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Terms used by Compathy when describing Harding and Yorke's products and services - Explained

- **Amadeus**
  - A Pan-European financial database from which Yuksel correlated our data
- **Balanced Scorecard**
  - Used to describe the balance between feeling and process
- **CAPEX**
  - Capital Expenditure – correlation analysis
- **Channels**
  - Used to describe the scope of our Measurement
- **Cronbach's Alpha**
  - Reliability analysis on our methodology
- **Experiential**
  - To describe one USP of our measurement and delivery
- **Exploratory Factor Analysis (EFA)**
  - A technique used by Yuksel to determine our Correlation
- **Facilitation**
  - To explain our Workshop technique
- **Functions**
  - Used to describe the scope of our Measurement
- **HYM Sheet**
  - Best way to describe what we do
- **Linear Correlations**
  - A technique used by Yuksel to determine our Correlation
- **Multiple Regression (Ordinary Least Square)**
  - A technique used by Yuksel to determine our Correlation
- **Net Promoter Score**
  - Key competitor and advocacy measure
- **OPEX**
  - OPEX – Operational Expenditure – anecdotal evidence
- **ROCE (Return on Capital Employed)**
  - Used to explain our correlation with Profit
- **Standard Deviation**
  - Used in ERIC Reports
- **Statistical Relevance**
  - Used to describe accuracy of our ratings
- **Strength of Correlation**
  - Used to describe the strength of the correlation between ERIC and Profitability

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Amadeus

The ERIC data was shared with Dr. Yuksel Ekinci and Prof. Merlin Stone and they compared our data with that in Amadeus.

AMADEUS is a comprehensive, pan-European database containing financial information on over 11 million public and private companies in 41 European countries. It combines data from over 30 specialist regional information providers (IPs). AMADEUS is a modular product; you can choose the level of coverage that you require - the top 250,000 companies, the top 1.5 million or all companies. Standardised annual accounts (for up to 10 years), consolidated and unconsolidated, financial ratios, activities and ownership for approximately 9 million companies throughout Europe, including Eastern Europe.

The AMADEUS database is exclusive to BvDEP (Bureau van Dijk Electronic Publishing) and its information providers and is not available over any other platform. BvDEP identifies the best source of information in each country and applies strict inclusion criteria to prevent any bias in coverage. A standard company report includes: 25 balance sheet items, 26 profit and loss account items and 26 ratios, descriptive information including trade description and activity codes, ownership information which is researched by BvD's own team of consultants. A news module contains information from Reuters', Dow Jones, the FT as well as M&A news.

CAPEX

This is an acronym for 'Capital Expenditure'. Our correlation is academically proven to correlate with Capital Employed.

Channels

By Channels we mean the route to market. Including: Retail / Telephony / Advertising / Correspondence / Internet (Web / Email) etc.

Our methodology can be used for any and all these channels in a comparable way. I have found the best way to describe this is to go through all the interactions one might do in a normal day:

Wake up / watch the news on Television / have breakfast listening to the radio / drive to car park / pick up coffee from Starbucks / go to meeting / do some internet banking / telephone call to supplier / lunch in Pizza Express / conference call on mobile / dash to other office using public transport / seek out new supplier using internet / interview new recruit / present to potential client etc.

Throughout the day you would have used every sense and utilised every channel and yet you can still differentiate how you felt during each interaction in a comparable way.

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Cronbach's Alpha

This is an internal audit mechanism that determines the quality of the data being used. Typically a measure of 95% plus is a reliable measure and below that figure the data is deemed as potentially unreliable. We achieved a rating of 98.9% which implies that there is an only 1.1% chance of getting our numbers wrong – this strengthens our correlation claims quite significantly. For those requiring a great sense of awareness I have put the Wikipedia explanation below.

Cronbach's α (alpha) is a statistic. It is commonly used as a measure of the internal consistency reliability of a psychometric instrument. It was first named as alpha by Cronbach (1951), as he had intended to continue with further instruments.

Cronbach's α measures how well a set of variables or items measures a single, unidimensional latent construct.

Cronbach's α is defined as

$$\alpha = \frac{N}{N-1}\left(1 - \frac{\sum_{i=1}^{N}\sigma_{Y_i}^2}{\sigma_X^2}\right)$$

where N is the number of components (items or testlets), σ_X^2 is the variance of the observed total test scores, and $\sigma_{Y_i}^2$ is the variance of component i.

