AI Business Systems

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AUDITMETRICS® AI-SYSTEMS

Auditing, Forecasting, and Market Research*
How They Work Together

Small business/learning V6 has file size and AI forecasting limitations. It also is not intended for long term forecasting. If you use small business V6 use overview Small Business V6.5.PDF

Auditing, Forecasting, and Market Research three components are interconnected in several ways:

1. **Data Integrity:** Auditing ensures that the data used in forecasting is accurate and reliable. By verifying the quality of data sources through audits, organizations can improve the accuracy of their forecasts. For instance, if an audit reveals inconsistencies in the administration of sales data collection methods, adjustments can be made to enhance future forecasting efforts.

2. **Revenue Trends:** Forecasting helps managers make informed decisions about critical business operations such as sales, expenses, revenue, and resource allocation. Forecasting adds a competitive advantage. Another benefit is that financial institutions will not put money in a business if it's unable to provide a set of thoughtful forecasts. Financial forecasts will also help develop operational and staffing plans that will make a business more efficient.

3. **Informed Decision Making:** Market research provides valuable insights that can guide both auditing processes and forecasting models. By understanding consumer behavior and market dynamics through research, organizations can set realistic goals during audits and create more accurate forecasts that reflect current market conditions.

4. **Continuous Improvement:** The feedback loop created by these three components fosters continuous improvement. Audits can identify gaps that can impact forecasting accuracy and impede meaningful market research methodologies. The audit corrects latent data issue which can lead to improved forecasting techniques which in turn can lead to better-informed market research initiatives that align with organizational goals.

**This Exercise is geared for the AuditmetricsAI Pro V7 version. There is an adage that the best approach to move forward is to "see one, do one, teach one". This exercise is to accomplish the first two. With the download of AuditmetricsAI Pro, in addition to expanded features, the availability of PowerPoint slides and other education materials are made available. Contact support@auditmetrics.com*

Bringing it Together

In this section we will go over the transition from auditing to forecasting using a sample created by AuditmetricsAI Pro 7 software. Springer book page references are inserted.

1. Data Integrity

The audit is the starting point to assure that cashflow performance is efficient. Suppose a fiscal manager wants to conduct an audit of a sales account with a million transactions. The AI process guides the manager to obtain an Excel statistical sample that can vary from 400 to 1000 records depending on the chosen precision and confidence, or as the pollsters term it "margin of error". The Auditmetrics AI process conforms to AICPA and IRS standards.

AI assistance provides guaranteed precision which improves on the standard method of an auditor selecting a random sample. The usual process would start with the inputs of precision and confidence to determine the appropriate sample size. For example, suppose an auditor decides to set precision at 5% and confidence 95%. The auditor can use the derived sample total as an unbiased estimate of the full account's actual dollar volume. But there is the provisional statement that one would be confident that 95 out of 100 or 95% of sample estimates would fall within 5% of the total account's actual dollar volume. Auditmetrics refers to the account to be sampled as the "audit population"

AuditmetricsAI guides the auditor to select a random sample that one is not 95% confident but 100% confident. This places precision out of the realm of statistical uncertainty to an engineering concept 5% tolerance. A good exercise would be to use the sample audit population data included with Auditmetrics 6.5 to determine what happens when precision is changed from 3%,5%,7% and 10%. This exercise would require to change details and strata boundaries on the fly. AI guidance streamlines the process.

