Managing Career Success of Geodetic Engineers

Tomas Ucol-Ganiron Jr.[1] and Tomas Malvecino-Ganiron[2]

[1]*Graduate School of Engineering, Auckland University of Technology, Auckland City*
[2]*526th Air Base Squadron, Philippine Air Force, Pasay City, Philippines*
tomasuganironjr@gmail.com, tomasmganiron@yahoo.com

Abstract

Currently, the construction industry in the Philippines is experiencing explosive growth. As the need for more skilled Geodetic Engineers increases, the focus on the diversity of individuals participating in land surveying jobs is highlighted. Therefore, there is a critical need to better understand the predictors that facilitate their career success. This study examined several variables that may contribute to Geodetic Engineers objective (fringe benefits) and subjective (life satisfaction) success. Predictive variables include professional development, networks and professional linkages. The construction business involved in this study will be properly informed of predictors of career success that will lead to satisfaction of Geodetic Engineers. This will also help management students to manage their career through planning and provide them with insight on how geodetic engineers can be successful in their chosen career and be satisfied with their work life. Hence, the contractors will be able to save a lot of time, effort and money in training. Some of the interesting insights are: (a) The Geodetic Engineers received high fringe benefits; (b) Geodetic Engineers are promoted because of their professional development; (c) Geodetic Engineers are only satisfied with life satisfaction and (d) Network and professional linkages predictors generally displayed stronger relationship both objective career success and subjective career success.

Keywords: *career management, career planning, career success, geodetic engineer*

1. Introduction

Career is a complex term, and different authors define it in different ways. In the past, people did not consider complex and important as now, and it was considered that when a person had a job, it was for a life long term (Bosionoles, 2004). People used to start their job when they were young and they used to stay in the same organization, and even at the same position, till they retired (Kim, 2005). It was taken for granted that a person if hard worker, reliable, competent, loyal and making no problems, would have a job as long as he/she wanted it. In return for such behavior of employees, companies offered them job security and stability of job. All the system, including organization was the one that acted in paternalistic way. In these days career started as soon as a person finished his/her education and started to work, and did not require any additional knowledge or professional development.

The importance of educated graduates in Bachelor of Science in Geodetic Engineering, as well as the quality education in Geodetic Engineering is recognized by Filipino population (Sandoval, 2005).This can be proved with the fact that Department of Geodetic Engineering in the Philippines hold prime position regarding the number of opening positions for new students as well as the annual number of the enrolled and graduated students. At the Filipino

labor market, there are a great number of those graduates in Geodetic Engineering who are waiting for their first job opportunity. On the other hand, it is important to mention that they represent those professionals whose process of employment is the most dynamic one. There are also a significant number of those who find their first employment immediately after their graduation. This can be applied to those students who proved themselves as successful students and hardworking individuals who had part time jobs during their educational process (Jaws, 2002). There are more and more companies in Philippines that require numerous skills and abilities from potential employees, and not only in graduation diploma. Such request can be seen as: creativity, challenge, incentive and finally potential for career planning. These are the reasons why it is important and useful to study careers of graduates in Geodetic Engineering for improving the efficiency of labor market activities on both sides, supply and demand (Gibson, *et al.*, 2005).

In the Philippines, Geodetic Engineer plays an important role in the success of civil work projects (Inkson, 2002). This career involves measuring land, air space, and water areas. Geodetic Engineers describe where a certain area of land is. They explain what it looks like, and how much is there. They put these facts in deeds, leases, and other legal documents. Geodetic Engineers also define air space for airports. In addition, they measure construction and mineral sites. Geodetic Engineers are the leaders of survey parties or surveying projects (Gibson, *et al.*, 2005).

According to the survey made by Sandoval (2005), the most important variables related to their career planning are individual interests, abilities, desires, needs and choices. Career planning also involves identifications of the career related goals and establishing plans for achieving this goals. It is an activity performed by an individual in order to understand and be able to control his/her work life. It is not necessary that a person does his/her career planning alone, but in cooperation with the human resources experts, counselors and the organization as a whole (Nicholson, 2003).

To become successful in this career, researchers need to identify the status of Geodetic Engineers in terms of professional development, network and professional linkages, determine the level of career success of Geodetic Engineer in terms of fringe benefits and life satisfaction, identify the factors predict the objective and subjective success and designed a model for managing Geodetic Engineer career, which serve as a guide for young Geodetic Engineers to be successful that will help them to manage their career in the near future. The aim of this research is to achieve these four objectives by an empirical analysis of a specific component of data.

