TOJSAT
The Online Journal of Science and Technology

ISSN 2146-7390

The Online Journal of Science and Technology

Volume 7 Issue 1

January 2017

www.tojsat.net
January 2017

Published in TURKEY

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Message from the Editor-in-Chief

Hello from TOJSAT

TOJSAT welcomes you.

We are very pleased to publish volume 7 issue 1 in 2017. As an editor-in-chief of The Online Journal of Science and Technology (TOJSAT), this issue is the success of the reviewers, editorial board and the researchers. In this respect, I would like to thank to all reviewers, researchers and the editorial road.

This issue covers different research scopes, approaches which subjects about science and technology by valuable researchers. I and The Online Journal of Science and Technology (TOJSAT) editorial team will be pleased to share various researches with this issue as it is the miracle of our journal. All authors can submit their manuscripts to tojsateditor@gmail.com for the next issues.

TOJSAT, TASET, Sakarya University, Governors State University and Vienna University of Technology will organize "International Science and Technology Conference – 2017" in Freie University, Berlin, Germany and Harvard University, Boston, USA. Please visit our web page www.iste-c.net.

Call for Papers

The Online Journal of Science and Technology (TOJSAT) invites article contributions. Submitted articles should be about all aspects of science and technology and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should also discuss the perspectives of students, teachers, school administrators and communities.

The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to The Online Journal of Science and Technology (TOJSAT). For any suggestions and comments on TOJSAT, please do not hesitate to send mail.

January, 01, 2017

Prof. Dr. Aytekin İŞMAN
Editor-In-Chief

Message from the Editor

Dear Tojsat Readers,

Six years were past since we published first volume of The Online Journal of Science and Technology. Now, we start to read 7th volume of The Online Journal of Science and Technology. We finished the Istec 2016 conference hold in Vienna, Austria. Contributed papers during the Conference were received interests from all over the areas of Science and Technology. The selected, peer-reviewed papers were accepted for publication apart from contributions from all over the World. The accepted and published papers are from information technology to mechanical engineering.

Prof.Dr. Mustafa S. Dundar

Editor

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A CASE STUDY OF SHE (SOLAR-HYDROELECTRIC) IN TURKEY

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Abstract: Nowadays, energy and source requirements are significant issues, as in the past. Besides, renewable energy sources that especially hybrid energy systems and their usages have been very popular in recent years because of a lot of reasons. In this study, efficiency of solar-Hydro Electric (SHE) is compared with hydro energy and solar energy systems and a case situation is computed with real data and it is clarified the efficiency, generation, cost and available credibility items of system in Turkey. Energy efficiency, systems cost, investment repayment period, operation expenditures, available energy credibility and optimum energy costs are computed and shown in study. Electricity generation of solar is calculated by PVsyst program. Generation and capacity utilization rates of systems are shown in graphics.

Keywords: SHE (Solar-Hydroelectric), Energy Efficiency, Energy Credibility, Distributed Energy Systems

Introduction

Nowadays, energy and source requirements are significant issues, as in the past. It is a usual application that restriction of the transformer capacity as 30% for renewable energy in most countries. It has become a necessity for supplying system stability and quality. But this situation is limited for renewable energy investments. A new transformer building and its infrastructure costs are very expensive. So, productive usage of transformer is more effective than build a new one. Hybrid systems like SHE (Solar-Hydroelectric) is aim to provide this efficiency. Despite a lot of scientific studies can be finds about hybrid energy systems, there are a few studies about SHE (solar-Hydro Electric) in literature. Hybrid system applications are steadily increased in Turkey, but there is no SHE application. So, in this study, a case situation is computed with real data and it is clarified the efficiency, generation, cost and available credibility items of system in Turkey.

Most of the researches are about water pumping which using solar energy for irrigation. One of them was released by Dursun and Özden (2014). Also, most of them are about off grid systems and generally solar and wind energy is used as integrated system for hybrid systems. Some SHE (Solar-Hydroelectric) studies in recent years is started all over the World. It could not have done yet at any project in Turkey.

It is mentioned in many articles about solar and Hydro Electric, in recent years. Some of them are Glasnovic and Margeta (2009), called their Project as SHE (Solar-Hydroelectric) which is tested in Croatia. They have explained that the system is not only an applicable project but also a complementary system. Bekele and Tadesse (2012) studied hydro-wind-solar in 6 different area of Ethiopia and published their article. Glasnovic and Margeta (2010), studied about solar-hydroelectric system for Europe. They offered a mathematical model for finding the optimum point of system's installed capacity. It is stated in their study that solar-hydroelectric is a good approach for management of electric generation due to their generation time. Kusakana and Jimoh (2009) stated that solar-hydroelectric systems are low-cost type project and it is so useful for rural zone. And solar-hydroelectric systems are compared with other renewable energy systems. Meshram and et. al (2013), analyzed on grid solar-hydroelectric system performance. It is stated in study that solar-hydroelectric system is reducing the complexity and cost. Sirasani and Kamdi (2013), studied about hybrid system which is occurred wind, solar and hydroelectric. It is investigated multiple effects on systems like social, environmental, affordability and efficiency. It is offered in study that solar-hydroelectric systems should be extended. A solution is searched in Afify's (2014) study by using solar and hydroelectric system for Qattara zone of Egypt.

There are a lot of methods for supplying lack of energy. The solar-hydro is one of them and it has been examined since 2000. But, these studies are about separate energy system for hydro and solar. It is stated in these studies, solar and hydroelectric systems are located in different places, but use same infrastructure for on grid. There are a few applications which using hydro energy structures to establish SPP. Generally reservoir area of HEPP is used for SPP plants.

Materials and Methods

Turkey is not a rich country in term of water resources. Most of the water resources of Turkey are depended to rainfall. The capacity utilization rate of HEPP (hydroelectric power plant) is between 25-40% in Turkey. Generally, electric generation of HEPP is more than average in spring and less than average in summer time in Turkey. According to the January 2016 data, 559 HEPPs in operation and total installed capacity is 26,136 MW. Average electric generation of Hydro Electric is 70,000 GWh and capacity utilization rate is about 35%. Turkey is located in a relatively advantageous geographical situation about solar radiation. Capacity utilization rate of SPP (solar power plant) is between 15-20% in Turkey. Generally, electric generation of SPP is more than average in summer time. Approved and commissioned SPP projects by TEDAŞ-TEDC (Turkish Electricity Distribution Corporation-until January 2016) are given in Table 1.

Table 1: Approved and commissioned SPP projects by TEDAŞ-TEDC

	Quantity	Installed Capacity (kW)
Approved SPP	2,748	2,544,816
Commissioned SPP	384	259,748

Allocated transformer capacity is limited for renewable energy in Turkey. Individually capacities are allocated for hydro and solar energy. Most of the investors wanted to enterprise renewable energy. But they cannot do it, because there is no suitable transformer capacity. Indeed hydro energy and solar energy are complemented each other, because of natural generation time. HEPP is not generated more electricity in summer. On the contrary summer time is the highest electricity generation time of SPP. So, they are complemented each other naturally and they do not need to a separate transformer capacity. Same transformer utilization can be possible for SHE (Solar-Hydroelectric) systems. It is a natural compensation for electricity generation and it is an efficiency system. Generation, cost, efficiency and credibility items are examined in this study.

A HEPP project is chosen for case study which is located in Siirt province of Turkey. In this study, cost, generation, capacity utilization rate and credibility items of solar system, hydroelectric system and solar-hydroelectric system are compared with each other. It is shown that solar-hydroelectric system is the best offer for the matter in hand.

HEPP Project characteristics are given in Table 2.

Table 2: Project characteristics

Project Characteristics	
Installed Capacity	12.78 MW
Turbines Type	Francis–horizontal axis
Gross Height	41.26 m
Net Height	40.85 m
Drainage Area	1,077.6 km^2
Dam Volume	1 hm^3
Project Flow	36 m^3/s
Average Flow	12.42 m^3/s
Canal Type	Trapeze
Base-Width of Canal	5 m
Height of Canal	3 m
Long of Canal	8,200 m

HEPP project has 12.78 MW transformer capacities that had been given permission by authorities. So, a system is planned to design that under limit of transformer and used same infrastructure. 100 Wp First Solar FS-3100-PLUS model solar panel and SMA Sunny Central 850 CP XT model inverter are used in design. 14.80 MW SPP can be assembled on canal which is 8,200 m length and 11 m surface width. SPP and HEPP can be using same infrastructure of grid and transformer. This is the main aim of solar-hydroelectric system. So, solar-hydroelectric system offers energy efficiency and transformer capacity and do not need a new ones. 14.80 MWdc and 12.75 MWac is planned to installed capacity of SPP. 12.75 MWac is preferred as installed capacity, because of HEPP's 12.78 MW transformer capacity. It is allocated to the HEPP by Electricity Distribution Corporation.

The credibility, cost, electric generation and capacity utilization rate of SPP, HEPP and SHE (solar-hydroelectric) was calculated in this study. HEPP's electric generation is calculated from formula and SPP's electric generation was calculated by PVsyst energy program. Acceptances of SPP, HEPP and SHE Project is given below;

- 1 USD = 3 Turkish Liras
- Ignore the promotion of deductible VAT, accounting ETL(energy transmission line) and the other promotions which are accepted by Turkish Government
- Same balance-sheet and financial data are accepted for SPP, HEPP and SHE projects
- Canal is covered by solar panels which is 8,200 m lengthy
- No land acquisition, ETL and on grid system infrastructure is accepted to solar part of SHE system. All infrastructure and land is common in SHE project
- SPP's electric generation is calculated by PVsyst program
- 39 years flow data are used in HEPP's electric generation calculation which is obtained in 1972-2010
- 0.073 USD is accepted for SPP and 0.133 USD is accepted for HEPP as unit price of revenue
- Annual 5% interest rate, 1.1 solvency, 2 years nonpayment and 10 years loan term are accepted as criteria of credibility for systems

Transform of Solar radiation to electric is termed as photovoltaic effect. Photovoltaic cell is the main equipment of SPP. The photovoltaic module is a form of cell series. And the photovoltaic array is a form of series-parallel combination (Ayyoubi, 2009, Said, 2003, İbrahim, 2009). A solar cell can be represented as a current model as simplified equivalent circuit of photovoltaic cell shown in Figure 1.