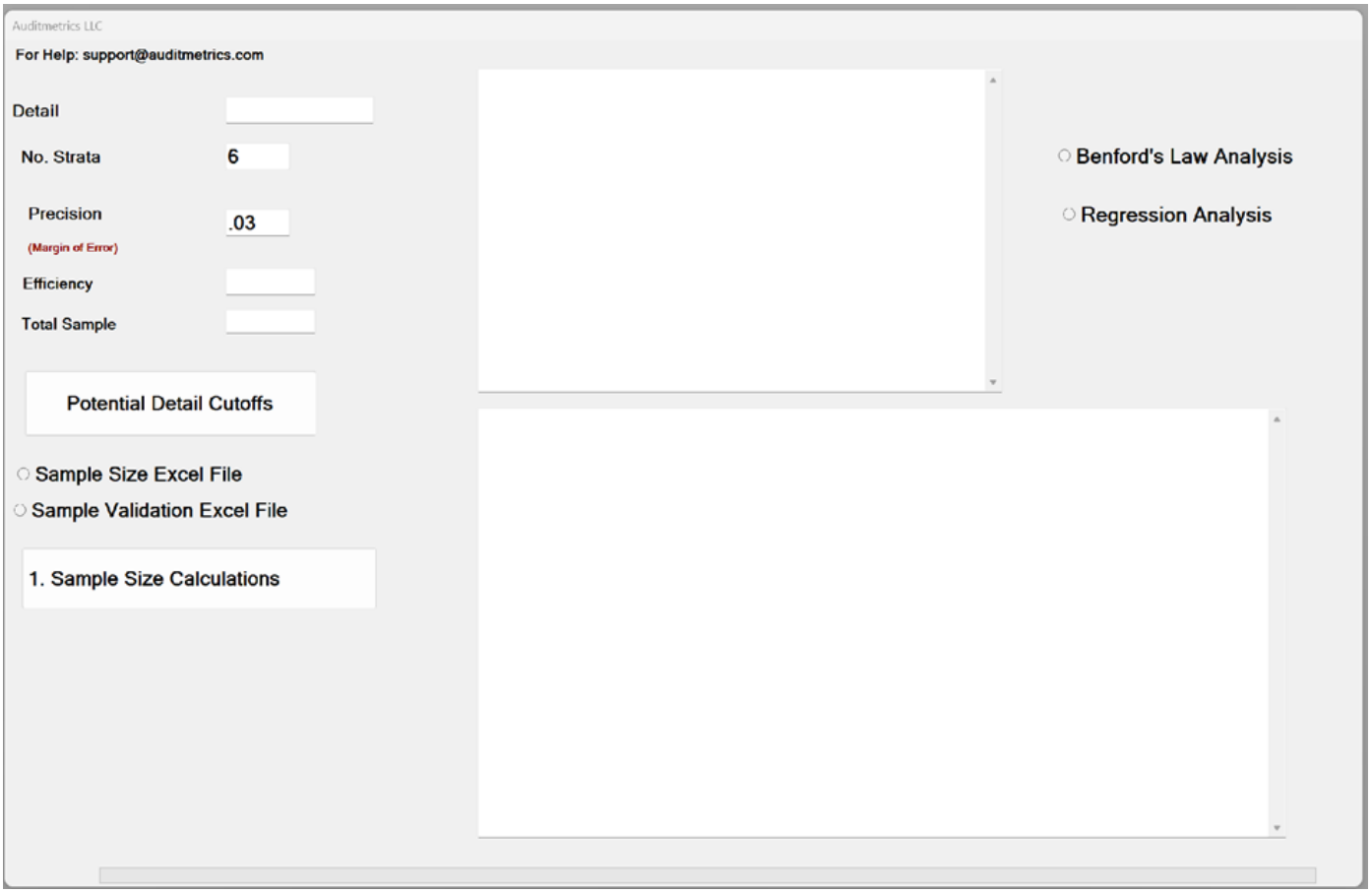
However, the issue of statistical uncertainty comes into play when the auditor sets the standard for whether a sampled record either passes or fails the specified audit standard. This can be statistically summarized as a 0 or 1 that can be summarized by the binomial probability distribution (pp 47-49).

It would be valuable to review the case study on (*pp.13-22,28,29)* Statistical efficiency has a major impact on sample size and cost effectiveness. Spending time to understand statistical efficiency is well worth the effort *(pp. 25,36,37,41-45,127)*. It is the pervasive underlying corner stone of all statistical inference processes for such diverse disciplines as medicine, economics, physics, biology, opinion polling and social sciences. Take the time to understand it rather than pass it on to AI alone to do the thinking.

