BENCHMARKING FOR SUCCESS

LEADING COMMUNITY RISK REDUCTION

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ABSTRACT

The Morrisville Fire Department (MFD) had no measurement program in place that measured and evaluated performance.

The purpose of the research was to review key elements of performance plans and to aid in the development and implementation of an effective plan for the MFD. Descriptive research was used to answer four questions:

1.	What is benchmarking?

2.	Why is it important to measure performance?

3.	What are some helpful benchmarks that measure and evaluate performance?

4.	What are the benefits in comparing performance measures among similar size departments?

The procedures used in this research project were comprised of literature review and survey.

Results of the literature review and survey suggested that benchmarking was an effective tool to measure performance and facilitate organizational improvement.

Recommendations were made to adopt the Plan, Do, Check, Act (PDCA) cycle as an implementation model for use by the MFD in the development of their benchmarking program.

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INTRODUCTION

Public safety organizations have for a long time maintained statistical data regarding incident responses, property loss from fires, and information of this nature. Unfortunately this information has not always been used to evaluate performance in a manner where interested parties could understand the level of services provided (Breedlove, 1997). Therefore, fire departments across the country are experiencing a decrease in funding while accountability is being raised. Many departments are contemplating using the private sector as a model for management techniques (Wessel, 1993). The problem is the MFD is a growing town who currently has no program in place that measures and evaluates performance. This is a problem shared by many other departments. The purpose of the research was to review key elements of performance plans and to aid in the development and implementation of an effective plan for the MFD. A survey was used to gain feedback on the use of benchmarking for departments of similar size in North Carolina. Four research questions were developed to guide this project in identifying tools that would be effective in measuring performance. Descriptive research will be used to answer the following research questions:

1. What is benchmarking?

2. Why is it important to measure performance?

3. What are some helpful benchmarks that measure and evaluate performance?

4. What are the benefits in comparing performance measures among similar size departments?

BACKGROUND AND SIGNIFICANCE

The MFD services the Town of Morrisville and surrounding unincorporated area in Wake

County. Morrisville is a community of approximately 12,000 people located in central North

Carolina. Morrisville has experienced a 12 % growth since 2003 (Town of Morrisville, 2006, p.

13). The department is organized with a Fire Chief, a Support Services Coordinator, 3 Captains,

6 Lieutenants, 9 Engineers, 6 Master Firefighters, 15 Firefighters, a Code Enforcement

Administrator, a Fire Inspector and 10 Volunteer Firefighters. Services provided to the

community include, public fire education, fire prevention, plans review, code enforcement, fire

suppression, technical rescue, emergency medical services (EMS) and hazardous materials. Fire

suppression includes both structural and wildland. Technical rescue services include high and

low angle rope rescue, extrication, and confined space. EMS is provided at a First Responder

level. The department contracts with a local EMS provider for advanced life support and patient

transport. All department members perform public education activities in a variety of subjects

such as injury prevention, safe use of portable fire extinguishers, home safety with the mobile

fire safety house, CPR, first aid, fire safety and fire station tours. In the next budget year the

department plans to join the North Carolina Task Force IV Regional Urban Search and Rescue

Team. In the best interest for the community, MFD is always seeking better strategies and

techniques for improvement. These improvements are extremely costly, and benchmarking will

show why these improvements are essential.

The services and activities have evolved over the last 51 years to provide quality fire

protection and to enhance the quality of life for the citizens of Morrisville. Historically these

services have been tracked and the department generated quarterly productivity reports that

showed how much work was completed. These workload measures as they are called identify

the amount of work performed (Ammons, 2001). The output reports are then distributed

quarterly to the Citizens, the Board of Commissioners, the Town Manager, the Community

Service Director and fire department employees for informational purposes. The quarterly

reports have been an acceptable practice to determine the MFD performance for the last 7 years.

At the beginning of the fiscal year the Town Manager directed all departments to research

the feasibility of developing a performance measurement program that uses benchmarking as a

way to monitor, evaluate and improve service delivery to the community. The purpose of

benchmarking is to facilitate a process that will encourage continuous organization improvement.

Historically, the success of the department has been based on the opinion of Citizens, Town

Administration and department members. These opinions are based on personal experiences

with the fire department and the review of quarterly workload reports. While this process has

done an adequate job identifying department activities, there is a need to develop a process that

will identify the level of services objectively. This program will validate or disprove the

perception of citizens, elected officials, the Town Administration and department members. This

performance based evaluation needs to target key program delivery areas to ensure the

department is being successful and is striving for continuous improvement. Proactive

management can set the stage for continuous improvement.

For organizations to be successful in the competitive world today, constant evaluation of

activities and goals should be assessed to most effectively adapt to customers needs. An

organization can not accept mediocrity in order to maintain superior performance (Leibried &

McNair, 1992).

Benchmarking is a frame work that identifies the progress of achieving goals in an organization. Benchmarking is the search for practices that lead to superior performance (Gay, 1993, p. 6).

This applied research project is related to the National Fire Academy's (NFA) Leading Community Risk Reduction course by enhancing the skills needed for an Executive Fire Officer to implement and lead a community risk-reduction initiative (NFA, 1998 , P. SM 0-3). Leading a community risk-reduction initiative effectively must have a mechanism that will evaluate performance and facilitate continuous improvement in the process. This research project also relates to and supports one of the U.S. Fire Administration's (USFA) operational objectives, which is to "respond appropriately in a timely manner to emerging issues," (U.S. Fire Administration, 2001, p. II-2). This applied research project will enable improvement in the areas of research analysis, critical thinking, decision making and professional development. This experience will contribute to a more efficiently operated department.