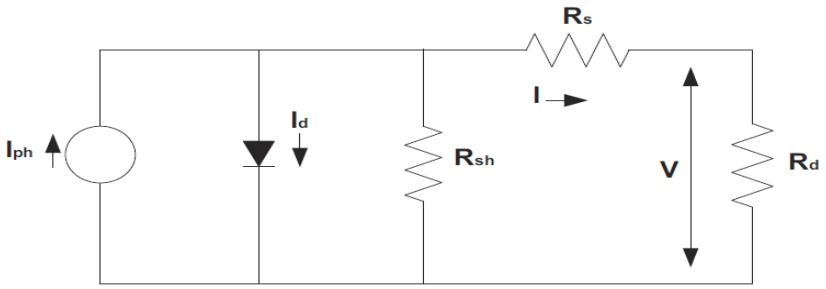

Figure 1. Simplified equivalent circuit of photovoltaic cell

The typical I-V characteristic of a PV array is given by the following in Equation 1. (Hussein, 1995);

$$I = Np.Iph - Np.Id.e^{\left(\frac{q}{kTA}X\frac{V}{Ns}\right)-1} \quad (1)$$

where, I is the photovoltaic array output current (A), Iph is the photo current, Np is the number of modules connected in parallel, Id is the cell reverse saturation current, q is the charge of an electron, V is the photovoltaic array output voltage (V), k is the Boltzman's constant, T is the cell temperature, A is the pn junction ideality factor, Ns is the number of cells connected in series, The factor 'A' determines the cell deviation from the ideal pn junction characteristic; it ranges from 1 to 5, 1 being the ideal value (Khallat, 1986).

The cell reverse saturation current I_d versus to temperature was given by in Equation 2. (Vachtsevanos, 1987);

$$Id = Ic.[\frac{T}{Tc}]^3.e^{(\frac{qEg}{kA}[\frac{1}{Tc}-\frac{1}{T}])} \quad (2)$$

where, Ic is the reverse saturation, Tc is the cell reference temperature, current at Tc, and Eg is the band gap energy of the semiconductor used in the cell. The photo current Iph depends on the solar radiation and the cell temperature as given by in Equation 3.

$$Iph = [Iscr + Ki.(T - Tc)].\frac{S}{100} \quad (3)$$

where Iscr is the cell short circuit current at reference temperature and radiation, Ki is the short circuit current temperature coefficient, and S is the solar radiation in mW/cm^2. The PV array power can be calculated by Equation 4.

$$P = I \,.\, V \quad (4)$$

$$P = V.Np.(Iph - Id).e^{\left(\frac{q}{kTA}X\frac{V}{Ns}\right)-1} \quad (5)$$

Hydroelectric energy generation formulas are given in below Equation 6.

$$N = \varrho \,.g\,.\mu\,.Q\,.H \quad (6)$$

where, N is the power (MW), ϱ is the water density (1000 kg/m^3), g is the gravity (9.81 m/s^2), μ is the efficiency of plant (multiplications of turbine, generator and transformer's efficiencies), Q is the project flow (m^3/s), H is the height of project (m).

Results and Discussion

HEPP transformer capacity (power) is 12.78 MW. Capacity Utilization Rate of HEPP is 33.37%. Capacity Utilization Rate of SPP is 22%. And Capacity Utilization Rate of SHE is 55.23%. So, most part of transformer capacity is useless in HEPP and SPP projects. SHE system is more effective than HEPP and SPP.

SPP and HEPP Projects have to use 2 separate transformer to connect grid. But a transformer is adequate in SHE system. New transformer investment is unnecessary in SHE systems. So, SHE systems can be called as efficient projects. Tables and graphics are obtained from studies is given below.

Table 3: Monthly electric generation summary table for three different position (kWh)

	Electric Generation (kWh)			
Months	**HEPP**	**SPP**	**SHE**	**Installed Cap.-12.78 MW**
Oct.	2,172,229	2,076,000	4,248,229	9,329,400
Nov.	2,177,983	1,679,000	3,856,983	9,329,400
Dec.	2,331,823	1,274,000	3,605,823	9,329,400
Jan.	2,328,107	1,351,000	3,679,107	9,329,400
Feb.	2,534,302	1,428,000	3,962,302	9,329,400
March	3,633,352	1,927,000	5,560,352	9,329,400
April	6,185,870	2,119,000	8,304,870	9,329,400
May	6,327,884	2,258,000	8,585,884	9,329,400
June	2,970,089	2,591,000	5,561,089	9,329,400
July	2,275,366	2,694,000	4,969,366	9,329,400
Aug.	2,176,311	2,687,000	4,863,311	9,329,400
Sept.	2,136,685	2,492,000	4,628,685	9,329,400

Table 4: Average capacity utilization of 3 different position obtained from electricity generation (MW)

	Average Capacity Utilization(MW)			
Months	**HEPP**	**SPP**	**SHE**	**Installed Cap.**
Oct	3.02	2.88	5.90	12.78
Nov.	3.02	2.33	5.36	12.78
Dec.	3.24	1.77	5.01	12.78
Jan.	3.23	1.88	5.11	12.78
Feb.	3.52	1.98	5.50	12.78
March	5.05	2.68	7.72	12.78
April	8.59	2.94	11.53	12.78
May	8.79	3.14	11.92	12.78
June	4.13	3.60	7.72	12.78
July	3.16	3.74	6.90	12.78
Aug.	3.02	3.73	6.75	12.78
Sept.	2.97	3.46	6.43	12.78

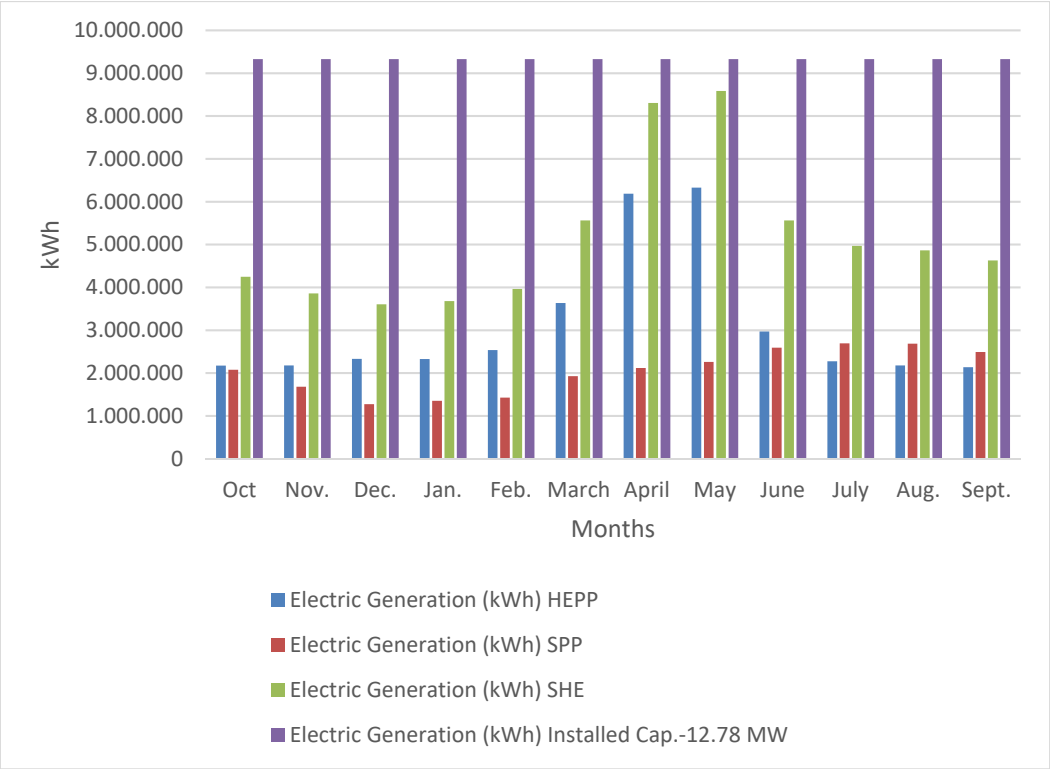

Figure 2: Monthly electric generation summary graphic of 3 different position (kWh)