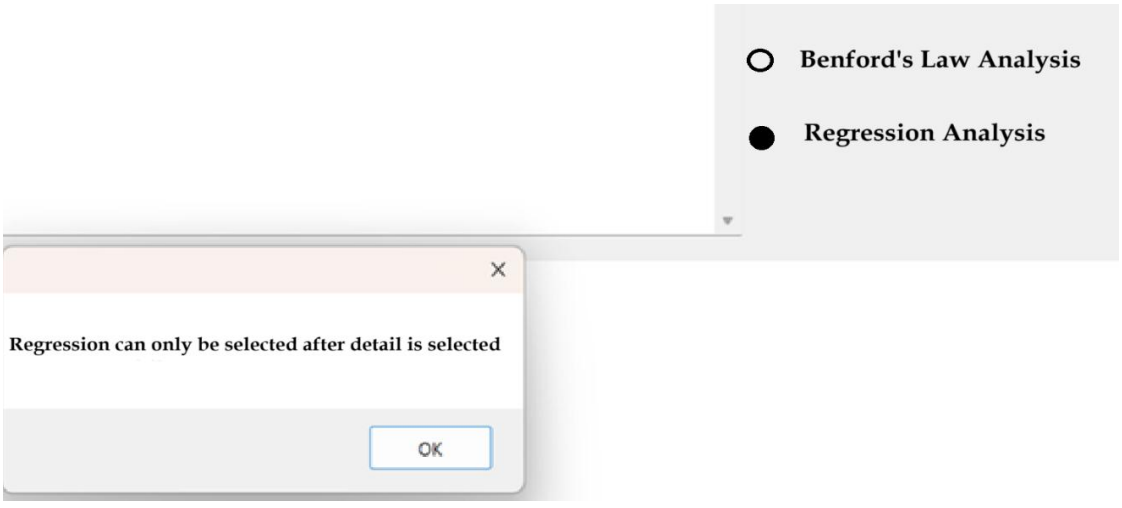
2. Revenue Trends

Auditmetrics Pro 7 AI Statistical Forecasting

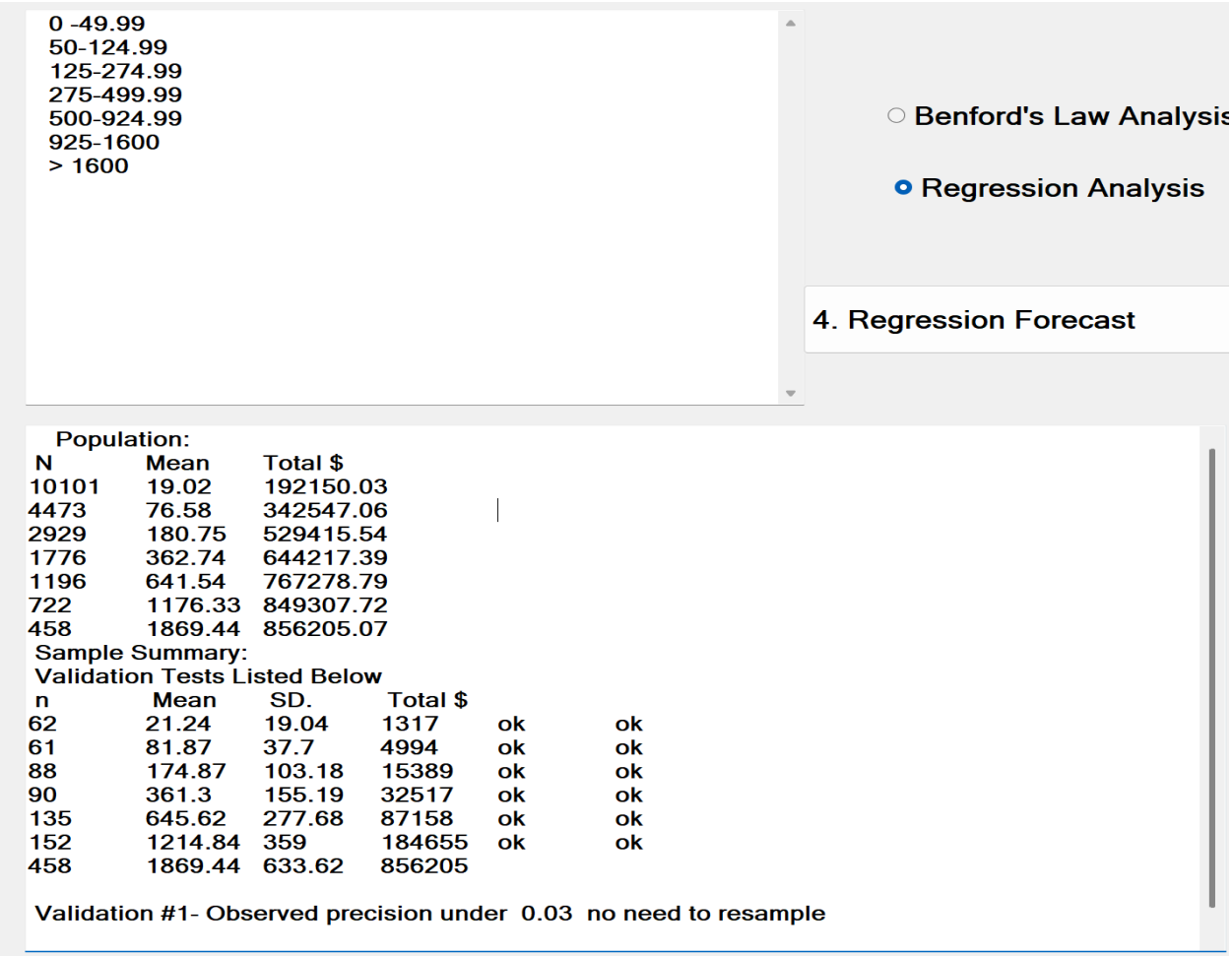
Auditmetrics Pro 7 has the same opening screen as the small business version V6 but the forecasting process is now automated. *Benford's Analysis is an important tool in forensic accounting. Chapter five of the text covers this valuable resource.*