Alternatively, the standardized Cronbach's α can also be defined as

$$\alpha = \frac{N \cdot \bar{c}}{(\bar{v} + (N-1) \cdot \bar{c})}$$

where N is the number of components (items or testlets), $\bar{v}$ equals the average variance

and $\bar{c}$ is the average of all covariances between the components.

Alpha is an unbiased estimator of reliability if and only if the components are essentially τ-equivalent (Lord & Novick, 1968[1]). Under this condition the components can have different means and different variances, but their covariances should all be equal - which implies that they have 1 common factor in a factor analysis. One special case of essential τ-equivalence is that the components are parallel. Although the assumption of essential τ-equivalence may sometimes be met (at least approximately) by testlets, when applied to items it is probably never true. This is caused by the facts that (1) most test developers invariably include items with a range of difficulties (or stimuli that vary in their standing on the latent trait, in the case of personality, attitude or other non-cognitive instruments), and (2) the item scores are usually bounded from above and below. These circumstances make it unlikely that the items have a linear regression on a common factor. A factor analysis may then produce artificial factors that are related to the differential skewnesses of the components. When the assumption of essential τ-equivalence of the components is violated, alpha is not an unbiased estimator of reliability. Instead, it is a lower bound on reliability.

α can take values between negative infinity and 1 (although only positive values make sense). Some professionals, as a rule of thumb, require a reliability of 0.70 or higher (obtained on a substantial sample) before they will use an instrument. Obviously, this rule should be applied with caution when α has been computed from items that systematically violate its assumptions. Further, the appropriate degree of reliability depends upon the use of the instrument, e.g., an instrument designed to be used as part of a battery may be intentionally designed to be as short as possible (and thus somewhat less reliable). Other situations may require extremely precise measures (with very high reliabilities).

Cronbach's α is related conceptually to the Spearman-Brown prediction formula. Both arise from the basic classical test theory result that the reliability of test scores can be expressed as the ratio of the true score and total score (error and true score) variances:

$$\rho_{XX} = \frac{\sigma_T^2}{\sigma_X^2}$$

Alpha is most appropriately used when the items measure different substantive areas within a single construct. Conversely, alpha (and other internal consistency estimates of reliability) are inappropriate for estimating the reliability of an intentionally heterogeneous instrument (such as screening devices like biodata or the original MMPI). Also, α can be artificially inflated by making scales which consist of superficial changes to the wording within a set of items or by analyzing speeded tests.

Experiential

By 'Experiential' we mean to bring it to life by creating and sharing an experience. We do this by selecting soundbites, video clips and scans that reflect a particular score.

Exploratory Factor Analysis (EFA)

Psychologists searching for a neat and tidy description of human intellectual abilities led to the development of factor analytic methods by developing quantitative methods to determine the interdependence between 2 variables.

Factor analysis could be described as orderly simplification of interrelated measures. Traditionally factor analysis has been used to explore the possible underlying structure of a set of interrelated variables without imposing any preconceived structure on the outcome. By performing exploratory factor analysis (EFA), the number of constructs and the underlying factor structure are identified.

The goals of factor analysis are

1. to help an investigator determine the number of latent constructs underlying a set of items (variables)
2. to provide a means of explaining variation among variables (items) using a few newly created variables (factors), e.g., condensing information
3. to define the content or meaning of factors, e.g., latent constructs

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Assumptions underlying EFA are

- Interval or ratio level of measurement
- Random sampling
- Relationship between observed variables is linear
- A normal distribution (each observed variable)
- Multivariate normality

Facilitation

We talk about 'Facilitated Workshops' quite a bit. We mean that we will manage and pull out the key issues in a workshop style gathering. A normal facilitator would not get involved with the actual content whereas we do. We contribute to the discussion through our experience and interpret the data for the group. We draw together the accepted reasons for the findings and help put together a road map to improve the position. These are generally offered free of charge so long as they immediately follow a paid presentation and they offer a wonderful opportunity for The Empathy Academy team to build confidence and secure an ongoing contract.

Functions

A function is the process you are going through during your interaction and would include: Sales / Customer Service / Billing / Retention / Complaints etc.

Our methodology can be used for all Functions although often we will ensure that the Customers come into each from a near neutral (or consistent) frame of mind as possible. In this way we can make cross-functional comparisons with ease.

Linear Correlations

Linear correlation plots are used to assess whether or not correlations are consistent across groups. That is, if your data is in groups, you may want to know if a single correlation can be used across all the groups or whether separate correlations are required for each group.