A survey was conducted as an element of this research. The survey was insightful to gain information on the wide spread use of benchmarking in similar sized fire departments. The survey was significant in identifying the similarities and differences in how individual fire departments utilize performance measurement systems.

<p align="center">LITERATURE REVIEW</p>

A literature review was conducted to assess how other departments across the nation measure performance. The literature review included a search of journals articles, reports, books, and Executive Officer Applied Research Projects. This section will identify insightful information in the areas of:

1.   What is benchmarking?

2.	Why is it important to measure performance?

3.	What are some helpful benchmarks that measure and evaluate performance?

4.	What are the benefits in comparing performance measures among similar size departments?

DEFINITION OF BENCHMARKING

One important aspect of this applied research project was to define benchmarking. *Merriam-Webster's Desk Dictionary* (1995) defines a benchmark as, "a point of reference for measurement" (p50). One author defined benchmarking as "a continuous, systematic process for evaluating products, services, and work processes of organizations that are recognized as representing best practices for the purpose of organizational improvement" (Spendolini,1994, p.9). Arnold (2000) defines benchmarking as "the process of identifying, learning, adapting and measuring outstanding practices and processes from any organization to improve performance (p. 14). Coplin and Dwyer (2000) defined benchmarking as having two parts. First, they are a form of measurement. Secondly, they identify the expectations (p.68). The authors go on to state that "Benchmarks are best thought of as measurable objectives, a structured method of evaluation" (p.68). Other definitions of benchmarking were found while reviewing books and journals. For example, Ronny Coleman (1997) summarized the definition by saying, " Put another way baselines are what we do and benchmarking is how well we would like to do it" (p.31). Another author provides the following information about benchmarking.

The term "benchmarking" was initially used by land surveyors. A benchmark was considered a distinctive mark on a rock, building or wall, and it was used as a reference point in determining the position or altitude in topographical surveys and tidal observation. A Benchmark today is considered as a sighting point to make

standard measurements (Patterson, 1996, p.4).

Defining and understanding benchmarking established the frame work for this research project. Gaining a better understanding of the definition of benchmarking clarifies the difference between benchmarking and work load indicators.

PERFORMANCE MEASURING IMPORTANCE

Benchmarking is a useful tool in evaluating organizational performance. This technique involves identifying organizations that are successful which provides organizations seeking improvement something to measure against (Walker, 1994).   Benchmarking creates a sense of what is possible, what is acceptable and what is not acceptable (Strout, 1997).

In the article *Benchmarking for Quality*, Cindy Davis, 1999-2000 Colorado PRIMA president and occupational safety and health manager at University of Colorado in Boulder was quoted as saying, "benchmarking gives you a blueprint to follow and makes it easier to do a better job" (Arnold, 2000, p. 14).

Cole (1999) stated "benchmarking is important because it focuses on how to make significant improvements rather than incremental ones or merely maintaining the status quo. Furthermore, it can help provide a framework for a measurement system that's useful in dealing with other arenas of government" (p. 31).

The significance of benchmarking is the desire or need to make organizational improvements. For example, to increase market share, enter a new market, or reduce operating expense. The objective is to improve performance or achieve the desired results. The desired results serve two purposes. First, it gives guidance that often identifies perimeters and the associated risk.   Second, a performance goal or benchmark

is a way people can keep score. Most people want to do well. Many of them want to do better than their competitors (Fiz-enz, 1997).

In summary there are many reasons why benchmarking is important to any organization. Fundamentally, benchmarking enables an organization to measure performance as it relates to organizational goals and objectives. One key component in the process is to know which benchmarks are helpful to an organization.

<div align="center">HELPFUL BENCHMARKS</div>

Spendolini (1994) explains effective benchmarks help address critical mission areas in an organization (p 71). To determine which benchmarks can be helpful certain questions need to be answered. Listed are ten questions Spendolini believes benchmarks should address:

1. What is the most critical factor to my function's/organization's success?

2. What factors are causing the most trouble?

3. What products or services are provided to customers?

4. What factors account for customer satisfaction?

5. What specific problems have been identified in the organization?

6. Where are the competitive pressures being felt in the organization?

7. What are the major costs in the organization?

8. Which functions represent the highest percentage of cost?

9. Which functions have the greatest room for improvements?

10. What functions have the greatest effect for differentiating the organization in the marketplace?

Gay (1993) explains, "a good starting point is the needs of your citizen customers and tax payers (p.6)." You must respond to citizens concerns about service quality and the cost

for services. These two important components should have equal weight. A second

source of guidance in collecting benchmarks is the mission and vision statement of the

department. A mission statement oriented toward a total quality measure aspects of

citizen service, product improvement, and employee involvement (p.6).

Following is a list of benchmarks found to be helpful to the application of MFD:

1.   Property saved to loss ratio of 98% or greater.

2.   Property protected to lost ratio of 99% or greater

3.   Confined fires to room(s) involved on arrival 80% of the time.

4.   First in unit arrival within 4 minutes 80% of the time to all emergency calls.

5.   Full assignment arrival within 8 minutes 90% of the time to all emergency calls.

6.   Turnout time of 60 seconds or less 90% of the time.

7.   Transmittal an "all clear" (no life hazard) within 10 minutes of full assignment

         arrival 80% of the time.

8.   Transmittal of "under control" within 15 minutes of full assignment arrival 80%

         of the time.

9.   95% of operations personnel scoring acceptable on fitness test.

10.   Clear 95% of fire code violations within 90 days

(Concord Fire Department, 2005)

The review of existing benchmarks was helpful in identifying target performance areas.