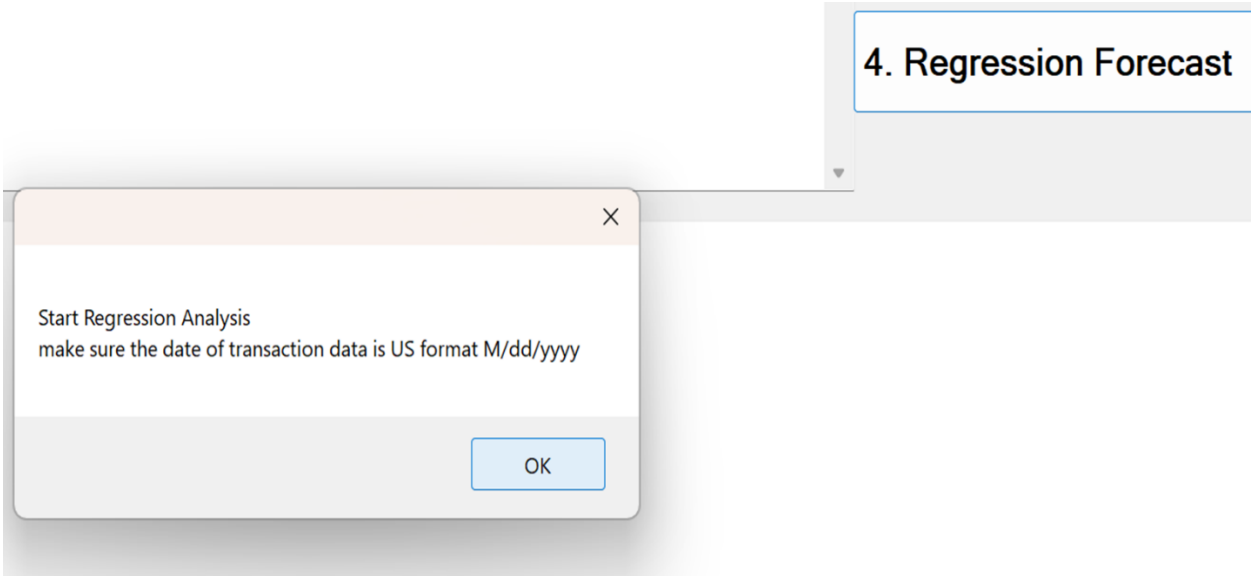
1. The process starts with to first follow all the steps to generate a random sample.
2. The next step is to start the process of forecasting with AI pro7.
3. The selection of the regression button only take place after a detail cut off has been decided upon and entered. If not get the error message:



Step 1: The sample has been selected with all validity tests passed



Now the regression process can be started but be sure there is only one date field in the U.S. standard of MM/DD/YYYY:



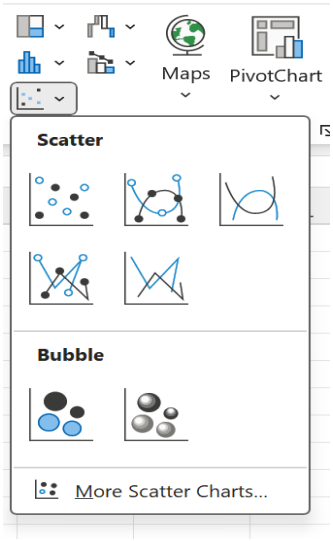
Step 2 Generated Model with Regression Coefficient, Intercept and Correlation

The displays on the screen are tab delimited so one can simply copy and paste the screen results onto an excel file. Then one can now use Excel to graph the results:

Regression Coefficient 15931 Intercept 19314
Correlation Coefficient = 0.79

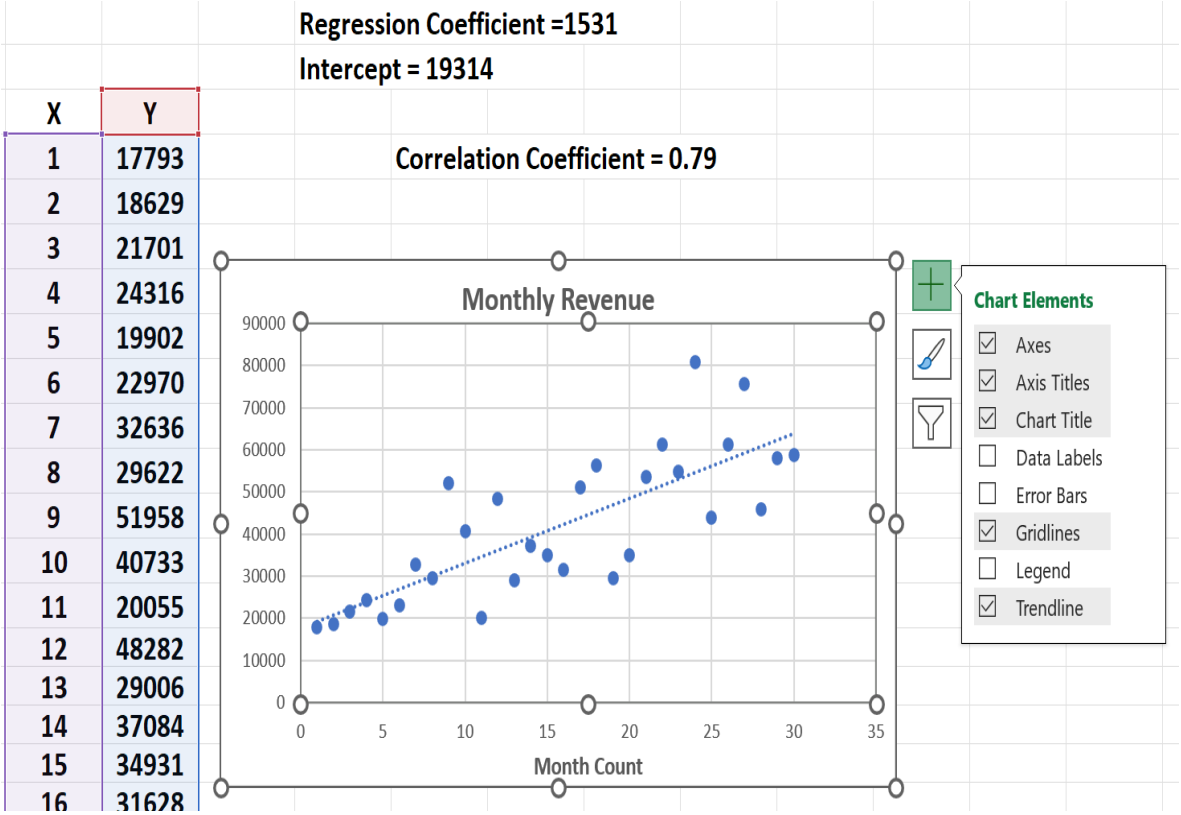
X	Y
1	23132.33
2	17831.87
3	20770.36
4	21993.38
5	24759.83
6	24961.35
7	31240.02
8	35892.74
9	50566.15
10	44187.64
11	25742.22
12	54467.16
13	29395.84
14	35721.28
15	32921.56
16	27674.69
17	42915.33
18	52385.76
19	37523.84
20	35586.82
21	48237.21