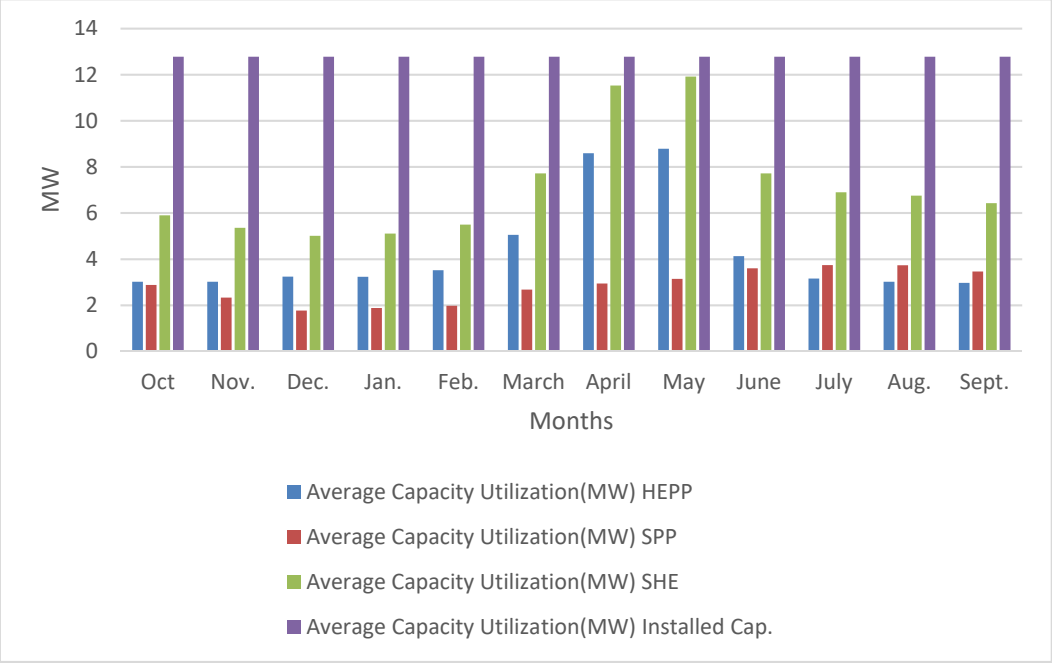

Figure 3: Average capacity utilization of 3 different position obtained from electricity generation (MW)

Reservoir area of HEPP and 8,200 m length storage capacity is about 8 hours in case study. Seasonal electricity generation discrepancy can be monitored in HEPP system because of rainfall dependence. Energy can be managed in SHE systems. Solar part of SHE system is generates electric only daytime. HEPP has enough storage capacity for interrupted electricity generation. The main idea of SHE system is efficiency usage of transformer capacity and interrupted electricity generation. A sample energy management of SHE system is given Figure 4 for a day.

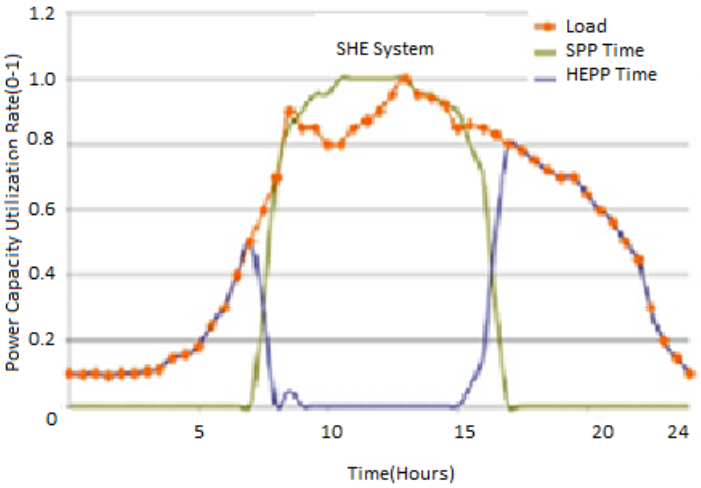

Figure 4: A Sample energy management of she for a day (Sunengy diagram)

Conclusion

Summary of SHE system is given in Table 5;

Table 5: Summary of case study

Items/Plants	HEPP	SPP	SHE
Electricity Generation (kWh)	37,250,000	24,576,000	61,826,000
Power Capacity Utilization Rate (%)	33.37	22	55.23
Total Fixed İnvestment Cost (USD)	16,600,000	17,750,000	33,460,000
General Investment Cost (USD)	17,781,072	18,324,991	35,170,538
Annual Operation Income (USD)	2,719,250	3,268,608	5,987,858
Annual Operation Expenditure (USD)	515,000	485,000	715,000
Project Credit Amount (USD)	10,750,000	15,750,000	31,000,000
Credibility - (%)	60.46	85.95	88.14
Recycling Period (years)	8.07	6.58	6.66

As a result of this study it can be concluded below;

- It is a usual application that restricts the transformer capacity as 30% for renewable energy in most countries. It has become a necessity for supplying system stability and quality. But this situation is limited the renewable investments. Transformer capacity is vital for renewable energy investments. An average capacity utilization rate of HEPP is 25-40% and capacity utilization rate of SPP is 15-20%. So, great part of transformer capacity is useless in single-handed energy transformer capacity like HEPP or SPP. HEPP and SPP are complementary systems actually, because of electricity generation time period. Solar part of SHE systems can be generated more energy in summer when hydroelectric generation is so limited and contrary to this hydroelectric part of SHE systems can be generated more energy in spring when SPP's electricity generation is so limited. And if a HEPP has got enough storage flow capacity, it can generate energy at night when generation is impossible for SPP. So, efficiency transformer capacity and interrupted energy generation can be supplied by SHE systems. With correct energy management capacity utilization rate of SHE can be between the ranges of 40-60%.
- SPP projects use 20,000 m^2 land for per 1 MW installed capacity. In addition, investor has to get dry marginal agricultural land permission. In SHE system, investors do not need to extra land and permission for activating the plant. It is time and Money saving part of SHE systems.
- Separately plants like HEPP or SPP is more expensive than SHE systems. SHE systems offered low-cost investment and operation expenditures because of common usages.
- There is a lot of credit loan about renewable energy. Generally International Banks like World Bank is evaluated this system with suitable lines. So, credibility of efficiency SHE system is higher than separately plants like HEPP or SPP.
- Equity is the most important part of investments. Many investors avoid from high equity investments. It is clear from table 5 that SHE systems offer minimum equity and maximum credibility. An investor can

spend more money to HEPP, than SHE system. So, it is understood that SHE system is the smartest choice for investors.

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A COMPARATIVE PERSPECTIVE ON WOMEN IN THE 19TH CENTURY THROUGH LITERATURE

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Abstract: 19th century is a very hot period in terms of scientific developments, economical and sociological transformations. Accordingly, the economic and social conditions of people were changing dramatically. Yet, no doubt that it was a patriarchal society and that the stage belonged to men even though women gradually started to appear on the stage as well. There were *Great Expectations*, hopes and fights for the future among men. Even after the fact that women's rights started to be advocated, the approach towards women did not really change easily. Although their existence in society was visible now, its limits were smartly drawn. Literature has a very interesting role here because it both helped women to enlarge their world and drew the line of the individuality at the same time. The depictions of women in the narratives of the male authors in this period show how it works. In this paper I am going to analyze two novels from two different cultures: *The Blue and the Black* (*Mai ve Siyah*) by Halid Ziya Uşaklıgil and *Great Expectations* by Charles Dickens. In these novels we can see both the world of women in this period vis-à-vis men and how literature works to draw the line for women socially and economically.

Keywords: 19th century, women, men, literature

Introduction

19th century is a very hot period in terms of scientific developments, economical and sociological transformations. Although it has been a long process which has started long before, 19th century was the peak. The economic and social conditions of people were changing dramatically. Yet, no doubt that it was a patriarchal society and that the stage belonged to men even though women started to appear on the stage as well. There were *Great Expectations*, hopes and fights for the future among men. Anyone could come up in the world through education, hard work and passion. Nothing was stable now, as Karl Marx manifested for the era that "all that is solid melts into air."

Yet it cannot be ignored the fact that this is also the period that women are accepted as individuals who have some rights. Even after the fact that their rights started to be advocated, the approach towards women did not really change easily. Although their existence in society was visible now, its limits were smartly drawn. Literature has a very interesting role here because it both helped women to enlarge their world and drew the line of the individuality at the same time. The depictions of women in the narratives of the male authors in this period show how it works. In this paper I am going to analyze two novels from two different cultures: *The Blue and the Black* (*Mai ve Siyah*) by Halid Ziya Uşaklıgil and *Great Expectations* by Charles Dickens. The reason I chose these novels is to have a comparative perspective between different cultures, one of which is my country and the other is one of the representatives of the West, which is also one of the role models of Turkey at the time. Though French literature was more effective on Turkish writers at the time, what is more the protagonist in *The Blue and the Black* is fascinated by French poets, I preferred to compare the novel with one from English literature because of the analogy between the two novels regarding both the conditions and positions of characters and the external reality the novels depict. Analyzing these novels, I want to show the positions of women in society vis-a-vis men.

The Blue and the Black is a novel written in 1897. It depicts the era from Ahmet Cemil's point of view. Ahmet Cemil, the protagonist of the novel, is a student in The Military School. He has high expectations for the future: being a famous poet who has an eloquent and avant-garde style. After his father died, however, being the only man in the family he has no choice but to leave the school in order to put bread on the table for his family. He makes his living from translating books and tutoring children of wealthy families. Then he begins to work in a newspaper. Meanwhile, he works passionately for his masterwork which he believes that it will bring fame to him. One day the owner of the newspaper dies and his son, Vehbi Effendi starts to head it. Dreaming of being the owner of the newspaper and of being wealthy one day, Ahmet Cemil weds his sister to Vehbi Effendi. After then he believes that Lamia, sister of Ahmet Cemil's best friend Hüseyin Nazmi, would marry him. Yet his dreams and plans do

not come true. First Vehbi Effendi starts to live with them and behaves badly to his sister and to all family. He runs into debt and mortgages the house inherited from his father. His sister, İkbal dies in misery. Furthermore, his masterpiece, contrary to his expectations, is mortified just in his own newspaper and he gets fired by Vehbi Effendi. Finally, he learns that Hüzeyin Nazmi, his idol in life moves to Europe as a principal officer and Lamia is engaged to a military officer. After his blue dreams turned into black realities, he decides to leave the city with his mother and heads for the east, on the contrary to his ideals.