BENEFITS IN COMPARING PERFORMANCE MEASURES

Having knowledge of what others benchmark can give you insight to industry trends.

History has shown organizations often contribute their success to what they learn from others.

Two case studies illustrate this point.

In 1979, Japan's Canon, Inc. introduced a midsize copier for less than $10,000, or less than it cost Xerox to make a similar machine. Xerox first assumed Canon could do this because it priced the product below fair market value to buy market share, but Xerox engineers showed that Canon could sell its product cheaper because Canon was more efficient. Xerox took more than a year to decide to change their ways to compete. Xerox decided to benchmark Canon's progress with the objective of reducing costs. It was Xerox's turn around through benchmarking that started the movement in the United States.

From 1980 to 1985, Xerox adapted Japanese techniques to cut its unit production costs in half and slash inventory costs more than 60%. Since then, the Xerox share of U.S. copier market has climbed 80% to almost 18%.

Everything Xerox does centers on surpassing customer expectations. Their Customer Satisfaction Measurement System, in which more than 2000,000 Xerox customers have been polled every year for, has resulted in the company improving its number of highly satisfied customers by more than 38%.

The amount of benchmarking Xerox does has vastly increased since 1984, when they benchmarked only 14 performance elements. Now more than 240 elements are benchmarked and the ultimate target for each attribute is the level of performance a world-class leader achieves, regardless of industry (Patterson, 1996, p. 11).

The second case study involves the German military. Early in the century, some Germans generals undertook to follow an American circus. In those days, circuses didn't perform in huge arenas; they performed under tents, which are huge things to set up and take apart. Of course, circuses moved from city to city, and in some cases, they moved in

a few hours. Workers would take everything down, put it on a train and take it to the

next town. Moving a circus is very complicated. Animals and people must be fed and

moved, gear must be packed and stored safely. In fact, special railways cars were

designed to enable all this to happen and circus workers were very good at it.

The generals had the same problem. They had all kinds of people. They had horses,

ammunition, food and they learned about deployment from seeing an operation that had

no relation to an army (Patterson, 1996, p. 16).

In the third step of a seven step process, the author suggests to select a benchmark partner

that is similar in size. One of the most effective ways to implement change is to learn from the

successful experience of others (Arnold, 2000, p. 17).

The next step is to identify the successes of your partner. Learn the best practices or your partner

and determine how they can be adapted to your organization (p.17).

Walker (1994) points out, in private sector, benchmarking has evolved from a few

companies in the 1970's that were vertically benchmarking competitors within their

industry to the 1990s where companies are benchmarking other industries outside their

own (horizontal benchmarking) on a global scale. For example, GTE Corporation

modeled its billing system on that of American Express and set a new standard within its

industry; Motorola benchmarked the First National Bank of Chicago's efficient electronic

data-transfer techniques; and Xerox adapted L.L. Bean's inventory and warehousing

procedures to its own distribution system. By taking the concept of benchmarking to this

higher level, many companies and whole industries have become more efficient, more

profitable and ultimately more successful. The same potential exists for the fire service.

While there are some processes unique to the fire service, there are others which are

similar across most other public sector communities and even overlap into the private

sector. Imagine what there is to gain from industries which are leaders in total quality

management, marketing, public relations, and personnel management (p. 10).

To conclude the literature review horizontal benchmarking prevents organizations from

reinventing the wheel. Incorporating performance measures in the form of benchmarking creates

an opportunity for continuous improvement in any organization. It would be difficult for any

organization to provide effective services without measuring their performance in the form of

benchmarking.

PROCEDURES

The purpose of the research was to review key elements of performance plans and

develop an effective plan of benchmarking for the MFD. Descriptive research was used to

answer four questions.

This applied research project began with literature review and data collection performed

at the National Fire Academy's Learning Resource Center, and at the Wake County Library in

Cary, North Carolina. The Town of Morrisville's Human Resource library was also used to

learn specific information about this project. Books, journal articles, reports, an Executive Fire

Officer Applied Research Project and a survey were utilized as the basis for research on this

applied research project.

Descriptive research was utilized to answer the four research questions posed in this

project. The literature review was conducted to research questions 1, 2 and 4. Research

question 1: What is benchmarking? Research question 2: Why is it important to measure

performance? Research question 4: What are the benefits in comparing performance measures

among similar size departments?

A survey was developed that was designed to answer research question 3. Research question 3: What are some helpful benchmarks that measure and evaluate performance? The survey did provide additional information to answer research question 2.

A cover letter explaining the purpose of the survey was developed and attached to the survey instrument. The cover letter and survey instrument are contained in Appendix A and B respectfully.

The next step was to identify the fire departments that would receive the cover letter and survey instrument. It was decided to pole some of the fire departments in North Carolina based on the following five criteria.

1.　 Fire departments in North Carolina

2.　 Career fire departments

3.　 Fire department serving populations of at least 12,000

4.　 Fire departments servicing area greater than 20 square miles

The fire departments selected were equivalent size or larger than the Morrisville Fire Department. The survey was mailed to 30 departments across North Carolina. Nineteen or 63% of the surveys were completed and returned. Eleven or 37% of the surveys were not completed and returned.

The survey listed 12 questions to be answered. Questions 1 through 3 were to identify contact information encase of follow-up questions. Questions 4 through 8 asked for specific jurisdictional information such as population served, number of existing fire stations, number of personnel in the department and number of incident responses. Question 9 asked if the department utilized formalized "benchmarks" to measure performance. Question 10 asked for each department to include a copy of benchmarks utilized. Question 11 asked to list the most

helpful benchmarks. Finally, question 12 asked each department to identify benchmarks that were not considered to be helpful.