A linear correlation plot could be generated initially to see if linear fitting would be a fruitful direction. If the correlations are high, this implies it is worthwhile to continue with the linear slope, intercept, and residual standard deviation plots. If the correlations are weak, a different model needs to be pursued.

The linear correlation plot can be used to answer the following questions.

1. Are there linear relationships across groups?
2. Are the strength of the linear relationships relatively constant across the groups?

For grouped data, it may be important to know whether the different groups are homogeneous (i.e., similar) or heterogeneous (i.e., different). Linear correlation plots help answer this question in the context of linear fitting.

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The earliest form of regression was the method of least squares, which was published by in 1805 and in 1809. Both applied the method to the problem of determining, from astronomical observations, the orbits of bodies about the Sun.

The term "regression" was coined by Francis Galton, a cousin of Charles Darwin, in the nineteenth century to describe a biological phenomenon. The phenomenon was that the heights of descendants of tall ancestors tend to regress down towards a normal average. T his work was later extended to a more general statistical context.

Regression methods continue to be an area of active research and this is what Yuksel used to track, map and predict the ERIC data with financial data taken from the Amadeus financial database.

It is because of this 'Regression' technique that we were able to predict an increase in ROCE for every point increase in Empathy.

Multiple Regressions (Ordinary Least Square)

In statistics, regression analysis refers to techniques for modelling and analysing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables — that is, the average value of the dependent variable when the independent variables are held fixed.

Regression analysis is widely used for prediction (including forecasting of time-series data). Regression analysis is also used to understand which among the independent variables are related to the dependent variable, and to explore the forms of these relationships. In restricted circumstances, regression analysis can be used to infer causal relationships between the independent and dependent variables.

A large body of techniques for carrying out regression analysis has been developed. Familiar methods such as linear regression and ordinary least squares regression are parametric, in that the regression function is defined in terms of a finite number of unknown parameters that are estimated from the data. Nonparametric regression refers to techniques that allow the regression function to lie in a specified set of functions, which may be infinite-dimensional.

Net Promoter Score (NPS)

Launched in 2004 by Fred Reichheld. Fred claimed that you only need one number to measure your customer satisfaction and he came up with NPS.

NPS is based on the fact that every company's customers can be divided into three categories: Promoters, Passives, and Detractors. By asking one simple question — How likely is it that you would you recommend [Company X] to a friend or colleague? — you can track these groups and get a clear measure of your company's performance through its customers' eyes. Customers respond on a 0-to-10 point rating scale

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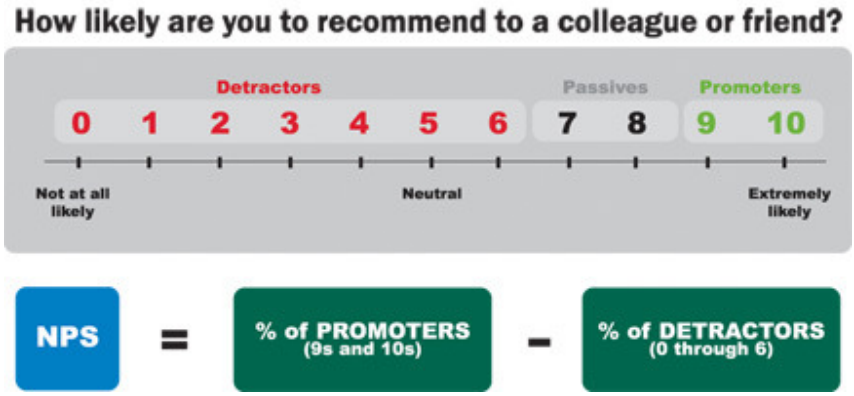
• **Promoters** (score 9-10) are loyal enthusiasts who will keep buying and refer others, fueling growth.
• **Passives** (score 7-8) are satisfied but unenthusiastic customers who are vulnerable to competitive offerings.
• **Detractors** (score 0-6) are unhappy customers who can damage your brand and impede growth through negative word-of-mouth.

To calculate a company's Net Promoter Score (NPS), take the percentage of customers who are Promoters and subtract the percentage who are Detractors.



NPS claims a correlation with Revenue Growth (although this has been challenged by Academia – An example of Revenue Growth would be a company increasing its revenue without taking into account the amount of investment made by investors. It therefore has little validity as a correlated measure as it could imply an overall negative position. I.e. a great deal of investment is made and the revenue growth is disproportionate.