Great Expectations, written in 1861, is also about a young man who has *Great Expectations* which he loses throughout the book. Pip, a seven-year-old orphan boy, lives with his sister who is always angry and hot tempered and with her husband Joe Gragery, a blacksmith. Sitting in a cemetery one evening he encounters an escaped convict. He orders some food and a file for his leg iron. The next day, he is recaptured with another escaped convict who came after him. One day his uncle Pumblechook takes Pip to Miss Havisham's Satis Hous to play with her adopted daughter Estella. Miss Havisham is a strange woman who lives in a strange house. She still wears her old wedding dress, the clocks stopped at the same time and the house is untouched since the wedding day on which her fiancé jilted her. Although Pip is always insulted by Miss Havisham and Estella being common and coarse, he continues to visit them because he falls in love with Estella. He begins to dream to be a gentleman admired by Estella. Miss Havisham, however, sends him back for his indenture as a blacksmith. Four years later in a pub a man whom Pip once saw in Miss Havisham's mansion, tells him that he is to be given monthly stipend by a secret benefactor. Thinking his benefactor is Miss Havisham he goes to London in order to be a gentleman. Years later, however, he learns the fact that his benefactor was the escaped convict, Magwitch. He is disappointed with the truth but at the end he acknowledges it and asks Joe and Biddy forgiveness, whom he ignored that much just because of thinking that they are common. His sister is already death and Joe is married now to Biddy who once fell in love with Pip. Estella also gets married to another man. Therefore, for many years Pip goes abroad to work. Coming back, he meets Estella in the Satis House, her husband is now dead. She was bitterly regretful of what she did to him. Finally, they leave the garden hand in hand.

What we see in these novels at first is nothing but a world of men. It is not only about protagonists' gender, but rather about their relationships with women and about the positions of women in general. It goes without saying that in a novel would be men and women; but the question here is how their positions in all respects, be it social, be it economic or political etc., are depicted. The crucial point for both novels is that their authors manifest that they present things as they are. In other worlds, the worlds in these novels are just representatives of the outside world they just live in. It does not necessarily mean that we should accept it as a mere reality. On the contrary, we should not forget that they are fiction, but we should also keep in mind that there is a different kind of reality there. It is different from history and documentary; yet it tells something about their era. It says a lot about gender relations, class differences and the institutions of society. On this basis, these novels give us some clue on how patriarchy works and what the positions of women in the late 19th century are.

The 19th century is the period marked by the collapse of the empires like Ottoman Empire and by the rise of British power all over the world with Russian Empire. Globalization and industrialization are the keywords. Science and technology are on the rise. There is a great belief in humanity and ability to progress. Vertical and horizontal social mobility was increasing incrementally. Man could move up social ladder. This is why the protagonists in these novels have *Great Expectations* for the future. They dream of a better position for themselves in terms of economic and social. Correspondingly they always dream of a beautiful, wealthy and noble woman whom they can only reach by belonging to the upper class.

Yet here comes the point: since this is the world of men, women do not have similar positions and expectations. For instance, the female main characters in other novels like *Aşk-ı Memnu* and *Tess of the D'Ubbervilles* which were written in the same century by Halid Ziya Uşaklıgil and Thomas Hardy respectively do not have such motives in their lives. Bihter in Aşk-ı Memnu wants to belong to high society and be in fashion. All Tess wants is just to survive and earn a living for he family. Bihter wants to fulfill her desires and Tess no to be condemned by something she is guilty of. What they suffer is patriarchal society which does not allow them to live as a woman. In this period woman are not depicted by male authors as individuals who are working for a better world like men, on the contrary depicted as subjects always related with men through sexual relationships[1]. Their lives are full of love and marriage, but no educational or career planning. They are always weak and sentimental. The only moment they are rational is the time they decide to marry to someone for his money and status.

Women who are not main characters in the novels aforesaid have similar positions, too; they are bound to male

[1] Female authors in this period may depict woman from a different perspective. For example, Fatma Aliye and Halide Edip from Turkish literature tell stories of strong women who are thirsty for a better world like men and struggle for it. This is why I emphasized authors' gender.

characters somehow. Lamia in *The Blue and the Black*, for example, is the woman of Ahmet Cemil's dreams. Lamia is not a character in the novel as an individual, she is like a ghost. She is only there for her social status. With her house, her car, her piano etc. which represent her class, she stands where Ahmet Cemil just exactly wants to be. This is why Ahmet Cemil hopes to marry her one day until he burns his work with the thought of failure. When he learns that she is engaged to another man, he loses his last hope. Until then, he married her sister İkbal to Vehbi Efendi in the hope of being a printing house owner; but her sister died in misery because of this marriage. İkbal was a girl who never tells her brother her feelings and thoughts, who is submissive to her family. She is another ghost who is there to make Ahmet Cemil's desires come true. Yet, she cannot help him because she, like all her other family members, is weak and ineffective in the face of Vehbi Effendi. She has no voice in the novel. Ahmet Cemil exploits her as a capital. Vehbi Effendi abuses her mentally and physically.

There are two other women, Ahmet Cemil's mother Sabiha Hanım and the maid Seher, in *The Blue and the Black*, but they are all like İkbal. Seher is harassed by Vehbi Effendi. Although İkbal and Sabiha Hanım are aware of the fact, they say nothing. Seher cannot take action or leave the house. This is because she does not have social and economic freedom. Neither in this novel nor in others written by Uşaklıgil are there such powerful women who can support themselves. They are all dependent on men. In *The Blue and the Black* Ahmet Cemil is the only one to take care of his family after his father's death. No woman is supposed to work. This causes both Ahmet Cemil's whole world turning upside down and women's committing themselves totally to home and men. This leads Ahmet Cemil being the only authority at home, but eventually causes a total catastrophe. The novel tries to show the problematic here, but never offers a solution[2]. Here come some solutions by female authors. Fatma Aliye, for instance, depicts women who have economic and social difficulties and needs to earn her living like men. This brings to mind some questions like what difference makes the gender of the author of a narrative regarding the world portrayed, what kind of audience they address, how literature serves ideology even if the authors claim otherwise, how literary narratives shape our vision and vice versa.

Those questions are also valid for *Great Expectations*. Likewise, gender relations, social and economic relations, expectations for the future and future anxiety can be observed here, too. Estella is raised as a misandrist by Miss Havisham who is a woman left by her fiancé on the wedding day. She wants Estella take her revenge. Both are portrayed as that cruel, proud and shallow. They do not have any concerns, but to agonize to men. Estella, like Lamia, is there as a statue representing upper class. Pip is charmed by her elegant dresses and manners. He begins to be ashamed of his family and to dream of being a wealthy gentleman in order to get married to Estella who insults him being common. Yet neither Miss Havisham nor Estella is successful at the end. Miss Havisham makes amends at the end to Pip for everything she has done to him and Estella. And Estella tells Pip that she suffered from her husband and that she feels sorry for making him suffer. Therefore, both women are depicted here totally different from men who have economic and social concerns. They are isolated from society. One may claim that they are exceptional, but telling a story of someone exceptional is a preference and tells us also something. Dickens is known by his realist attitude, which makes his preferences important. Dickens describes women through their outward appearances which indicates their inner world. But this prevents us from hearing their voice and having empathy with female characters. In fact, as Gregory Jusdanis and Rita Felski point out in their books *Fiction Agonistes: In Defense of Literature* and *Uses of Literature* respectively, literature enlarges our vision, helps us to see the world from different perspectives and to understand others different from us. Dickens' women conform with the Victorian thought which assigns women to home. A woman must devote herself to her house, husband and children; that is to say a woman must be "the angel in the house". This is why Miss Havisham and Estella are depicted as outsider and regretful at the end. It should be noted here again that they are not outsider because they seek professional training and careers but because they are misandrists and refuse to obey social norms.

Dickens' women are usually not sympathetic. Mrs. Joe Gargery, Pip's older sister is one of them. She is from lower class. She is home all day and keeps cleaning the house. She is very ambitious. She wants to get higher economically but what she does is nothing but complaining about her economic conditions and about Pip whom she sees as a burden. Always angry and stern, she makes life miserable for Pip and Joe. This is a woman "in the house" but apparently not "angel". Therefore, she is not an idol for the reader to identify with, too. Then, who is the ideal woman? Or is there an ideal one whom the narrator appreciates and the readers pattern themselves on her?

Biddy, Pip's classmate, is a kind of ideal woman of the novel. She is from lower class, but she is at peace with herself. She improves herself, and what is more teaches Pip. She is also Pip's confident till he leaves home. After then, she helps Mrs. Joe after she is attacked by Orlick and become invalid. She is depicted as naïve, plain, decent and kind as opposed to Estella and Mrs. Joe. She is never selfish. As long as she stays with Gargery family she

[2] Here it should be noted again that the sense of art of the author requires such an attitude. What I am trying to say is not that the novel should do it, but just to reveal the novel's position.

lives off there. Although she is cute and intelligent, her end is nothing but a happy marriage. Improving herself does not help her to build a career. At the end she gets married to Joe who is naive and decent as well, although she is into Pip at the beginning. This is a sort of reward for her. She becomes the lady of her own house and becomes happy.