2. Literature Review

2.1. Career Success

Career success is defined as the accumulated positive work and psychological outcomes resulting from one's work experiences (Venn, *et al.*, 2003). Researchers often operationalize career success in one of two ways. The first includes variables that measure objective career success. These include indicators of career success for Geodetic Engineers that can be seen and therefore evaluated by objectively by others, such as fringe benefits (Douvan, 2006). The second way that career success is operationalized is by variables that measure subjective career success. Such variables capture individuals' subjective judgments about their career attainments such as life satisfaction (Agustin, 2009).

2.2. Professional Development

Professional development activities for engineers and scientists are active participation on a committee or holding an office in a professional or technical society, attending program presentations related to technical or professional meetings, authoring papers or articles that appear in nationally circulated journals or trade magazines or presented to a professional society of organizations, engaging in self-study of new regulations, requirements or advances related to Geodetic Engineering, professional engineering programs, seminars, tutorials, workshops, short courses, on-line or in-house courses, professional trainings related to Geodetic Engineering, receiving a patent for inventions and discoveries, technical inspections related to Geodetic Engineering works and lectures on noble qualities are human capitals (Cardon, 2002).

Professional developments are called human capital because people cannot be separated from their knowledge, skills, health, or values in the way they can be separated from their financial and physical assets. Professional development is the most important investments in human capital (Cardon, 2002)

2.3. Networks and Professional Linkages

Networks and professional linkages play a vital role in improving technical skills of one's profession. There are six technical skills learned from networks and professional linkages. These are: creativity and an innovative approach to solving problems; ability to analyze and interpret complex data; ability to evaluate designs, plans and projects; effective assessment and management of risk, resources and time; highly developed numeracy and computer literacy; and clear written and oral communication skills (Fronda, 2006).

Role models and mentors found to be the greatest positive social influence (Fronda, 2006). Research has indicated that the presence or absence of role models may affect a man's work status, persistence in science and engineering and career success (Greenhaus, *et al.*, 1990). Geodetic Engineers defined role model as someone in greater authority in whom they saw things that were strong that they wanted to emulate and who played an important role in their careers (Ganiron Jr., 2012). Role models demonstrate valued behavior. The lack of role models in non-traditional professionals and senior level administrative positions as a significant barrier to career development impeding from pursuing non-traditional careers (Larsen, 1985).

There are eleven employability skills and aptitudes learned from a mentor. These are: flexibility, adaptability and the capacity to cope with and manage change, self-motivation and drive, analytical ability and decision making, communication and interpersonal skills, team working abilities and skills, organization, planning and prioritization abilities, ability to innovate, mental and physical resilience, leadership ability, managing long term projects, and time management (Ganiron Jr., 2012).

2.4. Fringe Benefits

Fringe benefits are the most widely used and readily accessible indicators of objective career success. These are salary advance, Christmas bonus, housing allowance, retirement benefits, death benefits and disability retirement (Ganiron Jr., 2012). These fringe benefits have the substantial of being readily available from existing records, standardized at least within firms, and efficient to collect. They are free from self-serving and common-method variance, if collected by means other than self-support.

They are valued by many engineers and executives. In some professions, fringe benefits stem are only objective outcomes that people seek from their careers (Hughes, 2002).

2.5. Life Satisfaction

Life satisfaction attributes engagement or having ones mental and/or physical capabilities deeply occupied by work, hobbies, or family activities is a component of happiness and individuals need to combine mental, emotional and social engagement or personal engagement to go beyond job satisfaction and career satisfaction (Larsen, 1985).

Adding life satisfaction to career success also acknowledges the importance of work life (or work family) balance. Life satisfaction seems particularly relevant in research, as the challenge of achieving balance between life facets (work and family) may differ with social policies (Judges, 1995).

3. Research Methodology

3.1. Research Design

The study used both inferential and descriptive method of research with questionnaires as the main data-gathering instrument. The subjects of this study were the companies located in the Philippines where vertical and horizontal structures projects are in progress.

