

OLLSCOIL NA hÉIREANN, GAILLIMH
NATIONAL UNIVERSITY OF IRELAND, GALWAY.

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Master of Business Administration
Higher Diploma in Management

Quality Management (IE529)

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Instructions: Time allowed: 2 Hours

Attempt: Any Three questions [All questions carry equal marks]. Graph paper available

- Q1 (a) Define the two major categories of quality cost and how they relate to each other. Give examples of each from your work. [11 marks]
- (b) What is the difference between internal and external failure costs? [11 marks]
- (c) Describe how a quality assurance program might impact the organisational functions of a fast-food business from a quality cost perspective. [11 marks]
- Q2 A machine at the Pacific Fruit Company fills boxes with raisins. The labelled weight of the boxes is 10 ounces. The company wants to construct X-bar and R charts to monitor the filling process and make sure the box weights are in control. The quality control department for the company sampled five boxes every two hours for three consecutive working days. The sample observations are as follows.

Sample	Box Weights (oz.)				
1	9.06	9.13	8.97	8.85	8.46
2	8.52	8.61	9.09	9.21	8.95
3	9.35	8.95	9.2	9.03	8.42
4	9.17	9.21	9.05	9.01	9.53
5	9.21	8.87	8.71	9.05	9.35
6	8.74	8.35	8.5	9.06	8.89
7	9.00	9.21	9.05	9.23	8.78
8	9.15	9.2	9.23	9.15	9.06
9	8.98	8.9	8.81	9.05	9.13
10	9.03	9.1	9.26	9.46	8.47
11	9.53	9.02	9.11	8.88	8.92
12	8.95	9.1	9.00	9.06	8.95

- (a) Construct X-bar and R charts with 3 sigma control limits, and plot the sample observations. [13 marks]
- (b) Comment on the process control and variability. [7 marks]
- (c) Explain process capability in terms of C_p and C_{pk} indices. When and why are they used? Use diagrams to explain your answer. [13 marks]

Q3 Write short explanatory notes on three of the following:

- (a) Deming's philosophy on quality. [11 marks]
- (b) Quality Function Deployment. [11 marks]
- (c) ISO9001. [11 marks]
- (d) Inspection Sampling. [11 marks]
- (e) Safety management. [11 marks]

Q 4 (a) What is the ISO14001 standard?

[15 marks]

- (b) "Total Quality Management is the system of activities directed at achieving delighted customers, empowered employees, higher revenues and lower costs". Discuss. [18 marks]

Q5 (a) Explain the role of self-assessment in the European Business Excellence or Malcolm Baldrige Awards. [15 marks]

- (b) "When products harm the customer, it brings home the necessity for having an effective Product Liability Prevention Program". Discuss. [18 marks]

ATTACHMENT

X-BAR, R, AND S CONTROL CHART—3-SIGMA LIMIT CONSTANTS
(Based on Sampling from a Normal Distribution)

Subgroup size n	d_2	d_3	c_4	D_3	D_4	B_3	B_4	A	A_2	A_3
2	1.128	0.8525	0.7979	0.00	3.27	0.00	3.27	2.12	1.88	2.66
3	1.693	0.8884	0.8862	0.00	2.57	0.00	2.57	1.73	1.02	1.95
4	2.059	0.8798	0.9213	0.00	2.28	0.00	2.27	1.50	0.73	1.63
5	2.326	0.8641	0.9400	0.00	2.11	0.00	2.09	1.34	0.58	1.43
6	2.534	0.8480	0.9515	0.00	2.00	0.03	1.97	1.22	0.48	1.29
7	2.704	0.8332	0.9594	0.08	1.92	0.12	1.88	1.13	0.42	1.18
8	2.847	0.8198	0.9650	0.14	1.86	0.19	1.81	1.06	0.37	1.10
9	2.970	0.8078	0.9693	0.18	1.82	0.24	1.76	1.00	0.34	1.03
10	3.078	0.7971	0.9727	0.22	1.78	0.28	1.72	0.95	0.31	0.98
11	3.173	0.7873	0.9754	0.26	1.74	0.32	1.68	0.90	0.29	0.93
12	3.258	0.7785	0.9776	0.28	1.72	0.35	1.65	0.87	0.27	0.89
13	3.336	0.7704	0.9794	0.31	1.69	0.38	1.62	0.83	0.25	0.85
14	3.407	0.7630	0.9810	0.33	1.67	0.41	1.59	0.80	0.24	0.82
15	3.472	0.7562	0.9823	0.35	1.65	0.43	1.57	0.77	0.22	0.79
16	3.532	0.7499	0.9835	0.36	1.64	0.45	1.55	0.75	0.21	0.76
17	3.588	0.7441	0.9845	0.38	1.62	0.47	1.53	0.73	0.20	0.74
18	3.640	0.7386	0.9854	0.39	1.61	0.48	1.52	0.71	0.19	0.72
19	3.689	0.7335	0.9862	0.40	1.60	0.50	1.50	0.69	0.19	0.70
20	3.735	0.7287	0.9869	0.41	1.59	0.51	1.49	0.67	0.18	0.68
30	4.086	0.6926	0.9914			0.60	1.40	0.55		0.55
40	4.322	0.6692	0.9936			0.66	1.34	0.47		0.48
50	4.498	0.6521	0.9949			0.70	1.30	0.42		0.43
60	4.639	0.6389	0.9958			0.72	1.28	0.39		0.39
70	4.755	0.6283	0.9964			0.74	1.26	0.36		0.36
80	4.854	0.6194	0.9968			0.76	1.24	0.34		0.34
90	4.939	0.6118	0.9972			0.77	1.23	0.32		0.32
100	5.015	0.6052	0.9975			0.79	1.21	0.30		0.30

* R-chart factors are given only up to $n = 20$; for larger subgroup sizes the S chart should be used.

Source: Adapted with permission from E. L. Grant and R. S. Leavenworth, *Statistical Quality Control*, 6th ed., New York: McGraw-Hill, pp 669-672, 1988.