The final results of the survey were tabulated and can be found in Appendix C. The results of questions 1 through 8 were compiled and documented in the form of a list. The results of question 9 were tabulated resulting in a number and percentage of Yes and No answers that were listed.   The results of question 10 through 12 were compiled and listed.

<div align="center">Assumptions and Limitations</div>

Every survey was mailed to the Fire Chief of each department with the assumption that he/she or a designee would personally answer the survey. It was assumed the person that completed the survey would answer as accurately as possible.

Only 19 of the 30 fire departments surveyed returned a completed survey. This accounts for a 63 % return rate. The limited number of departments surveyed could limit the accuracy of the results.

<div align="center">RESULTS</div>

The results of this applied research project have been compiled from extensive literature review and survey information. The following results are provided to answer each of the four research questions.

<div align="center">Research Question one</div>

What is benchmarking? The literature review found 8 definitions of the term benchmark or benchmarking. Three of the definitions were more inline with this author's view. First, Spendolini (1992) defined benchmarking as "a continuous, systematic process for evaluating the products, services, and work processes of organizations that are recognized as representing best practices for the purpose of organizational improvement" (p.9). In the consortium benchmarking

study best-practice report, *Leadership Development: Building Executive Talent* , (1999) defined benchmarking as "the process of identifying, learning, and adapting outstanding practices and processes from any organization, anywhere in the world, to help an organization improve its performance" (p.8). The underlying rationale for benchmarking process is that learning by example, from best-practices cases, is the most effective means of understanding the principles and the specifics of effective practices. The third favorable definition was from the article *Benchmarking for Quality* (2000) which defined benchmarking as "the process of identifying, learning, adapting and measuring outstanding practices and processes from any organization to improve performance" (p.14).

Variations in definitions lead the efforts to look for common words and phrases in each definition researched. Theses key words and phrases are measuring, continuous, process, evaluating, and organizational improvement. This author has created a hybrid definition of the common term "benchmarking" using these key words and phrases as the basis for the following definition.

Benchmarking is the process of measuring internal practices by comparing what others do to evaluate the opportunity for continuous organizational improvement. The MFD in the development and implementation of its benchmarking program will use this benchmarking definition.

<div align="center">Research Question Two</div>

Why is it important to measure performance?

The literature review discovered many important reasons to measure performance. Cindy Davis was quoted as saying, "by implementing a benchmarking project we can track performance and see growth and improvements" (Public Risk 2000, p. 14).

The importance of measuring performance in The Cooper and Lybrand Performances

Solution Series suggest that in a free market, every stakeholder has other "investment"

options. The game that management is playing, therefore, is not getting product to

market faster or building it a little cheaper. These are important ways to gain

competitive advantage, but they are only part of the challenge. In reality, managing a

corporation is a brutal competitive struggle to secure and expand the resources committed

to the corporation by its various stakeholders. Only by benchmarking the company's

performance against the expectations of these stakeholders can this game be won for the

long run (Leibreied & McNair, 1992, p. 4).

In *The Benchmarking Book*, Spendolini (1992) concludes benchmarking is important

because it can improve:

1. Strategic Planning

2.   Forecasting

3.   Generate new ideas

4. Facilitate product/process comparisons

5. Help establish goal setting

Spendolini believes the most successful organizations begin the benchmarking process

with a clear purpose or objective (p. 25).

<div align="center">Research Question Three</div>

What are some helpful benchmarks that measure and evaluate performance?

For the response to survey question 9, 12 or 63% of the respondents answered yes, that

their department were using formalized benchmarks to measure performance. Seven or 37% of

the respondents answered no to this question.

For survey question 11, the 12 respondents listed 185 specific benchmarks that they found meaningful to their departments. This equates to an average of 15 performance measures per respondent. The complete list of 185 benchmarks is contained in Appendix C.

Research Question Four

What are the benefits in comparing performance measures among similar size departments?

In the book *Benchmarking Basics: Looking for a Better Way* companies were identified that benefited from comparing performance measures as seen in Table 1.

Table 1

SUCCESSFUL BENCHMARKERS

Company	Process Benchmarked	Methods Used	Results
Motorola	Manufacturing quality of consumer electronics	Sent benchmarking team to Japan to study their auto manufacturing facilities	Lowered the defect rate and reduced costs
Xerox	Logistics and distribution and warehouse productivity	Examined L.L. Bean's fulfillment methods	Gained over 5% in warehouse productivity
KPM Pete Marwick	Expediting word – processing in documents	Analyzed supermarkets express lane checkout practices	Established express lines, improved internal customer satisfaction, improved cycle time
SouthWest Airlines	Refueling and after-flight servicing at docks	Analyzed race car pit-stop crews' process	Improved turn around time and efficiency
Chrysler	Assembly line problem-solving processes	Looked into L.L Bean's worker level problem solving process	Speeded up the assembly line by having workers solve line problems
Motorola	Cycle time between order receipt and product delivery	Studied Domino Pizza's order and delivery procedures	Reduced cycle time
Convex Computers	Routine maintenance and repairs	Benchmarked Disney World's fixed pattern for routine maintenance chores	Reduced electrical breakdowns by 80%, which saved millions

		and empowered workers to make on-the-spot decisions	of dollars

(Patterson, 1996, p. 13)

There are advantages to comparing benchmarks. Listed in Table 2 are the types,

definition, examples and advantages of comparing benchmarks.