Be sure to select the X and Y Excel data columns and insert them into a Scatter Plot:



Step 3 Finalize Regression results

Creating a forecasting exhibit using Excel graphs that add titles and trendline.



Step 4 The Moving Regression Predictor

Below is the result of regression of an account with a million transactions:

Regression Coefficient =3655			**X**	**Y**
Intercept = -3440			**1**	**19988**
			2	**5819.3**
	Correlation Coefficient = 0.47		**3**	**15735**
	R^2 =	**22.1%**	**4**	**14083**
	N	**1,134,251 Transactions**	**5**	**17573**
			6	**31967**
			7	**34779**
			8	**27586**
			9	**35230**
			10	**47800**
			11	**24789**
			12	**63335**
			""	""

As a rule of thumb, a correlation greater than 0.75 is considered to be strong between two variables. Correlations between 0.45 and 0.75 are moderate, and those below 0.45 are considered weak. A weak correlation does not mean the business is failing. Its financials may be good; it just means it is not growing. The statistical model section of Appendix 1 of Springer book goes into more detail discussing R and R^2. The regression line is an estimate with statistical uncertainty as indicated by the data points around the straight line.

X	Y
1	19988
2	5819
3	15735
4	14083
5	17573
6	31967
7	34779
8	27586
9	35230
10	47800
11	24789
""	""
27	58830
28	48227
29	43270
30	59653
31	53049
32	47597
33	65618

The Regression model can now be used to monitor progress. The weak growth is indicated by a baseline R^2 with predictor efficiency is only 22%. The business is doing well financially but it seems to exhibit only a modest growth (pp 59-67). If there is a desire for more growth then a marketing plan must be implemented. Some options are discussed in chapter eight of the Springer Book, but it is not indented to be an exhaustive discussion. Market research is much more open ended process where AI will be a valuable tool.

The original analysis involved 30 months of data. But once a marketing plan is implemented, a three-month quarter should be analyzed to determine if there is a measurable improvement in forecasted revenue. One could do monthly projections but the projections would be more volatile.

If there is no growth then it is back to the drawing board to see what can be done to improve performance. The key is to maintain focus and as in an audit concentrate on concise data inputs to measure progress. There can be many options to a small business.

To reach a wide range of local customers there are mixes of digital and print marketing strategies. One could run social media ads that target specific groups, and place eye-catching print ads in local publications.

One can get involved in local events, sponsor charity functions, or host workshops to show off expertise. In doing so, use analytics of Auditmetrics to track how well these separate strategies are working. Then, refine what's working by adjusting approaches based on the data. For example, if social media ads are driving more sales than print ads, focus more on social media marketing.