Consequently, in *Great Expectations* and *The Blue and the Black* all women are somehow socially, economically and psychologically bound to men. None of them have desires and expectations from life and future, which are independent from men. If they are wealthy, they do not have economic concerns and do not need to work professionally. Otherwise, as opposed to men, they usually do housework or work as a maid. None of them have a chance to get education and do a career, unlike men. They find a place for themselves only next to men. Biddy's training only works to help a man, Pip. She has limited choices in life. She is appreciated just because of being the angel in the house. In *The Blue and the Black* there is no ideal woman. Women are just there for men to either as a symbol indicating men's social and economic position in society or as a capital for men to climb the social ladder or as a burden on men's shoulder. The depiction of women is important because literary narratives are not only shaped by outer reality but also shape the outer world. Here, the difference between female and male authors comes into prominence. Male authors, even they support women's rights and uprisings, are out of their depth in face of patriarchy. Patriarchy, as Ayşe Saraçgil manifests, "is a system which expresses the most intimate forms and structures of power relations in all kinds of unique historical, socio-economic and cultural settings" (Saraçgil, 2005, p. 10-11). Therefore, it penetrates everywhere and it is really hard to get out of it. Again as Saraçgil points out that "cultural history shows us that radical changings in politics, economy and institutional organizations do not automatically lead to changes in identity. When individual and social identities started to be threatened and lose their descriptions, various forces come into action in order to protect and redefine them firmly" (Saraçgil, 2005, p. 204). Here literature works two-way. According to Althusser, it is impossible to escape from ideology because all ideologies constitutes a subject through ideological state apparatuses which are family, media, schools etc. Literature, at this point works as one of them.

The Blue and the Black and *Great Expectations* at this point corroborate patriarchy; which can be observed in the characterization of women and men. The world they portray does not only reflect the outer world as their authors claim, but also limits and restructures it. The image of women in these novels shows us that a woman's place is her home. She is always bound to a man. Her education only helps her to be a better wife. The 19th century which is depicted as the period of hope and expectation ultimately is the era of men although it is also the period that women start to speak up. Male authors, however, do not hear their voices and project it into their novels which they claim that they reflect the outer world. It is particularly seen in comparison with other novels both by the same authors telling female protagonists' stories and by female authors wrote in the late 19th century.

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A QUALITATIVE ANALYSIS OF EFL WRITTEN CORRECTIVE FEEDBACK

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Abstract: This study focuses on the qualitative aspects of written corrective feedback provided by Turkish teachers of English as a foreign language. The participants were 171 teachers working at state schools in Turkey. The participants were provided with an essay written by a B1 level 20-year-old Turkish EFL learner. They were asked to evaluate the essay and write feedback to the learner. The results were analyzed through an inductive approach; the themes and recurring ideas were watched for without any predetermined concepts or categories. The results revealed that the feedback given to the learner varied to certain extents; a number of categories emerged during the analysis. However, it was concluded that the expectations of EFL teachers from a written text in English focused dominantly on grammatical accuracy.

Keywords: EF, Feedback, EFL Analysis

Introduction

The role of classroom interaction in second and foreign language (henceforth L2) development has been studied from different aspects. Some of these studies accept that L2 interaction includes corrective feedback (henceforth CF) in response to learners' ungrammatical utterances to make them aware of the difference between incorrect and correct L2 forms in which way learners are oriented to modify their ungrammatical utterances (Gass & Lewis, 2007; Lightbown & Spada, 1990; Long, 1991; Mackey, 2006;).

The impact of CF in L2 has been one of the mostly discussed topics in language teaching environments and received much attention. It has become a highly controversial issue by playing a head role in language acquisition (Vries, Cucchiarini, Hout & Strik, 2010;). According to Furnborough and Truman (2009), feedback requires "a gap between what has been learned and the target competence of the learners, and the efforts undertaken to bridge these gaps." CF is defined as a teacher's response providing "comments, information, or questions related to the well-formedness of the student's utterance" (Lyster & Ranta, 1997), as "a pedagogical technique teachers use to draw attention to students' erroneous utterances, and which may result in learners' modified output" (Suzuki, 2004), as "information from any source regarding the learner's L2 performance in order to stimulate acquisition" (Cornillie et al., 2012). Ellis, Loewen and Erlam (2006) identify CF as "a response to a learner's utterance that contains error". The responses can include (a) "an indication that an error has been committed", (b) "provision of the correct target language form", or (c) "metalinguistic information about the nature of the error", or "any combination of these" (Ellis, Loewen & Erlam, 2006, p. 340).

According to Ellis (2013), there are two reasons of CF getting too much attention. Firstly, there is an important place of grammatical correctness in language pedagogy; and secondly, negative evidence has a role in second language acquisition whether accepted or not because the study of CF in second language acquisition (henceforth SLA) allows for "an evaluation of common pedagogical claims about whether, when and how to correct learners' errors" (Ellis, 2013). Chaudron (1988) constructs another way to define CF by making it clear that the term CF may correspond to different meanings. For example, the term "treatment of error" identifies "any teacher behaviour following an error that minimally attempts to inform the learner of the fact of error" by making "to elicit a revised student response" the aim of the correction (p. 150). In his view, if "the true" correction is managed, the learner's interlanguage rule is qualified, and "the error is eliminated from further production" (p. 150). Lightbown and Spada (1999) define CF as:

> "Any indication to the learners that their use of the target language is incorrect. This includes various responses that the learners receive. When a language learner says, 'He go to school

> every day', corrective feedback can be explicit, for example, 'no, you should say goes, not go' or implicit 'yes he goes to school every day', and may or may not include metalinguistic information, for example, 'Don't forget to make the verb agree with the subject'". (p. 171-172)

The term of CF is used in the field of language teaching and the term of negative evidence is used in language acquisition (Ellis, Basturkmen, & Loewen, 2001; Fanselow,1977; Lochtman, 2002; Schachter, 1991; Sheen, 2004; White, 1996). Some psychologists situated the issue within the discussion of negative feedback. These terms are sometimes used interchangeably (Gass, 1997; Schachter, 1991). In a more comprehensive view feedback can be categorized as positive evidence and negative evidence as opportunities to "perceive the differences between output and input by means of a negotiation of meaning" (Long, 1996). Positive evidence is defined as "providing the learners with models of what is grammatical and acceptable in the target language", and negative evidence is defined as "providing the learners with direct or indirect information about what is unacceptable" (Doughty & Varela, 1998; Long, 1996; Spada & Lightbown, 1993; VanPatten & Cadierno, 1993; Williams, 1999; Williams & Evans, 1998). According to Long (1996), this information may be:

> "Explicit (e.g., grammatical explanation or overt error correction) or implicit (e.g., failure to understand, incidental error correction in a response, such as a confirmation check, which reformulates the learners' utterance without interrupting the flow of the conversation) — in which case, the negative feedback simultaneously provides additional positive evidence — and perhaps also the absence of the items in the input." (p. 413)

Types of CF

Baleghizadeh and Gordani (2012) emphasize that deciding on the right CF type, which is an important pedagogical issue, requires "different amounts of time and teaching skill." Various types of CF exist, each with its own appropriate uses. Bitchener et al., (2005) identified three types of CF: direct, indirect, and metalinguistic. In direct CF teacher provides "the correct linguistic form through the deletion of an unnecessary word, addition of a necessary one, or substitution of an incorrect word with a correct one" (Ferris 2006: p. 82). Since it does not require processing, direct CF may be more beneficial for low proficiency students (Asassfeh, 2013). If the teacher does not provide the correction and just indicates to the learner that there is an error, s/he uses indirect CF. It can lead to long-term learning contrary to direct CF because it generates learner reflection and in-depth processing. The third CF type is metalinguistic CF which can be implemented in two ways (a)" providing a label or code" (e.g., *sp* for spelling, *prep* for preposition, etc.) or (b) "providing comments about each error the learner has made" (Bitchener et al., 2005). Direct CF (just underlining and labelling errors by type) is less time-consuming for teachers; however, "holding student-teacher conferences on errors will necessarily call for sufficient metalinguistic knowledge possessed by students as well as teachers" (Baleghizadeh & Gordani, 2012).

Lyster and Ranta (1997) identified six categories of CF: (1) *Explicit correction*: "any feedback technique that involves a teacher simply providing a student with the correct answer"; (2) *Recast*: "a more implicit feedback technique that involves the teacher's reformulation of all or part of a student's utterance, minus the error"; (3) *Clarification request*: "feedback type in which the teacher asks a question indicating to the student that there is a problem with the language utterance"; (4) *Repetition*: "the type of the feedback that involves a teacher repeating wrong utterance highlighting it with intonation"; (5) *Metalinguistic feedback*: "involves a teacher making comments or indicating to the student that there is an error in the language output (e.g., Can you find an error?)"; (6) *Elicitation*: "a feedback type when teachers ask for completion of their own sentence by pausing and allowing students to correct themselves; they may also ask questions to elicit correct form and help students to reformulate an ill-formed utterance" (Lyster & Ranta, 1997). However, Darabad (2013) asserts that "using metalinguistic explanations as CF interferes the flow of communicative interaction and treats language as an object with focusing on the forms." *Focused* and *unfocused CF* is another way of providing correction in the classroom setting. The former refers to the "intensive corrective feedback that repeatedly targets one or a very limited number of linguistic features"; unfocused CF is "extensive corrective feedback that targets a range of grammatical structures" (Sheen, 2011).

In an observational study, Lyster and Ranta (1997) concluded that recasts were the most common type of CF used by the teachers, which is in line with the study conducted by Lyster (2004) who asserted that recasts provide learners with negative evidence. According to Storch's (2010) study, the most frequent feedback technique was explicit correction (49%), and elicitation was the second one (19%) used by L2 teachers. Ashwell (2000) found that L2 learners who received feedback in the form of underlined or circled grammatical, lexical, or mechanical errors as well as content-oriented comments in their drafts benefitted from CF, and he revealed that form-oriented CF was more beneficial than content-oriented CF. However,

Fathman and Walley (1990) found that form-oriented CF and content-oriented CF were equally effective on the writing of L2 writers. In a study Treglia (2009) states that no matter which type of feedback is provided, students understood and were able to address corrections, which showed that students benefited from the CF.

Results of the studies on this subject have been speculative because there are various aspects of CF that need to be taken into consideration and these aspects have been discussed for a considerable amount of time. For example, decades ago, in an attempt to reach a sound understanding about error correction Hendrickson (1978) dealt with five fundamental questions:

1. Should learner errors be corrected?
2. If so, when should learner errors be corrected?
3. Which errors should be corrected?
4. How should the learner errors be corrected?
5. Who should correct learner errors?