Purposive sampling was utilized in order to determine the participation of the knowledgeable employees only by considering those who meet the five criteria. The criteria are (1) Registered Geodetic Engineer; (2) Minimum of fifteen to twenty (15-20) years of work experience in land surveying since graduation; and (3) Member of the Geodetic Engineers of the Philippines. The respondents were purposively selected and have included 200 Geodetic Engineers who are members of Geodetic Engineers of the Philippines.

3.2. Instrumentations

The major tool for data gathering was the questionnaire. The questionnaire was divided into 2 parts. The first part dwelt on the status of Geodetic Engineers in terms of professional development, network and professional linkages. The second part focused on the level of career success of Geodetic Engineer in terms of fringe benefits and life satisfaction.

Objective career success was measured through one variable: Fringe benefits include salary benefits, salary advance, Christmas bonus/other special hours, housing allowance/ house rent subsidy, retirement benefits and disability retirement. However, subjective career success (life satisfaction) was measured with Life Scale (Larsen, 1985).

Life satisfaction deals with five general statements about life. The five items are (1) In most ways my life is close to my ideal; (2) The condition of my life are excellent; (3) I am satisfied with my life; (4)So far I have gotten the important things I want in life; and (5) If I could live my life over, I would change almost nothing. Larsen (1985) reported an acceptable level of internal consistency for this scale is 0.88.

The researchers also used unstructured interview. It was administered to the respondents to further clarify the opinions reflected in the questionnaire. Statistical tests of regression analysis, percentage and weighted mean values were used to enable researchers give appropriate responses to the objectives of this study

3.3. Validation of Questionnaire

The final draft of the questionnaire was pretested by an initial group of 7 prospective respondents and their comments and suggestions were incorporated in the final draft. The initial group however, will not be included on the respondent group whom the final questionnaire will be administered.

To further ensure the validity of the questionnaire, the researchers read various books regarding institutional relations and corporate values in order to develop appropriate questions and choices. Likewise, the researchers also repeatedly went to the prospective respondents and asked them about the possible questions that could be asked in relation to the research topic. The researchers also sought the professional expertise of the adviser members of Geodetic Engineers of the Philippines (GEP) to come up with an appropriate set of questions and probable answers that will be used as option. To further instill validity of the questionnaire content, a draft of it was given to the research adviser for the determination of correlation coefficient and for some necessary inputs and revisions.

3.4. Statistical and Treatment of Data

All the data gathered were statistically treated using the following tools.

3.1.1. Percentage: The percentage score was computed by the number of responses divided by the total number of the subjects and the quotient multiplied by one hundred (Sprinthall, 2011). This method was helpful in interpreting subjects and subgroups having unequal sizes as in the cases of the status of the respondents and the level of career success of Geodetic Engineers.

The formula is $\% = (f/N) \times 100$

where: f = frequency of responses
N = number of cases/responses

3.1.2. Weighted mean: The mean of the answers was determined to provide the average option (Sprinthall, 2011). It was computed using the formula:

where: $\sum$ = symbol for summation
X = mean
W = weighted of each item
x = item value

This formula was used to measure the networks and professional linkages. Similarly the same was used in finding the level of life satisfaction of Geodetic Engineer. The criteria that served as basis for interpretation of the result was adapted from the concept of boundary made as follows:

Table 1. Network and Professional Linkages

Mean	Weight	Interpretation	Abbreviation
3.51-4.00	4	Very High	VH
2.51-3.50	3	High	H
1.51-2.50	2	Little	L
1.00-1.50	1	Very Little	VL

Table 2. Life Satisfaction

Mean	Weight	Interpretation	Abbreviation
3.51-4.00	4	Strongly Agree	SA
2.51-3.50	3	Agree	A
1.51-2.50	2	Disagree	D
1.00-1.50	1	Strongly Disagree	SD

3.1.3. Multiple Regression Analysis: This inferential statistics was used to determine the degree of association between the factors of career success and level of career success of Geodetic Engineers (Mackinnon, 2005). Moreover, this was used to determine the factors that predict objective and subjective career success of Geodetic Engineers to become successful.

Formula:

$$y' = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + \ldots + b_n x_n$$

where:

y = multiple regression model (dependent variable)
a = y-intercept
b = represents the change in y for a unit increase in x or slope of the line
x = independent variables (indicators)

To simplify the statistical calculations, the SPSS package was adopted. This was very convenient computer software that can facilitate long calculations in short.