Integrating with the community in advertising in community publications, sponsoring a little league team or local nonprofit, or paying to put up a banner at a local event can position a business as an active part of the community. This not only gets the brand in front of relevant eyes, but it establishes trust with your first impression.

If analysis indicates progress, then update the model by adding the new data. At the same time removing the first quarter of data and in essence having an ongoing moving predictor of revenue growth. If any quarter seems to be flat, the time should be taken to assess if it is a transient fluctuation or some problem to be solved.

Seasonal Adjustment

This regression model so far, though very useful, is not complete. The model is a bivariate linear model, a dependent variable with only one predictor variable. There is a good fit and is specifically designed as an ongoing monitoring tool.

Suppose a business starts a marketing plan and it seems to work because there is a measurable increase of cashflow. However, the correlation coefficient is always in the moderate to weak range. This indicates the regression model may need additional information.

Many Small businesses, such as retail outlets, experience cashflow seasonal fluctuations. With the bivariate prediction model the next month will always be higher than the previous month. But business activity does have seasonal fluctuations. The fourth quarter of the year and its increased commercial activity will always be higher than the first quarter of the following year. The regression model so far does not allow for this fluctuation.

For more information on this topic: Seasonal Fluctuations PDF

Informed Decision Making

Regression and Local Market Area -Regression *(pp. 79-86)* is very valuable in adjusting predictions using categorical inputs for various demographics factors such as geographic region and gender. Geographic region can also be a surrogate for income distribution which is readily available from government published data. For example, there is available, through census data, sources that break down income tax collections or median income by zip code. Such geographic data based on zip code combined with company sales data can be an indicator of the socioeconomic characteristics of a business' customer base. The compilation of this type of socioeconomic dataset requires time, but gaining insight of the customer base is invaluable. The first step is to set up a dataset of sales accounts that include customer zip code.

The first step is to group the diverse array zip codes into broader more manageable zip code areas. This is where background research of examining census data to develop sociodemographic relevant zip code areas (Table 8.1).

Table 8.1 sales and sociodemographic research resulted in condensing the data into four geographic areas. This number was chosen to simplify the presentation of the concept of using regression to project sales by geographic area. It is most likely that many more areas would be of value, especially for larger businesses. From a statistical data perspective. Zip codes are categorical or classification data.

Table 8.1 Sales Data by Zip Code and by Four Geographic Areas

Zip_Code	Zip_Area	Sales
0017	1	3,102
0016	1	6,658
0008	3	6,514
0012	4	10,000
0007	3	6,000
0005	3	9,634
0011	4	12,666
0003	3	35,548
0006	3	40,508
0020	4	60,074
"	"	"

Regression results:

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	**-30,885**	$6,135	-5	0
Zip_Area	**$47,049**	$2,540	18.5	0

R=.**86**

R^2=.74 goodness of fit measure. 74% of this company sales are explained by geographic area (p.62).

Quite a sizable difference.

Sales = -**$30**,**885** + **$47**,**049** x **Zip** (Geographic Area number**)**

Pivot table to summarize sales by zip code area

Area	Sum of Sales
Zip Area 1	$185,228
Zip Area 2	$446,808
Zip Area 3	$608,160
Zip Area 4	$602,265
Grand Total	**$1,842,461**

Determining how to group zip code requires a certain amount of insight and ingenuity. Examining government census, chamber of commerce and other data are great sources. In the era of AI, the available tools are growing exponentially. ***However, the goal of Auditmetrics is that the human business manager intellectually controls the analytic process rather than rely totally on AI.***

As part of business forecasting, it is key to get a picture of the possibilities for selling products or services in a local market. Looking at local markets will provide information about the types of individuals who might buy products or services and how extensive is the company's geographic reach. Also, it may indicate what is the competition within the various market areas.

Create a Customer Profile Next there is a need to determine who are the people who will buy products or services.

at what age are they?

What is their income level?

What is their education level?

What kind of jobs do they have?

What do they like to do for entertainment?