Each of these issues has been studied from different perspectives and the framework of the current study is related to the third question above. Understanding teacher perspectives on CF is integral to our understanding the place of written corrective feedback (henceforth WCF) in L2 writing pedagogy (Evans et al., 2010). It has been suggested that some teachers regarded all errors as equally serious with an "an error is an error" attitude (Vann Meyer and Lorenz, 1984).

It has also been long argued that no standards exist about error correction of language learners and who should correct these errors and how they should be corrected. As can be understood from the literature review up to this point, English as a foreign language (henceforth EFL) teachers' perspectives on WCF is a topic that needs to be furthered studied and discussed. Therefore, the following research question is the main concern of the current study.

RQ: What are the main focuses of written corrective feedback (WCF) provided by Turkish EFL teachers?

A solid answer to this research question will make it clear whether there is a pattern among Turkish EFL teachers' perception concerning language learner errors.

Method

Participants

850 EFL teachers work in the district where the current study was carried out. In total, 230 teachers participated in the study (about 27 %). However, data coming from about 60 of the participants were invalid and removed from the dataset; therefore, data coming from 171 of the participants could be analyzed in the current study. The participants all work at state schools in the same district in Turkey. Their ages vary from 24 to 55 and about 80 % of them are females. In terms of academic level, most of the participants hold BAs, some of them hold MAs and very few of them hold PhDs. Related data are provided in Table 2.

Table 2. Academic levels of the participants

Academic level	**n**	**%**
BA	142	83.05
MA	24	14.05
PhD	5	2.90
Total	**171**	**100.00**

Data collecting and analysis procedures

The aim of the current project was twofold involving both quantitative and qualitative aspects. The quantitative results of the project were presented previously (Ünaldı, 2016). In the current study, the same question is regarded from a qualitative point of view. An essay which had been written by a Turkish EFL was used as the data collecting tool. The learner was at B1 proficiency level in English and was 20 years old. The essay was written during a 50-minute examination and has 311 words in it. It was chosen among many other learner essays by two experts because it included a wide variety of errors ranging from basic spelling to much more complex syntax errors along with discourse issues. The same essay was handed out to the participants,

the instructions were given and after a week the essays were collected back. In the instruction part the participants were asked to provide a general evaluation and feedback about the essay to the learner who wrote it.

After the sifting procedure as was mentioned above, 171 essays were analyzed through an inductive procedure; a content analysis was carried out. During the analysis process it was noticed that 55 of the participants (32 %) preferred not to give any kind of written feedback or evaluation of any kind; therefore, 116 essays (about 68 %) with feedback or some kind of evaluation were analyzed. Table 3 provides the relevant information.

Table 3. Participants' preferences for providing feedback to the learner

Preference for feedback	***n***	***%***
Preferred to provide feedback	116	68
Preferred not to provide feedback	55	32
Total	**171**	**100**

116 feedback sheets collected from the participants were analyzed through the use of content analysis. In content analysis, qualitative categories are not predetermined but are derived from the data in an inductive manner (Dörnyei, 2007). In other words, the researcher does not have predetermined concepts or categories in the analysis process, s/he watches for categories as they emerge from the collected data. Dörnyei (2007, p. 246) describes the steps involved in the analysis process. First of all, the data gathered has to be transformed into a textual form, but when the data is already in written form this phase may not be applicable. The next step is the initial coding stage. In the process, the texts at hand are read several times in order to familiarize with the content. This phase involves marginal notes, highlighting and labelling. During this procedure, an external code check is recommended; another researcher checks the overlaps in the codes and the texts. The next process is called second level coding, and in this stage a hierarchy of codes is created, and finally the data is interpreted and conclusions are drawn. In the current study very similar procedures were followed in the analysis and interpretation process.

Results and discussion

From the 171 essays collected from the participants, 116 of them preferred to provide a general evaluation of the essay. After the procedures mentioned in the previous part were completed, a number of categories emerged from the data collected. These thematic categories are as follows in order of importance:

1. Grammatical problems
2. Vocabulary related problems
3. Tolerability
4. Cohesion related problems
5. Intelligibility
6. Organizational problems
7. Unnecessary repetitions
8. Thinking in the native language and/or translation

These themes are briefly analyzed below through the use of extracts taken from the participants' feedback. The quotations are direct quotations and no modifications as to the spelling or grammar have been made. The themes are presented in a hierarchical order and the first and the most important theme that emerged from the analysis of the data is grammar related problems. When given a chance to provide feedback to an EFL learner, most of the participants consider grammar as the foremost issue to be dealt with on the learners' side. Some extracts from the feedback sheets are provided below.

Grammatical problems
P165. On the other hand, there are several critical grammatical mistakes that are not expected from a B1 level learner. These mistakes should immediately be corrected.
P146. There are many grammatical mistakes.
P143. …but there is some important grammer mistakes.
P129. The writer has to be careful with spelling and grammar mistakes.
P122. But it could be better. Because there are grammar mistakes and punctuation mistakes.
P119. Of course there are grammar mistakes he should be more careful about grammar mistakes when it written or spoken in formal language.
P100. There are many grammatical mistakes as I underlined.
P50. There aren't grammatical mistakes except from two/three simple ones.
P45. There are so many grammer fails.

Vocabulary related problems was the second most prominent issue according to the results of the qualitative analysis. Many of the participants provided feedback concerning the use of certain vocabulary items, phrases and part-of-speech related issues. Some extracts taken from the dataset can be analyzed below.

Vocabulary related
P154. I think when we choose wrong word or use wrong word, there can be lots of misunderstanding problems.
P153. …using wrong words can cause some misunderstanding problems.
P148. On the other hand, some vocabularies are chosen wrongly.
P101. And some vocabularies aren't choosen correctly.
P81. Wrong word choice is common.

The next theme emerged from the dataset was related to tolerability of the language used in the composition. Many of the participants questioned the tolerability of the composition written by the EFL learner. Some found certain problems tolerable while others dubbed certain errors intolerable even if they are simple. Following are some of the extracts from the feedback sheets provided by the participants.

Being tolerable or not
P166. I think generally this essay can be tolerable because if someone reads this article she / he can understand what the student is writing about.
P164. According to the level of the learner, the grammatical mistakes of the essay are not tolerable an unexpected.
P163. For me there are not too many mistakes those cannot be tolerated.
P151. It is a successful essay. The mistakes are generally tolerable.
P150. I cannot tolerate if someone doesn't write a country name in capital letters.
P139. There are so many simple mistakes that can't be tolerated.

Cohesion related problems was another issue which was found to be noteworthy by the teachers who participated in the current study. Many of the participants provided cohesion related feedback to the EFL learner stating that connections among the sentences are missing. Some example of these feedback are provided below.

Cohesion related
P75. In some parts of the essay, one can have difficulty in understanding the connection among the sentences.
P49. You should use conjunctions effectively because there isn't any connection between your sentences.
P47. No unity and coherence
P36. There is not a coherence due to the lack of connectors, the flow of the essay is disrupted.

In addition to cohesion related issues, in their feedback, a number of the participants mentioned problems about the intelligibility of the essay. Interestingly, the participants stated that the intelligibility of the

composition is intact albeit some problems. Below, some of these intelligibility related comments given to the learner can be analyzed.

Comprehensibility
P142. This essay gives the main message to the readers.
P140. Main idea can be understood easily. Topic sentence is clear.
P98. Although there are some mistakes in this survey, they don't affect the comprehension of it.

Organization related problems were also a common issue in the participants' feedback. Some of the participants found these problems worth mentioning. Some extracts concerning this issue can be found below.

Organizational problems
P134. There are also important problems with the organization.
P135. …whereas he has problems with essay organization and unity in content.
P121. Lacks clear organization of the lay-out.
P36. The organization is very poor.

Another common point made by the participants was related to the unnecessary repetitions in the learner's essay. A few of the participants found these repetitions problematic by stating the followings.

Unnecessary repetitions
P139. …and some of them are repeated in different words but meaning same.
P113. Same sentences cannot be repeated.
P109. Some thoughts are repeated unnecessarily.

As the last theme, the effect of the native language of the EFL learner, which is Turkish, emerged from the dataset. Very few of the participants stated that the learner was thinking in Turkish and trying to write in English. Some examples of feedback related to this issue are provided below.

Thinking in the native language and translation
P145. Most students still think in Turkish. That's why they make so many mistakes.
P168. Please don't think in Turkish.

To sum up the results concerning the themes that were determined during the qualitative analysis stage, the following graphic in Figure 1 can be analyzed. The themes are in order of quantitative importance.