Decision Criteria

The probability basic for decision criteria regarding to the sources of tests: like significance level =0.05 or 0.01. The decision on whether to accept or reject the null hypothesis (Ho) was based on the following criteria:

sig.$\geq$ 0.05, null hypothesis is accepted (no significant difference)
sig. < 0.05 , null hypothesis is rejected (significant)

3.5 Hypothesis

Ho1 There is no significant relationship between the factors of career success in terms of professional development, network and professional linkages and level of career success of Geodetic Engineers.

Ho2 None of the following factors such as professional development, network and professional linkages predict the objective and subjective career success of Geodetic Engineers.

4. Findings

4.1. Factors of Career Success

4.1.1. Professional Development: Respondents were given two or more choices to indicate the professional development activities for the last two years. As shown in table 3, majority of the respondents, 90% chose "active participation on a committee on holding an office in a professional or technical society" as an answer, 81% are attending "professional engineering

programs, seminars, tutorials, workshops, short courses, on-line or in house courses", 70% are "attending program presentations related technical or professional meetings", 62.5% are both engaged in "self-study of new regulations and "teaching or instructing", 56.5% are "attending professional training related to Geodetic Engineering", 53.5% are in "technical inspection in related to geodetic engineering works". Very few respondents, 51% are "authoring papers or articles that appear in nationally circulated journals or trade magazines or presented to a professional society of organizations" and 40% selected "receiving a patent for inventions and discoveries". This means that Geodetic Engineers are very active in professional development activities.

Table 3. Frequency and Percentage Distribution of Geodetic Engineers by Professional Development

Professional Activities	f	%
1. Active participation on a committee or holding in a professional or technical society	180	90.0
2. Attending program presentations related to technical or professional meetings	140	70.0
3. Authoring papers or articles that appear in nationally circulated journals or trade magazines or presented to a professional society of organizations	102	51.0
4. Engaging in self-study of new regulations, requirements or advances related to Geodetic Engineering	125	62.5
5. Professional engineering programs, seminars, tutorials, workshops, short courses on-line or in-house courses	162	81.0
6. Professional trainings related to Geodetic Engineering.	113	56.5
7. Receiving a patent for inventions and discoveries.	80	40.0
8. Technical inspection in related to land surveying, photogrammetry and remote sensing work receiving a patent for inventions and discoveries	107	53.5
9. Teaching or giving instruction (does not apply to faculty in the performance of regular assigned duties)	107	53.5

4.1.2. Network and Professional Linkages: As shown in table 4, respondents perception that the level of confidence to demonstrate technical skills gained from networks and professional linkages have an over-all mean of 3.75 which is very high. Each technical skill gained from networks and professional linkages have a mean between 3.56 and 3.89. This means that Geodetic Engineers are very much interested in the technical skills gained from networks and professional linkages

Table 4. Mean Responses of Geodetic Engineers on level of Confident of Technical Skills

Technical Skills gained from Networks and Professional Linkages	Mean	Interpretation
1. Creativity and an innovative approach to solving problems	3.86	Very High
2. Ability to analyze and interpret complex data	3.78	Very High
3. Ability to evaluate description of lands, its boundaries and location, plans and projects	3.89	Very High
4. Effectiveness assessment and management of risk, resources and time.	3.56	Very High
5. Highly developed numeracy and computer literacy.	3.64	Very High
6. Clear written and oral communication skills	3.77	Very High
Over-all mean	3.75	Very High

4.2. Level of Career Success

4.2.1. Fringe Benefits: Respondents were given two or more choices to indicate fringe benefits, *etc*., miscellaneous benefits and paid time off (PTO)/leave bank received from the company for the last two years. As shown in Table 5, more than half of the respondents received Christmas bonus/other special bonus (77.5%), housing allowance/house rent subsidy (68%) and salary advance (62%).Therefore, the level of the fringe benefits received by Geodetic Engineers is highly competitive compared with other professions.