It may be too cumbersome and difficult for a small business to survey for such data. But a small demographically diverse focus group is a proven way to measure customer opinions. It is set up in guided or open discussions about new products or current views of the company to determine reactions that can be expected from a larger population. The use of focus groups is a market research method that is intended to collect data through interactive and directed discussions by an experienced interviewer. If there are issues with lagging sales that don't respond to standard means of marketing, then arranging for a focus group may be what is needed.

Springer book pp. 81-86 discusses how to coordinate opinion Likert data with regression projections.

Constant Monitoring of Business Activities

Regular timely random samples allow the business manager to deal with small workable subsets of account data representative of the total book. There is no need to use the gold standard of 3% margin of error with its sample size of 1,152. It should be reserved for official filings such as for tax agencies or fiscal year end assessments and reporting.

Regular routine smaller samples in the 5% to 7% range can involve samples approximately 40% to 50% smaller, therefore resulting in reduced cost. The statistical efficiency of using regular, timely small samples can be quite significant, especially when employing robust statistical methods:

1. **Increased Precision:** Small samples can provide precise estimates if the sampling method is consistent and well designed.

2. **Sequential Testing:** Regularly updating with small sample sizes allows for sequential testing of new ideas and data, which can improve business performance over time.

Total Process Overview The overall process in conducting forecasting and market research is to:

1. *Start with a random sample of accounts.*
2. *From there use regression to project revenue and expenses.*
3. *Also add to the account data pertinent variables such as geographic and socio-demographic data.*
4. *Set up a mechanism to obtain customer ratings using Likert scales or focus groups.*
5. *The total process from audit to market research cannot be done without also being closely connected to the personnel and operations of the business. The major benefit is creating an environment leading to technology and employee cohesion*.

Conclusion: A Synergistic Approach

In conclusion, auditing, forecasting, and market research work together synergistically to enhance organizational effectiveness. Ensuring data integrity through audits leads to confidence in the insights from forecasts and market research. informed decision-making results in utilizing accurate forecasts for strategic planning. As a result businesses can achieve greater success in their operations.

Health Statistical Audits in Medicine

Value Added in Healthcare and Public Health

The extra value created over and above the original value of something

- For private business it is usually the products sold to the consumer
- It is the difference between a product final selling price and the direct and indirect expenses incurred in providing that product

In healthcare and public health, the challenge is how to measure value added

- Research into organizations that have achieved better health outcomes while often lowering costs suggests a strategic framework for value-based public health and healthcare implementation

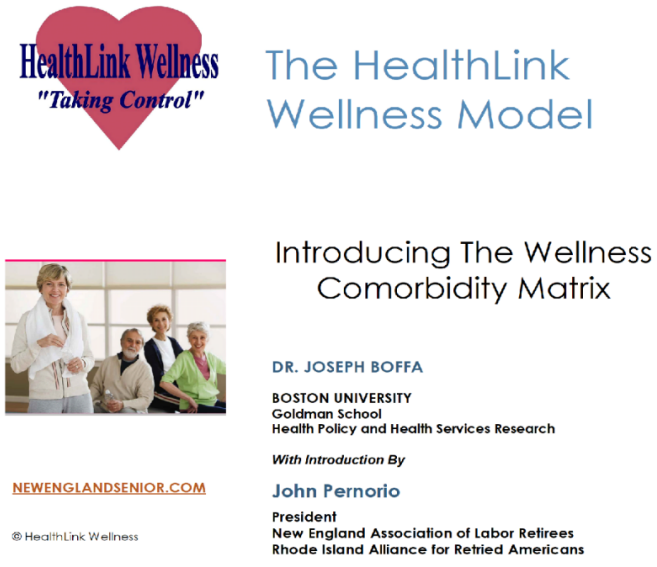
- Focusing on health outcomes aligns how patients experience their health with links to the investment incurred

- This is the basis of cost effectiveness and cost benefit analysis of public health and healthcare programs

- The Mathematics of HealthLink Wellness

Book available on Amazon:

HealthLink Wellness: Science for the Individual



HealthLink Wellness