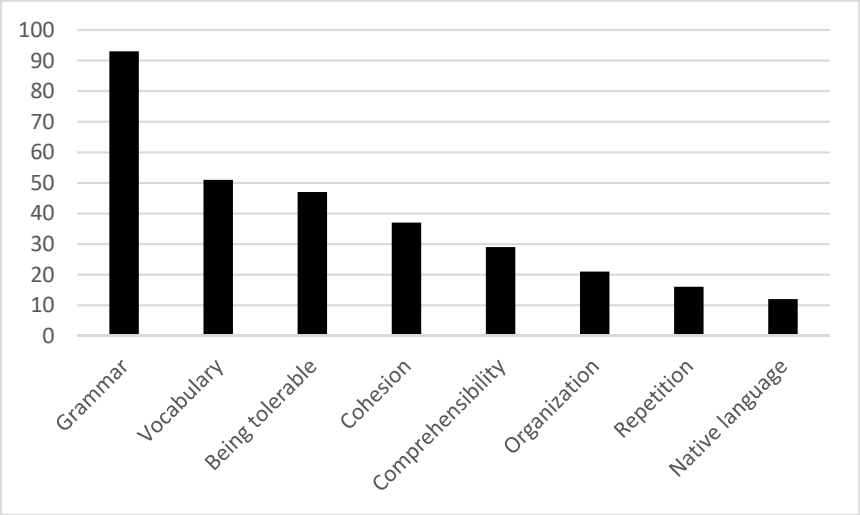

Figure 1. Graphical representation of the themes emerged from the analysis of the participants' feedback

Figure 1 shows a graphical representation of the themes emerged from the analysis of the participants' feedback with their percentages. It is obvious from the figure that Grammar is the dominant theme among

others. From the 116 papers over 90 % of them involve some sort of grammatical feedback. About 50 % of these feedback involve points concerning vocabulary and being tolerable or not. The other feedback provided by the participants are about cohesion (about 40 %), comprehensibility (about 30 %), organization (about 20 %), repetition (about 15 %) and about 10 % for the effects of the native language on the learner's essay. It should be born in mind that a feedback provided by the teacher can include a variety of aspects of the essay; therefore, a feedback can focus on grammar and involve other aspects at the same time.

The results of the current study indicated that grammar related issues in written productions of EFL learners actually is the main focus of their teachers, which means that there is integrity and reliability in WCF provided by EFL teachers to some extent. Because nearly all of the instructors (over 90 %) who participated in the study have grammar related CF. However, providing grammatical feedback to learners is a controversial issue. For example, Polio (2012) claims that CF works in accordance with Vygotsky's (1978) sociocultural model of learning, particularly the zone of proximal development, by identifying that CF is a kind of scaffolding since it indicates "a gap between language learners' behavior on their own compared to that performed after receiving support." According to Sampson (2012), with more practice on CF, students may have more control over the target linguistic form. Norris and Ortega (2000) conclude that "focused instructional treatment of any sort is far better than non-intervention." However, Truscott (1996) proposed, theoretically, WCF would disturb the natural development order of SLA, and he supported his opposition to CF by pointing out that the number of the studies investigating CF was not sufficient (1996, 1999, and 2007). He set against CF for different reasons such as the absence of control groups and delayed post-tests or the use of grammar exercises as their only writing tasks. In line with this, Long (1977) criticizes CF by saying that "error correction is unreliable, vague, and ineffective." Krashen (1982) defends that language is acquired unconsciously, so learning it formally by concentrating on formal correction may be useless.

By some approaches, it is predicted that CF has a facilitative role if used in an effective way (Mackey & Goo, 2007; Norris & Ortega, 2000), and these claims like Truscott's were criticized by the proponents of CF, and they tried to change this opposing perspective (Bitchener 2008; Bitchener et al., 2005, 2008, 2010; Chandler, 2003; Ferris, 1999, 2004; Ferris & Roberts, 2001; Sheen et al., 2009), although after each attempt, they were criticized severely by Truscott for not being able to demonstrate that error correction has any benefit (Truscott and Hsu, 2008).

However, Ferris (1999) refutes this idea by suggesting that CF can be helpful for language learners if it is "clear, selective, and prioritized," which supports Polio (2012) who stated that "CF could be effective in certain conditions." In response, Truscott (1999) explains that "many questions are left unanswered and calls for language educators to acknowledge the general idea that CF, which is not necessarily a deviant teaching practice, can hardly also be claimed to be a good practice."

Directly related with the framework of the current study, Truscott's (1996) claims that CF does not help to improve writing accuracy by assuming that (a) CF is implemented without being aware of the complex nature of L2 acquisition; (b) we cannot assure of "teachers' and students' willingness to participate in giving and taking CF"; (c) Instead of spending time and effort on applying CF, developing students' interlanguage development can be concentrated on in a much more productive aspect. In order to support his claim, Truscott put "pseudo-learning" forward because it results in the learners' peripheral and superficial acquisition of language forms. Since they may feel nervous, and this may negatively affect the content when they are corrected, they must be encouraged to use simple language, which results in simplified writing (Truscott, 1999). Therefore, he claims WCF is harmful to L2 writing and should be avoided.

There is a general agreement in the previous studies that CF has positive effects on learners' performance (Bitchener, Young, & Cameron, 2005; Fathman & Walley, 1990; Russell & Spada, 2006; Sampson, 2012). Lyster, Lightbown and Spada (1999) disagree with Truscott's claims about CF and self-esteem, and they state that "learners actually expect to receive feedback." In spite of the questions attributed to the effectiveness of CF by Truscott (1996), CF is widely considered effective in promoting awareness in L2 learning (Bitchener, Young, & Cameron, 2005; Mackey & Philp, 1998; Sheen, 2007). Bitchener and Knoch (2008) analyzed the CF types, and their research revealed that students receiving at least three CF options were better at writing tasks that the students who did not get any written feedback. Since some structures are pretty difficult for students to learn, it is difficult to learn them when provided only with positive evidence. Therefore, CF is vital to "foster learners' language awareness and the ability to notice gaps in their interlanguage" (Pawlak, 2004). Asassfeh (2013) confirms the positive effect of CF on students' performance, by indicating a statistically significant difference in students' performance prior to and after exposure to CF. For example, Russell and Spada's (2006) meta-analysis of 34 studies indicated an overall positive effect of CF. Another

important research about the WCF was conducted by Ellis et al. (2008). He investigated the Japanese university students' gains in the accuracy of using English articles in narrative writing by concluding that the student groups who received CF were better at the post-test. This conclusion supports the idea of the positive contribution of CF to the development of students' accuracy.

However, it is important for language learners to be aware of expectations of their instructors and ignoring students' expectations might lead to demotivation (Leki, 1991). In the process of WCF, teachers try to modify and correct learner errors with certain assumptions as to what learners are trying to write in the target language, but mismatches between what learners' ideas and those assumed by their teachers are unavoidable (Ferris, 1995; Gass & Selinker, 1994). In addition, Ferris (1995) stated that language learners had a variety of problems understanding WCF provided by their teachers.

According to Burt (1975) language teachers should focus on global errors rather than local errors. Global errors cause communication problems because they affect overall sentence organization like missing word or wrongly placed connectors. Local errors, unlike global errors, do not cause communication problems because they affect single elements in a sentence like grammatical function errors. It is often advised to language practitioners to focus attention on a couple of error types rather than trying to address all kinds of errors available in learners' productions (Harmer, 1983, and Ur, 1996). These approaches might sound quite conclusive, but again there are counterarguments suggesting that WCF provided by the teacher are imprecise and inconsistent Ellis (2009), and he goes on to claim that

> "There is no widely accepted theory of grammatical complexity to help teachers (or researchers) decide which rules are simple and portable or to determine which features are marked. Hard-pressed teachers often do not have the time to ascertain which features are problematic. Even if the careful selection of errors to target were possible in written correction, it would be well-nigh impossible in on-line oral correction" (Ellis, 2009: p. 6).

The debates that have been reviewed so far make it quite clear that we need much more evidence for whether CF improves writers' product quality and the circumstances under which this evidence functions (Asassfeh, 2013). Nevertheless, EFL teachers' obvious focus on grammar in writing has been established with the results of the current study. It might be related to this point that WCF does not seem to be making the language learning process easier. From the learners' perspectives, the prioritization of grammar structures of the target language by their instructors might be pushing the meaning to the background. There are many elements of expedient and successful writing and grammar is actually only one of them. While writing, what is being built is actually a lexical network in which the components are connected to each other through the use of grammar and cohesive devices; therefore, too much focus on only one of these elements is very likely to foster ineffective L2 writing.

Conclusion

The results of the current study indicate that when the issue is giving WCF to EFL learners, EFL teachers' main orientation is dominantly grammar and structure. Vocabulary related problems are also considered important by these teachers. The merits of dwelling on grammatical errors in a given EFL written production could be questioned from many perspectives; however, the results of the current study suggest that EFL teachers' seemingly fixed perceptions on the matter appears to be the most urgent problem to be dealt with.

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ANALYSIS OF LYMPHOCYTE IMAGES FOR DIAGNOSING RHEUMATOID ARTHRITIS USING THRESHOLD SEGMENTATION METHOD WITH SLIDER CONTROL

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Abstract: Medical images today help bring to divulge hitherto concealed knowledge about diseases that were, at one time, rarely subject to intense and prolonged scrutiny and analysis. In recent times, however, imaging has gone a long way in helping establish plausibly both the causes and behavioural patterns of a given disease. The objective of this paper is to constitute a series of techniques to detect accurately, in lymphocytes from blood smear images, the occurrence of Rheumatoid Arthritis (RA). This paper has used computer-aided diagnosis for accuracy and consistency, and the threshold segmentation method with slider control as a proposed segmentation method for lymphocyte extraction from blood smear images, precisely because it performs much better than existing segmentation methods. The paper discusses critical medical parameters - such as area, perimeter, circularity, roundness and solidity - from segmented lymphocytes, and also describes the ADTree method governing classification and decision rules. The final part of the paper deals with a case study on datasets of inflamed and non-inflamed types (for three different medical cases) using correlation and Analysis Of Variance (ANOVA) techniques to discover the homogeneity and relationships that exist between the critical parameters listed above for identifying the status of RA.

Keywords: Computer-Aided Diagnosis, Edge Detection, Histogram Smoothing, Rheumatoid Arthritis, Statistical Analysis

Introduction

Rheumatoid Arthritis (RA) is a lingering systemic inflammatory disease involving, predominantly, the peripheral synovial joints. Figure 1 includes two different shapes of lymphocyte extracted from a blood smear. The first image Figure 1 (a) represents a normal-shaped lymphocyte, while Figure 1 (b) represents an inflamed lymphocyte being considered for further RA analysis (Aman Kumar Sharma, 2011).