There are a number of papers to read and available on our Website:

The Dangers of NPS -
http://www.empathy.co.uk/downloadable/157889The%20Dangers%20of%20NPS.pdf

Net Promoter – Is it Valid? A Longitudinal Examination of Net Promoter and Firm Revenue Growth
http://www.empathy.co.uk/downloadable/315621Net%20Promoter%20Score.pdf

More and more companies are pulling away from NPS as they are having problems interpreting both the NPS score and because they can't determine the reasons behind the score. However, there are a lot of NPS advocates around too.

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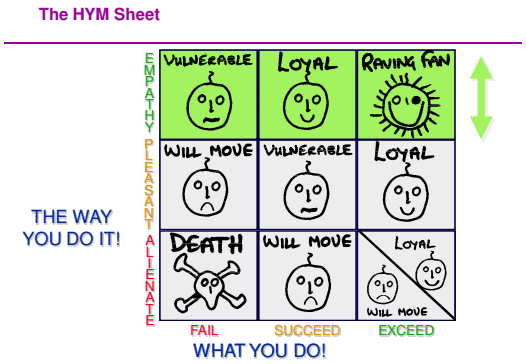
HYM Sheet

This is Harding & Yorke's Matrix – a four square 'Boston Matrix' growing to reveal a nine-box matrix determining on its axis ' What you do' and 'How you do it'.



OPEX

This is an acronym for 'Operational Expenditure'. Whilst we don't have an academically proven correlation with Operational Expenditure it does not mean that it does not exist. It is a really difficult measure to relate to as there are so many variables. However we do have lots of anecdotal evidence provided both by our own clients and out own experience to suggest that a correlation does exist. This has, for the most part, been documented in 'Chicken Soup' – Using ERIC to influence HR elements of OPEX

ROCE – Return on Capital Employed

Also know as Equity Shareholder Funds. It describes the percentage return an investor gets when/if he invests money into a company.

i.e. a £1000 investment nets a return of £8,000. The ROCE is 8%. An increase of 16.4% (academically proven by Yuksel) would increase this to 9.312%. If you reverse the formula then this equates to a return of £9,312 – an increase of £1,312.

It is the closest and most accurate measure of profit.

We have two papers available to view on the Website:

A published 'Academic Journal' by Jamie Lywood, Prof Merlin Stone and Dr. Yuksel Ekinci

and 'Empathy vs. Profitability' – a White Paper

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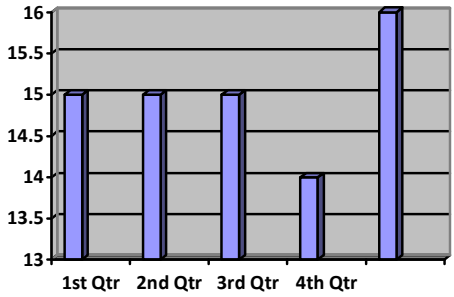
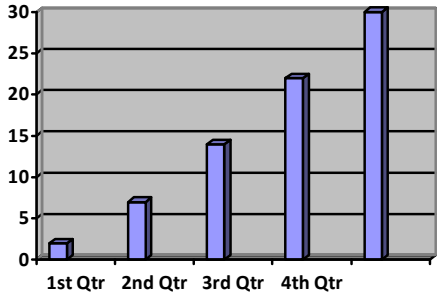
Standard Deviation

Standard deviation is an important measure of spread or dispersion.

The standard deviation measures the spread of the data about the mean value. It is useful in comparing sets of data which may have the same mean but a different range. For example, the mean of the following two is the same: 15, 15, 15, 14, 16 and 2, 7, 14, 22, 30. However, the second is clearly more spread out. If a set has a low standard deviation, the values are not spread out too much.





From our point of view a Standard Deviation of below 0.75 represents a quite tight group which probably means that the particular issue is trained in – i.e. creates a fairly consistent response from Customers. Anything beyond 0.75 is a wider spread provoking an inconsistent feeling amongst respondent Customers. This implies that there is no consistency in training and the result are probably a consequence of other actions.

