANOVA two factors without replication.

The value of calculates F was tested against the following hypothesis.

There is a comparison between score of control product and standardised recipe.

Level of significance is 0.05

ANOVA: Two-Factor Without Replication				
SUMMARY	*Count*	*Sum*	*Average*	*Variance*
Croissants	2	350	175	242
Bread rolls	2	394	197	450
Brioche	2	382	191	2
Doughnut	2	441	220.5	0.5
Christmas stollen	2	370	185	8
Black forest gateau	2	403	201.5	40.5
Pineapple gateaux	2	398	199	98
Linzer torte	2	443	221.5	40.5
Éclair	2	434	217	288
Muffin	2	386	193	1152
Control Product	10	1922	192.2	350.4
Standardized Product	10	2079	207.9	251.4333

Table no.13: Calculation of ANOVA for ten control products & ten standardized Products

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	4327	9	480.8278	3.973601	0.026024	3.178893
Columns	1232	1	1232.45	10.18507	0.010982	5.117355
Error	1089	9	121.0056			
Total	6649	19				

Table no. 14: Value of ANOVA for ten control products & ten standardized Products

For df 9, the critical value of F is 3.17 and calculated value of F is 3.97.

Calculated F > tabulated F.

Hence Null Hypothesis no 1 is rejected.

There is a significant difference between the scores of products. It means that the marks allotted to recipes differ from evaluators' point of view

The ingredients used & procedure for making the control product & standardized product is same. Also the parameters used for evaluating both the products are almost same. Even the oven, baking temperature, baking time & small equipments used are same. The difference is only in the quantity of raw ingredient used which majorly affects on the overall quality of the product. Second may be skill level of the chef is not up to the mark & procedure for making products are not followed properly. Hence there is a significant difference between the scores of the products. For df 1, the critical value of F is 5.11 and calculated value of F is 10.18.

Calculated F > tabulated F.

Hence Null Hypothesis no 2 is rejected.

There is a significant difference between the scores of control product and standardised product. It means that the marks allotted to recipes differ from expert's point of view. It means that the difference in the scores of control product and standardised product is not due to chance or error Chefs are not trained for making such product & have negligence in following recipe. Second cause may be staffs are not dedicated to their work. The difference is only in the quantity of raw ingredient used for control product & standardized product which majorly affects on the overall quality of the product. Except control brioche & control doughnut, all standardized products better than the control product. It means control brioche & control doughnut is better than standardized brioche & standardized doughnut. Evaluators must have given more score to the better product. Hence there is a significant difference between the scores of control product and standardised products.

For testing Hypothesis no 3 the two sample variance as done. It is given in table below.

F-Test Two-Sample for Variances		
	Control product	**Standardized product**
Mean	192.2	207.9
Variance	350.4	251.4333
Observations	10	10
df	9	9
F	1.39361	
P(F<=f) one-tail	0.31449	
F Critical one-tail	3.178893	

Table no.15: Value of ANOVA for ten control products & ten standardized Product (in total)

For df 9, the critical value of F is 3.17 and calculated value of F is 1.39.

Calculated F <tabulated F.

Hence Null Hypothesis no 3 is accepted.

There is no interaction between the total score of the recipes from hotel and standardised recipes. It supports the premise that the recipe preparation is independent. Control recipe was collected from the respective five hotels. Five recipes of each product were collected & then the mean of each recipe was derived & it was considered as standardized recipe for the trial purpose. Out of five controls recipe one recipe was taken for the preparation purpose. It means that we have used independent recipe for every control product& standardized product. Individually all control product& standardized products were prepared. During the evaluation, it was presented to the evaluators separately & scored by the evaluators separately. Hence there is no interaction between the total score of the recipes from control product and standardised product.

4. Suggestions and recommendations

1. Current research is conduct on bakery and flour confectionery products, it is recommended to perform study on various starters or main courses preparation.

2. Research can be carried out on regional dishes and comparison to be done between homemade and industrial preparations.

3. Study can be conducted by selecting preparations from fine dining restaurants or smaller standalone outlets.

5. Conclusion

Bakery shops produce various types of products which can be consumed at any time of the day. Generally in the bakeries breads and dessert, sweet and savory products are made as per the inclination of the customers. For the current research ten bakery and ten flour confectionery products were selected from five star hotels in Pune which was compared with the standardized recipe. Out of ten products eight standardized products scored high and two products from hotels scored high in sensory evaluation using different parameters.

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