Table 2

TYPES OF BENCHMARKING

Type	Definition	Examples	Advantages
Internal	Similar activities in different locations, departments, operating units, county, etc.	1. U.S. manufacturing practices vs. Fuji (Japan) Xerox practices 2. Marketing strategies by division (copiers vs. workstations)	1. Data often easy to Collect 2. Good results for diversified, "excellent" companies

Competitive	Direct competitors selling to same customer base	Cannon, Ricoh, Kodak, Sharp	1. Information relevant to business results 2. Comparable practices/ technologies 3. History of information gathering
Functional	Organizations recognized as having state-of-the-art products/services/ processes	1. Warehousing (L.L. Bean) 2. Shipment status tracking (Federal Express) 3. Customer service (American Express)	1. High potential for discovering innovative practices 2. Readily transferable technology/ practices 3. Development of professional networks 4. Access to relevant databases 5. Stimulating results

(Spendolini, 1992, p. 22)

DISCUSSION

As the fire service considers the use of benchmarking, it must do so understanding the

process will expose good and bad practices. Not all analytical information will be good.

Working through the process ultimately leads to employee growth and organizational

improvement. The sometimes painful efforts are worth the outcome. In the next few years, the

fire service must be able to look towards and rely on its leaders, both individuals and institutions, to pave the way (Walker, 1994, p. 10).

The importance of this reference is that benchmarking "grows people and builds organizations" (p.10). How does one know if an organization is providing quality services? Historically, MFD has based its effectiveness on perceptions and how active the department has been in performing services. However, these perceptions and workload indicators do very little to evaluate the fire departments effectiveness in providing services. Results of this research suggest that the use of benchmarking can be an effective tool in evaluating performance and offering an avenue for continuous improvement.

Research was conducted on the definition of benchmarks or benchmarking. It is important to understand the term "benchmark" and/or "benchmarking" before one can apply its principles. Many different definitions were discovered in this research for the term benchmark. This author decided to take a hybrid of several to develop a definition that seem to best suit the MFD. Benchmarking is the process of measuring internal practices by comparing what others do to evaluate the opportunity for continuous organizational improvement.

The conclusion of this research has determined "benchmarking can produce quality results for your organization" (Patterson, 1996, p. 49). The key to organizational improvement is learning to benchmark. Benchmarking is a cycle of continuous improvement. There were several processes and model research on how to implement a benchmarking program. The process that was most appealing to this author was the PDCA Cycle.

The PDCA (Plan, Do, Check, Act) Cycle according to Patterson (p. 53) has four phases.
Phase 1: Plan

Any quality improvement process starts with the P, or plan. The plan can be a large-scale

organizational review of operations or a small-scale unit plan to learn how best to carry

out a simple task. No matter how big the process is, it should be subject of constant

scrutiny. Planning shouldn't be seen only as something you do before you start a new

process; you should also do it as a means of constant evaluation.

A plan is anything that might improve a process, whether it happens at the point the

process begins or at any other later point. If you can't tie any planned change to your

organization's mission (satisfying customer needs), don't consider it.

You should also have a way to evaluate the effectiveness of the plan. How will you

know the plan has been successful if you can't measure its progress?

Phase 2: Do

Now that you have a customer-oriented plan, you're ready to put it into action. At first,

test the plan on a limited scale. This is the D or Do phase. By limiting the scope of the

project, you can minimize the cost or time to gather data related to the plan.

Phase 3: Check

The C or Check phase of the cycle entails examining the data to discover if the plan and

implemented change has created the quality improvement you intended.

Phase 4: Act

In the A or Act phase, your data may suggest that you run through a second PDCA cycle

to change the variables to see if you can improve the process or you might decide to

standardize the process as it is.

Then the next step is back to the Plan, where you again try to improve your operations in

the full cycle of continuous improvement.

Benchmarking can produce measurable quality results for your organization, but it is no quick fix. A good benchmarking program needs time, labor, money and planning, and benchmarking is a continuous process (p. 49).

The survey results indicated that 63% of the respondents currently utilize formal benchmarking. The 12 respondents provided 185 specific performance measures. Provided is a list of the seven most frequently used performance measures;

1.   Call processing time within 60 seconds or less 90% of the time

2.   Time out within 60 seconds or less 90% of the time

3.   Travel time within 4 minutes or less 90% of the time

4.   Correct fire code violations within 90 days 90% of the time

5.   Complete plan reviews within 10 days of receipt 90% of the time

6.   Maintain property saved to loss ration greater than 95%

7.   Maintain property protected to loss ration greater than 99%

The study further identifies that all respondents who currently utilize formally benchmarking found the process as being meaningful to each respective department. Five of the respondents that answered "no" to question number 9, indicating their department did not use benchmarking, requested a copy of this applied research project with hopes it would provide them information to get started with formalizing benchmarking in their own organization.

The author of this applied research project has concluded that one effective way to provide quality services that can be measured with the opportunity for continual improvement is with the utilization of benchmarking. There are many benefits to an organization that chooses to utilize benchmarking as a means of measuring performance and continuous improvement. Benchmarking is a quest for best practices. "Benchmarking is a continuous process that leads to

superior performance in fire and emergency medical services through the implementation of innovations" (Gay, 1993, p. 6). The organizations that choose not to use benchmarking must be willing to accept the status quo. The MFD desires to provide the highest quality services possible to the community it serves. The results from this research project will help lay a foundation for the development of a benchmarking program for the MFD.

RECOMMENDATIONS

The following recommendations are based upon the problem and purpose statement of this research project and resulting research. As previously stated, the problem for the MFD was no existing measurement program in place that measured and evaluated performance. The purpose of the research was to review key elements of performance plans and to aid in the development and implementation of an effective plan for the MFD.