Table 5. Percentage and Frequency Distribution of Geodetic Engineers by Fringe Benefits

Fringe Benefits	f	%
1. Salary advance	124	62.0
2. Christmas bonus /other special bonus	155	77.5
3. Housing allowance/ house rent subsidy	136	68.0
4. Retirement benefits, gratuities, pensions	89	44.5
5. Death benefits	62	31.0
6. Disability retirement	60	30.0

4.2.2. Life Satisfaction: Respondents claimed that Geodetic Engineers "agree" that they are satisfied with the conditions of their life which is excellent. This statement received high mean responses of 3.29 from Geodetic Engineers. Moreover, a closer look on the Table 6 further exhibited the mean responses on the respondents' perception as regard that the Geodetic Engineer "agree" that their ways of life is closer to their ideal and if they would have their life over, they would change almost nothing where the respondents register a mean response of 3.25. Furthermore, the same table presented that they are satisfied with the important things they want in their life and satisfied with their life. The mean responses were 3.18 and 3.13. All of which were interpreted as "agree".

Generally, the level of career success of Geodetic Engineers in terms of life satisfaction was satisfied only. With a composite mean response of 3.22, it was interpreted "agree". Therefore, the level of satisfaction received in life satisfaction for Geodetic Engineers is average.

Table 6. Mean Responses of Geodetic Engineers by Life Satisfaction

Life Satisfaction	Mean	Interpretation
1. In most ways, my life is close to my ideal.	3.25	Agree
2. The condition of my life are excellent	3.29	Agree
3. I am satisfied with my life	3.13	Agree
4. So far, I have gotten the important things that I want in my life.	3.18	Agree
5. If I could live my life over, I would change almost nothing.	3.25	Agree
Composite Mean	3.22	Agree

4.3. Predictors of Career Success

As shown in Table 7, professional development, network and professional linkages have significance values of 0.004 and 0.001 in fringe benefits and indicating a significant result at 0.05 levels. Thus, professional development, networks and professional linkages are predictors of fringe benefits. This shows that Geodetic Engineers learned professional skills, technical skills, knowledge, *etc.* through the level of the fringe benefits received by the Geodetic Engineers in their company. It also shows that there is no significant relationship between professional development and life satisfaction. However, network and professional linkages has significance value of 0.026 in life satisfaction. This means that Geodetic Engineers enjoy network and professional linkages of different societies that make them very satisfied in their life.

Table 7. Predictors of Career Success

Factors of Career Success	Career Success	Beta (β)	R^2	Sig.	Decision	Interpretation
Professional Development	Fringe Benefits Life Satisfaction	0.266 0.117	0171 0.014	0.004 0.225	Rejected Accepted	Significant Not Significant
Networks and Professional Linkages	Fringe Benefits Life Satisfaction	0.313 0.213	0.198 0.145	0.001 0.026	Rejected Rejected	Significant Significant

5. Career Planning Model

Results in Table 7 shows that network and professional linkages play a vital role in improving technical skills of one's Geodetic engineering profession and contribute in objective success of Geodetic engineers. The researchers made a model for network and professional linkages.

The objective of this model is to build relations with all Geodetic Engineers for intellectual interactions and Geodetic Engineers updates. Figure 1, shows that Geodetic Engineers should attend seminars, workshops and short courses and quickly form a friendship with a dozen or so likeminded people. There will be tunes that Geodetic Engineer asks a favor when it will help to know someone in another organization that can help their problem query. Moreover, Geodetic Engineers should list all the people who are successful Geodetic Engineers. Geodetic Engineers should seek their advice in technical skills. They could get 2-3 referrals from a contact they know quite well.

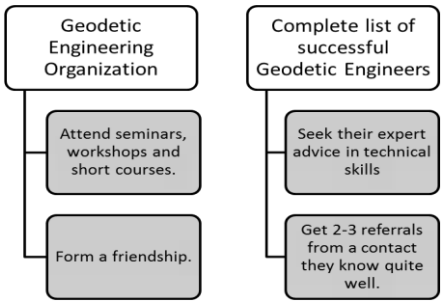

Figure 1. Network and Professional Linkages Model

Moreover, Table 7 also shows that professional development was found highly contribute in objective success of geodetic engineers.

Since professional development is very important in objective success of Geodetic Engineers, the researchers made a professional development program as shown in figure 3. The purpose of this program is to acquire new knowledge and information and build a conceptual understanding of it.

The professional development program of Geodetic Engineer has four (4) components shown in Figure 2. These are activities (*e.g.*, active participation on a technical society and attending professional meetings), skill and leadership development(*e.g.*, professional engineering programs, seminars and workshops, and authoring papers or articles that appear in nationally journals), professionalism (*e.g.*, professional trainings related to attitudes, etiquette, ethical development and civil engagement), and personal development and overall maturity (*e.g.*, employability skills learned from mentors, managers and colleagues). Through these components, Geodetic Engineers will develop skills and characteristics necessary for their success in their profession, an applicant to professional program, a career professional and most importantly, objective and subjective success as Geodetic Engineers grow in both experience and maturity as an individual.