Example:
Find the standard deviation of 4, 9, 11, 12, 17, 5, 8, 12, 14
First work out the mean: 10.222
Now, subtract the mean individually from each of the numbers in the question and square the result. This is equivalent to the $(x - xbar)^2$ step. x refers to the values in the question.

x	4	9	11	12	17	5	8	12	14
$(x - x)^2$	38.7	1.49	0.60	3.16	45.9	27.3	4.94	3.16	14.3

Now add up these results (this is the 'sigma' in the formula): 139.55
Divide by n-1. n is the number of values, so in this case is 8: 17.44
And finally, square root this: 4.18

The standard deviation can usually be calculated much more easily with a calculator and this is usually acceptable in exams. With some calculators, you go into the standard deviation mode (often mode '.'). Then type in the first value, press 'data', type in the second value, press 'data'. Do this until you have typed in all the values, then press the standard deviation button (it will probably have a lower case sigma on it). Check your calculator's manual to see how to calculate it on yours.

NB: If you have a set of numbers (e.g. 1, 5, 2, 7, 3, 5 and 3), if each number is increased by the same amount (e.g. to 3, 7, 4, 9, 5, 7 and 5), the standard deviation will be the same

and the mean will have increased by the amount each of the numbers were increased by (2 in this case).

When dealing with data such as the following:

x	f
4	9
5	14
6	22
7	11
8	17

the formula for standard deviation becomes:

$$\sigma = \sqrt{\frac{\Sigma f(x - \bar{x})^2}{\Sigma f}}$$

Try working out the standard deviation of the above data. You should get an answer of 1.32 .

Statistical Significance

When we refer to our data being 'Statistically Significant' we are generally referring to the number of calls being a correct, or enough, in order to carry out the proper analysis. This can be quite confusing when some people say that they receive 250,000 calls a week and we only measure 40! How can that be.

Statistical Significance relates to the accuracy derived from the number of calls being analysed giving a general view of the whole.

There are several points we can make although you should read and absorb our document 'Scales, Samples and Theoretical Tolerances'

Our significance is heightened above the 'norm' for many reasons:

1. We measure the Agents and not the customers (there may only be 300 agents dealing with 1.5 million customers). Clients can sometimes confuse the two. A ratio of 40 calls measuring 300 agents is 1:7½ The equivalent ratio for 1.5 million customers is 1:37,500

2. The Agents that we measure are not statistically that different. i.e.

   - they work for the same company
   - Paid the same money
   - Trained by the same people and in the same way
   - Live locally
   - Share information
   - Have the same manager
   - Socialise together
   - Are measured and incentivised in the same way

Therefore instead of expecting a distribution over the full 10-point scale we can expect the majority of the measures to fall in a 4-point scale – albeit within the 10-point scale. I.e. a homogenous group being measured may fall between 3 and 7 or 4 and 8 in the 10-point scale.

3. We measure each interaction across 47 different criteria (31 empathy related questions and 16 process ones). By using our own trained researchers we achieve a far greater level of insightfulness than we would be otherwise able to ascertain from Customers directly. We know that the maximum number of questions one can ask a customer is 12.

4. We also increase the Statistical Significance by ensuring there is consistency and quality control around the understanding of the questions and the way they are interpreted by our own researchers. These researchers are not swayed by 'levels of expectation' prevalent in real customers.

5. We either manage our own interactions through proper management processes or filter supplied interactions for fairness and quality.

6. Our researchers are monitored both by a quality management team and electronically. Each H&Y researcher is electronically monitored against their last 40 interactions. Should their current scoring deviate beyond a set criteria (as devised by the averages of the participating programmes) an email is automatically sent to the Quality Monitoring Team alerting them to this fact and advising them to physically monitor the interaction.

All of these activities give as an accuracy of about 0.02 as opposed to a normal distribution of around 0.2. The difference is worth noting. Try the exercise in the White Paper.

Having noted all of the above you should remember that benchmarking a score requires a great deal of accuracy although determining the areas to work on through the 80/20 principle is less scientific. After all we are trying to determine the 20% of things to work on to give us 80% uplift – this determination does not need such high degrees of accuracy and the issues are often glaringly obvious

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Strength of Correlation

The strength of correlation is the degree of which one set of figures correlates with another. Below is a table which signifies how we can determine the strength. A score of 0 to .32 represents no correlation; between .33 and .55 the correlation is described as week; between .56 and .75 there is a Good Correlation and anything over .76 is described as a Strong Correlation.

Our correlation is .85 which implies a very Strong one. In fact it is so strong that it could be described by many as 'the same as' although we back away from this. It was because of the strength of the correlation that Yuksel and his team decided on doing Cronbach's Alpha test. With this done he was very confident in the correlation.