The literature review and survey results have defined benchmarking, benefits of benchmarking, and how it can be implemented. The result of this research clearly demonstrates the need for MFD to develop a system that will measure and evaluate performance. In order to effectively address the problem it is recommended MFD development and implement formal benchmarking by doing the following:

1. Educate MFD staff on the purpose, benefits and importance of Benchmarking.

2. A review of organizational operations; compare strengths, weaknesses, opportunities and threats in order to develop benchmarking criteria. the entire organization should be involved in this part of the process.

3. Form a benchmark committee. The committee should be representative of the entire organization.

4. The committee should receive training on benchmarking.

5. Develop a benchmarking action plan. The plan should reflect the organization

    mission statement, goals, objectives and scope of services.

6. Identify areas that are mission critical.

7. Develop specific benchmarks that measure targeted areas.

8. Develop a means of reporting identified bench mark results.

9. Implement new process and evaluate its effectiveness during a trail period.

10. Make needed adjustments to improve the plan.

11. Present the final plan to the Town Manager for approval

12. Once implemented the plan will need constant review to determine effectiveness.

A recommendation to future readers of this Applied Research Project is to further research how departments should go about selecting specific benchmarks for their department. It is important to set realistic performance measures. To expand this research a study on the correlations between the department size in terms of number of personnel, number of apparatus, area protected and total incident response have on determining specific performance measures for a department. It would be helpful to the fire service if a methodology could be developed where related data could be considered that would result in realistic performance measures for a fire department.

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Appendix A
Benchmarking Survey Instrument

Date:

Name
Department Name
Address

Dear:

I am currently enrolled in the Executive Fire Officer Program at the National Fire Academy and recently attended the "Leading Community Risk Reduction" course. I am completing my applied research project related to benchmarking programs that measure performance. As part of the requirements for this project, I am conducting a survey to determine which fire departments currently use benchmarking to measure performance.

This survey will only take a few minutes to complete. When you are finished, please fax this survey to: 919-380-6720 to my attention or mail to: Todd Wright, Morrisville Fire Department, PO Box 166, Morrisville, NC 27560.

If you have questions, you can e-mail me at twright@ci.morrisville.nc.us or call me at 919-463-6321.

Thank you in advance for your assistance in this valuable research. The information you provide is key to my completion of this applied research project.

Sincerely,

Todd Wright
Fire Chief

Appendix B
Benchmarking Survey Instrument

1. Department Name:_____

2. Contact Name:_____

3. Contact Phone Number:_____

4. Population of your jurisdiction:_____

5. Size of service area in square miles:_____

6. Number of fire stations serving your jurisdiction:_____

7. Number of department personnel:_____

8. Number of incident responses in Fiscal Year 2005:_____

9. Does your department use formalized "Benchmarks" to measure performance?
    Yes or No

    Examples: First due companies will maintain a travel time of 4 minutes or less 90%
               of the time to reported structure fires.

               To provide minimum staffing response of 13 firefighters and
               one officer to all incidents recommended by NFPA 1710 within 8
               minutes of alarm time inside the Town Limits

               To maintain a property save to loss ratio greater than 95%.

               To increase the percentage of rapid primary search functions and
               transmittal of "all clear" (no additional life hazard) within 10 minutes of
               the full first alarm arrival 90% of the time

               To achieve 80% inspection completion of all Town
               businesses annually with a goal of working toward 100%.

10. If your department uses "Benchmarks" to measure performance, please include a
    copy of the program.

11. What specific benchmarks do you find most helpful?

12. Please list any benchmarks that you found not to be useful:

Appendix C
Benchmarking Survey Results

9. Does your department use formalized "Benchmarks" to measure performance?
    Yes or No

    12 Yes / 63%   9 NO / 37%

10. If your department uses "Benchmarks" to measure performance, please provide a copy of the
    program.
    Apex Fire Department
    *   4 persons on scene within 5 minutes based on a 90th percentile to urban areas
    *   4 persons on scene within 7 minutes based on 90th percentile to suburban areas
    *   4 person on scene within 9 minutes based on 90th percentile to rural areas
    *   Remaining balance of personnel to arrive within 8 minutes on structural calls
    *   Minimum 2 personnel on medical calls

    Ashville Fire Department
    *   Reduce the incidence of fires in coverage area by 10% in the next 5 years
    *   Reduce incidence of fire casualties by 10% in the next 5 years
    *   Reduce the effects of hazmat releases in the coverage area by 10% in the next 5 years
    *   Reduce the incidence of rescues in the coverage area by 10% in the next 5 years
    *   Reduce the number of fatal injuries in the coverage area by 10% in the next 5 years
    *   Reduce the incidence of wildfires in the coverage area by 10% in the next 5 years
    *   For 70% of all fire incidents in all risk areas the first-due unit shall arrive within 8
        minutes total reaction time. The first due unit shall be capable of performing search,
        rescue, protect interior exposures, perform fire attack, flow 1000 gpm, and provide a
        rapid intervention crew.
    *   For 70% of all hazmat incidents in all risk areas the first-due unit shall arrive within 8
        minutes total reaction time. The first due unit shall be capable of performing
        identification, evacuation, and decontamination of evacuating victims.
    *   For 70% of all rescue incidents in all risk areas the first-due unit shall arrive within 8
        minutes total reaction time. The first due unit shall be capable of performing
        stabilization, patient care, CPR, and airway insertion.
    *   For 70% of all wildfire incidents in all risk areas the first-due unit shall arrive within 8
        minutes total reaction time. The first due unit shall be capable of initiating a fire line and
        initial extinguishment with water.
    *   For 70% of all fire incidents in all risk areas the remaining initial effective response force
        shall arrive within 14 minutes total reaction time. The total response force shall be
        capable of performing search, rescue, protect exposures, perform fire attack, provide
        water supply, flow 3000 gpm, ventilation, salvage, back up, command, safety, and
        provide a rapid intervention crew.
    *   For 70% of all hazmat incidents in all risk areas the remaining initial response force shall
        arrive within 14 minutes total reaction time. The total response force shall be capable of