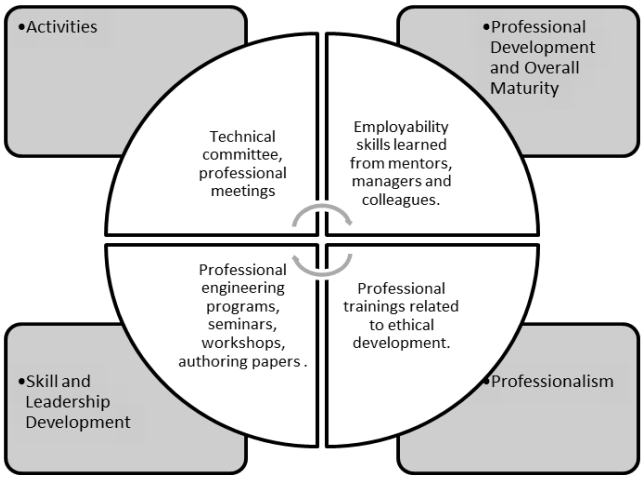

Figure 2. Professional Development Program

6. Conclusion

In this paper, the authors made use of purposive sampling of 200 Geodetic Engineers who are members of Geodetic Engineers of the Philippines (GEP).

The instruments used by the author to assess the Geodetic Engineers objective and subjective career success were the questionnaire dwelt on the status of Geodetic Engineers in terms of professional development and social capital and questionnaire focused on the level of career success of Geodetic Engineer in terms of fringe benefits and life satisfaction The study made use of both descriptive and inferential statistical tools, namely: 1) frequency count; (2) weighted mean; and (4) analysis of variance.

These results indicate that the most objectively successful Geodetic Engineer appears to be one who is active to participate on a committee, holding an office in a professional society, highly skilled in mathematics and computer literate.

Specifically, with respect to fringe benefits attributes, a Geodetic Engineer who has a special bonus, housing allowance and salary advance is projected to have more professional development activities. Professional development enables Geodetic Engineers to develop their technical skills through new technology and innovation.

Moreover, professional development, network and professional linkages were found highly contribute in objective success of Geodetic Engineers.

However, Geodetic Engineer has only average levels of life satisfaction. This happens when a career and job are given more emphasis rather than a family which is also determinants of life satisfaction.

On the other hand, network and professional linkages were found the best predictors of objective success in terms of fringe benefits. The role models in network and professional linkages affect Geodetic Engineers work status persistence in career success. Geodetic Engineers learned technical skills, employability skills and aptitudes through network and professional linkages. These skills helped them to manage their career in a workplace that will give them more fringe benefits.

To attract students in the field of Geodetic Engineering, the academe must develop mentoring program for students and help students build support networks before they graduate. They should introduce students to role models in industry and show them that Geodetic Engineers are succeeding in construction industry. Further, the academe should provide students on job training program which serve as foundation for future career in Geodetic Engineering

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Authors

Dr. Tomas Ucol-Ganiron Jr.

This author obtained his Doctor of Philosophy in Construction Management at Adamson University (Philippines) in 2006, and subsequently earned his Master of Civil Engineering major in Highway and Transportation Engineering at Dela Salle University-Manila (Philippines) in 1997 and received Bachelor of Science in Civil Engineering major in Structural Engineering at University of the East (Philippines) in 1990. He is a registered Civil Engineer in the Philippines and Professional Engineer in New Zealand. His main areas of research interest are construction engineering, construction management, project management, highway engineering, transportation engineering and structural engineering.

Lt. Tomas Malvecino-Ganiron

He specialized in the field of Business Administration major in Accounting at the University of the East (Manila). Lt. Ganiron was with 520th Air Base Wing of the Philippine Air Force (PAF). He served various positions in preparation to the more demanding position in the PAF. He was a member of the famed Blue Diamonds, a combat ready pilot. Lt. Ganiron was a lecturer of the Philippine Air Education and Training Command and received several military awards including the Philippine Legion of Honor, Medal of Valor, PAF Merit Award and PAF Leadership Award.