performing identification, entry, mitigation, back up, decontamination, research, command, safety, water supply, evacuation, and rehab.
- For 70% of all EMS incidents in all risk areas the remaining initial effective response force shall arrive within 14 minutes total reaction time. The total response force shall be capable of providing immobilization and treatment for a 5 patient incident.
- For 70% of all wildfire incidents in all risk areas the remaining initial effective response force shall arrive within 14 minutes total reaction time. The total response force shall be capable of performing command, safety, constructing a fire line, extinguishment, and structure protection.

Concord Fire Department

- # of work-related injuries
- 3 of vehicle and equipment accidents
- % of level three occupancies inspected per year
- % of level two occupancies inspected per year
- % of level three occupancies inspected per three years
- % of fire suppression personnel scoring "acceptable" on physical fitness testing
- # of shareholders/customer education contacts
- # of neighborhood CERT programs
- # of fire related fatalities
- Property to save loss ratio
- Property protected to lost ratio
- % fire code violations cleared within 90 days
- % of fires confined to room(s) involved on arrival
- % of arson fires cleared
- Average response time to priority 1 calls in minutes
- % of first unit arrivals within 4 minutes (suppression)
- % of first units arrivals within 4 minutes (EMS)
- % of full assignment arrival within 8 minutes
- % of turnouts of less than 60 seconds
- Transmittal an "all clear" within 10 minutes
- Transmittal of "under control" within 15 minutes

Carrboro Fire Department
- Provide minimum staffing response to the Northern part of Town of Carrboro, for all requests for emergency service, within 6 minutes, 85% of the time. An ultimate goal of 6 minute response, 95% of the time, is set for the addition of the new station in 2007
- Provide effective emergency service with a new radio system that complies with the Homeland Security Act of 2002, which requires all municipalities to be NIMS (National Incident Management System) compliant under the Presidential Directive # 5, Title V- Emergency Preparedness and Response
- Protect all town employees and citizens on town property, to ensure compliance with OSHA 29 CFR 1910 and OSHA CFR 1926, along with NFPA 1500

- Maximize training opportunities with neighboring fire departments and town departments
- Prepare for our "Office of the State Fire Marshal" inspection in hopes of lowering the fire insurance rating for the businesses in both city limits and extra-territorial jurisdiction
- Total number of actual fires
- Number of actual structural fires
- Total number of fire related incidents, medical, incidents, false alarms and other incidents
- Average dispatch time
- Average turnout time
- Average travel time
- Dispatch - % responses within 1 minute
- Turnout - % responses within 1 minute
- Travel - % responses within 4 minutes
- First unit - % responses within 6 minutes
- Full response - % responses within 10 minutes
- Number of injuries/deaths-firefighters
- Number of civilian injuries/deaths
- Number of structural fires confined to room(s) involved upon arrival of 1st unit
- Availability rate of first-line fire apparatus
- Total number of hydrants serviced
- Number found operable during testing
- Number found inoperable in an emergency
- Number of inspections completed
- Number of plan reviews
- Average time spent per inspection
- Number of fires in occupancies meeting the mandated state inspection period
- Number of fires in occupancies not meeting the mandated state inspection period
- Number of fire code violations found
- Number of fire code violations "cleared" by correction of hazard, imposition of penalty or proper referral/administrative recourse within 90 days
- Number of fire safety complaints received
- Number of fire safety complaints resolved within 1 working day
- Amount of property protected
- Amount of fire loss
- Amount of property prior to fire damage

Durham Fire Department

- % turnout time less than 1 minute
- Average turnout time
- % response time 4 minutes or less
- Average response time
- To maintain a minimum 30% clearance rate for arson fires
- To reduce the number of fire related deaths in businesses, homes and other occupancies located within the city
- To maintain skill levels of 95% or better score on EMS quarterly skills testing

- To confine structure fires to the room(s) of origin 45% of the time

Hickory Fire Department

- Number of responses
- Average turnout time
- Average travel time
- Average total response time
- # of fire inspections completed/average time in minutes
- # of plan reviews/average days in review
- Number of fire education programs/citizens served
- Number of training classes, training hours and physical fitness hours

Highpoint Fire Department

- Dispatch - % responses within 1 minute
- Turnout - % responses within 1 minutes
- Travel - % responses within 4 minutes
- First unit - % responses within 6 minutes
- Full response - % responses within 10 minutes
- Fire related injuries/death firefighters
- # of fire related injuries/ civilians
- Number of structural fires confined to room(s) involved upon arrival of 1st unit
- Availability of first-line fire apparatus
- Total 3 hydrants in service area
- Hydrants found inoperable during testing
- Hydrants inoperable in emergency
- Fire inspections completed
- Number of plan reviews
- Average time spent per fire inspection for Level I, II, & III
- Number of fires in occupancies meeting the mandated state inspection period
- Number of fires in occupancies meeting the mandated state inspection period

Jacksonville Fire Department

- Respond to all in-city emergency calls within 7 minutes 85% of the time
- % of fires contained to room(s) involved on arrival 75% of the time
- % of fires for which cause is determined 75% of the time
- Annual accreditation compliance report is submitted and approved
- Recordable injury rate does not exceed target rate
- Required fire inspections conducted according to schedule 95% of the time

Raleigh Fire Department

- Number of incidents
- Fires investigated
- Permits issued
- Average hours per fire call
- Average hours per EMS call
- Average response time to emergency calls in minutes
- Property losses % of property value where fires occurred
- Civilian deaths per 100,000 population- fire calls only
- Firefighters injured per 100 fire calls
- Reported fires per 1,000 population
- % annual, 2-year, 3-year inspections completed
- % Citizens reached by public fire education
- % of time first-line was in service

Rocky Mount Fire Department

- Number of emergency incidents
- Number of fire department personnel per 1,000 population
- Number of square miles served
- Average response time
- Value of property loss due to fire(millions)
- Fire inspections performed
- Public fire education programs held
- Plans reviewed
- Certificate of Occupancy inspections performed
- Fire investigations performed
- Total fire code violations enforced
- Total class / drill hours of specialized training
- Monthly average of hours of specialized training
- Man hours of nigh drills / classes
- Number of mutt-company drills / classes

Wilson Fire Department

- Advance 1-200' preconnected within 35 seconds
- Advance 2-200' preconnected 1 ¾" within 1 minute and 11 seconds
- Advance 1-200' preconnected 1 ¾" with 100' of 5" supply line (forward lay) within 1 minute 47 seconds
- Advance 2-200' preconnected 1 ¾" with 100' of 5" supply line (forward lay) within 1 minute 58 seconds
- Advance 1-50' jump line within 26 seconds
- Advance 1-100' jump line within 50 seconds

- Setup 1 master stream-mounted at 1000 GPM with 100' of 5" supply line (forward lay) within 1 minute 32 seconds
- Setup 1 master stream-portable base at 1000 GPM with 100' of 5" supply line (forward lay) within 2 minutes and 34 seconds
- Advance skid load with 50' of 3' hose within 1 minute 22 seconds
- Advance skid load with 50' of 3" hose with 100' of 5" supply hose within 2 minutes and 12 seconds
- Advance skid load with 100' of 3" hose with 100' of 5" supply hose (reverse lay) within 1 minute and 30 seconds
- Advance skid load and 3" for (double reverse) each 100" of 3" house with 5" supply hose within 2 minutes and 13 seconds
- Setup sprinkler/standpipe connection using 2-3" supply lines in forward lay with 5" supply within 2 minutes and 35 seconds
- Setup sprinkler/standpipe connection with 2-3" supply lines in a reverse lay with 5" supply hose within 1 minute 52 seconds
- Establish water supply to separate apparatus (forward lay) with 100' of 5' supply hose within 1 minute and 1 second
- Establish water supply to separate apparatus (reverse lay) with 100' of 5" supply hose within 1 minute and 33 seconds
- Set up positive pressure ventilation fans for typical residential type structure within 1 minute and 11 seconds
- Perform vertical ventilation utilizing ground ladders and power saws (residential type 4 X 4 hole) within 5 minutes and 21 seconds
- Perform vertical ventilation utilizing aerial device and power saws (residential type 4x4 hole) within 10 minutes and 38 seconds
- Perform vertical ventilation utilizing ground ladders and hand tools (residential type 4x4 hole) within 7 minutes and 12 seconds
- Establish aerial stream operation with full ladder extension supplied with 100' of 5' supply hose within 5 minutes and 9 seconds
- Deploy aerial waterway for use as an external standpipe device with capability of supplying two 1 ¾" attack lines to a height equal to that of an average 4th floor window within 4 minutes and 39 seconds
- Rescue a conscious victim from a height equal to that of a 2nd floor window utilizing ground ladders within 2 minutes and 23 seconds
- Rescue an unconscious victim from a height equal to that of a 2nd floor window utilizing ground ladders within 2 minutes and 57 seconds
- Rescue a victim from a height equal to that of a 4th floor window utilizing an aerial device within 6 minutes and 5 seconds
- Deploy search and rescue techniques to complete a primary victim search in a 12'x12' room under heavy smoke conditions within 6 minutes and 8 seconds
- Perform high angle rescue to remove victim from a stationary platform via rappel pick-off technique within 25 minutes and 25 seconds
- Perform high angle rescue to remove victim from a rope device via a rappel pick-off technique within 18 minutes and 51 seconds

- Deploy "Grip Tech" mechanical advantage system utilizing aerial device as anchor for raise or lower operation within 4 minutes and 29 seconds
- Deploy salvage techniques (salvage covers) to protect a random selection of furniture expected to be present in a given residential room within 1 minute and 28 seconds
- Force entry into a randomly selected residential wood door within 36 seconds
- Force entry into a randomly selected residential window within 24 seconds

Wintson-Salem Fire Department

- Actual fires per 1,000 population
- Fire inspections completed per 1,000 population
- Inspections completed per inspector FTE
- % of fire code violations cleared within 90 days
- % of fires which cause determined
- Fire department response per 1,000 population
- Cost per fire department response
- Average response time to priority 1 calls in minutes
- % fires confined to room(s) involved on arrival
- % full response within 10 minutes

11. What specific benchmarks do you find most helpful?
    - 2 All / 8.3%
    - 8 Response related / 66.7%
    - 1 Room of Origin / 8.3%
    - 1 Engine company hose lays / 8.3%

12. Please list any benchmarks that you found to not be useful:
    - All respondents found every benchmark to be useful