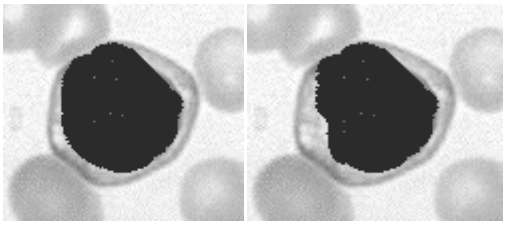


Figure 1(a) Normal Lymphocyte (b) Inflamed Lymphocyte

Image preprocessing is used to enhance the quality of the image obtained from various sources to ensure that all requirements are satisfied before further processing can take place. Image pre-processing techniques, like de-noising, can be used to remove noise from an acquired image (Bharanidharan, 2012). Noise in an image can be grouped, based on the underlying contents. Stray marks, marginal noises, and salt-and-pepper noises are independent of the size and location of the underlying content Noises naturally present in microscopic medical images can be removed using any of the following filters: mean, median, Gaussian, and Wiener (Chokkalingam , 2014). A set of 390 images, comprising 227 inflammatory and 163 non-inflammatory types (Chokkalingam, 2014) was taken for the purpose of analysing the condition of RA, Each noise-generating image has been filtered using

different filters. A comparative study of the relative performance of each filter was made alongside, with the best filter discovered at the end of the process being studied at length. The filtered image is compared against the original image using the following quality measures: Parameter Peak Signal-To-Noise-Ratio (PSNR), Mean Square Error (MSE), Normalized Correlation (NC) and Normalized Absolute Error (NAE)(Krishnapuram, 1993; NiponTheera-Umpon, 2007). When compared to the Wiener filter, the median filter performs better. Consequently, the median filter is reckoned to be optimal for microscopic (electronic) blood smear images (Pavlova, 1996; Tabrizi, 2010).

Materials and Methods

Segmentation is an essential part of obtaining the Region of Interest (ROI), since the results obtained depend entirely only on the ROI. In this model, therefore, a new segmentation method proposed - the threshold segmentation method with slider control - has been introduced. In this method, values are assigned to the slider controls and images segmented based on the slider values. RGB images are converted into grey scale images, with image sizes in the form of a matrix that can be assigned rows and columns. The slider control is required to process upto*n* number of rows and columns, and checks each time whether the row and column values are greater than the slider values - and if they are, they can be converted into white pixels; otherwise they can continue to remain black.

Algorithm : Threshold segmentation method with slider control

Input : Microscopic blood smear image of size m x n

Output : Segmented lymphocyte image

1. Let the input image be I (m,n).
2. The RGB image is converted into a greyscale image.
3. Calculate a mean value of input image , say T_m
4. Let the pixel values be $p_0, p_1, p_2,\ldots,p_N$; g denotes grey scale value; N be the maximum pixel value of the image.
5. An initial threshold guess at t, where t is the median value of the image

$$\sum_{g=0}^{t} p_g >= \frac{n^2}{2} > \sum_{g=0}^{t-1} p_g$$

where p_g is the sum of pixel value of grey scale image and n^2 is the number of pixel in the image

6. Threshold value t is assigned to slider control. Calculate mean pixel value under two conditions namely, less than and greater than the threshold value separately

   (a) for values less than or equal to t, T_{low} is calculated as

$$a = \sum_{g=0}^{t} g p_g \quad b = \sum_{g=0}^{t} p_g$$

$$T_{low} = a/b$$

   (b) and for values greater than or equal to t, T_{high} is calculated as

$$c = \sum_{g=t+1}^{N} gp_g \quad d = \sum_{g=t+1}^{N} p_g$$

$$T_{high} = c/d$$

(c) Re-estimate t between T_{low} and T_{high}

$$T_{new} = \frac{T_{low} + T_{high}}{2}$$

Repeat steps 6(a), (b) and (c) until T_{new} converges to a single value.

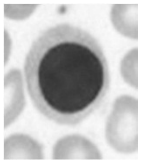
7. Assign T_{new} to slider control

8. If g >T_{new}then the image pixel values are converted into white color (255) else convert to black (0).

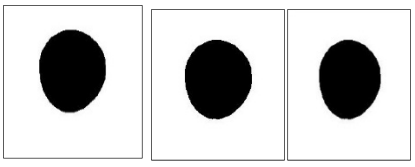
Figure 2 (a) shows segmented image using the gradient method, Figure 2 (b) displays segmented image using the proposed threshold segmentation method with slider control and Figure 2 (c) illustrates the segmented image using the global threshold segmentation method. Table 1 illustrates the existing method is evaluated by means of comparisons with other segmentation methods such as the gradient method and the global threshold method. It is found that the dice similarity measurement is very high - while the white count is low and the black count is high - for the threshold segmentation method with slider control, compared with the existing segmentation methods.

S.NO.	Gradient Method			Global Threshold Method			Proposed Method		
	DSM	WC	BC	DSM	WC	BC	DSM	WC	BC
1	0.9038	0.1755	0.8245	1.1213	0.1689	0.8311	1.9121	0.1629	0.8371
2	0.8692	0.2314	0.7686	1.0012	0.2058	0.7942	1.8982	0.1348	0.8652
3	0.9428	0.1083	0.8917	1.2134	0.1118	0.8882	1.9423	0.1033	0.8967
4	0.8710	0.2285	0.7715	1.0034	0.2252	0.7748	1.8994	0.2081	0.7919
5	0.8989	0.1837	0.8163	1.0097	0.1897	0.8103	1.9014	0.1755	0.8245

Table 1 Comparison of Threshold Segmentation Method with Slider Control and Existing Methods



Lymphocyte with tiny particles



(a) (b) (c)

Figure 2 (a) Segmented image using the gradient method (b) Segmented image using the proposed threshold segmentation method with slider control (c) Segmented image using the global threshold segmentation method

Feature Extraction

Features like area, perimeter, circularity, roundness, and solidity are calculated and the sample values shown in Table 2.The area, determined by counting the total number of non-zero pixels within the image region, is given by

$$\text{Area} = \frac{(\text{Perimeter})^2}{\text{Compactness}} \qquad (1)$$

The perimeter, estimated by calculating the distance between successive boundary pixels, is given by

$$\text{Perimeter} = \sqrt{(\text{Compactness} * \text{Area})} \qquad (2)$$

A circularity ratio measures the compactness of a shape.

$$\text{Circularity} = \frac{4\Pi * (\text{area})}{(\text{perimeter})\ 2} \qquad (3)$$

Solidity is the ratio of the actual area and convex hull area, and is also an essential feature for blast cell classification. It is estimated as

$$\text{Solidity} = \frac{\text{Area}}{\text{Convex Area}} \qquad (4)$$

Roundness is a measure of the sharpness of a particle's edges and corners, calculated as

$$\text{Roundness} = \frac{4 * \text{Area}}{(\pi * \text{Major axis})^2} \qquad (5)$$

Table 2. Features extracted from lymphocytes for the analysis of RA

Image	Area	Perimeter	Circularity	Solidity	Roundness	Result	Level
1	6581	359	0.6413	0.9167	0.0585	Inflamed	High
2	7583	398	0.6013	0.904	0.067	Inflamed	Moderate
3	7679	405	0.5880	0.9028	0.0672	Inflamed	Moderate
4	9036	471	0.5116	0.8866	0.0794	Non-inflamed	Level 0
5	9069	473	0.5091	0.8852	0.0792	Non-inflamed	Level 0
6	13479	640	0.4133	0.8294	0.1109	Inflamed	Low
7	13519	641	0.4133	0.8289	0.1149	Inflamed	Low
8	14876	674	0.4113	0.8117	0.142	Inflamed	Moderate
9	14957	676	0.4111	0.8107	0.1252	Inflamed	Moderate
10	24753	864	0.4165	0.6854	0.1919	Inflamed	High

Results and Discussion

Classification

For the purpose of detecting RA, lymphocytes are classified into two categories: inflammatory and non-inflammatory, and rules generated for the classification process.

The ADT automatically generates positive and negative values for all parameters, and all attribute values are interlinked; based on which decision trees are classified. The clustering results for inflammatory and non-inflammatory types of images are given in Figure 3. The clustering is performed by considering all the five attributes, where the difference shows the classification between the inflammatory and non-inflammatory types The Minitab tool (http://www.minitab.com/en-us/products/minitab) is used to plot contour interaction and study its main effects, also enabling improved quality and providing the confident assurance that the right predictions have been made.

```
Alternating decision tree:

: -0.149
|   (1)Area < 12999.5: 0.661
|   |   (2)Area < 8958.5: -4.777
|   |   (2)Area >= 8958.5: 4.788
|   |   (4)Circularity < 0.513: 0.458
|   |   (4)Circularity >= 0.513: -0.458
|   (1)Area >= 12999.5: -4.237
|   (3)Solidity < 0.835: -0.731
|   (3)Solidity >= 0.835: 0
Legend: -ve = inflamed, +ve = Non-inflamed
Tree size (total number of nodes): 13
Leaves (number of predictor nodes): 9

Time taken to build model: 0.03 seconds
```

Figure 3 ADT for inflammatory and non-inflammatory types of images

Roundness, skewness and median are taken as significant attributes in this model. It can be deduced from these attributes whether or not the lymphocytes are inflamed, taking into consideration the constraints that follow. In the ADTree, the negative represents the inflamed and the positive for the non-inflamed. The tree size has been calculated based on the total number of nodes and predictor nodes, and is used to define the leaf node.

Conditions for inflamed:

a). If solidity is less than 0.835, area less than 8995, and perimeter lies between 494 and 502, then the image is of the inflammatory type.

b). If solidity is less than 0.835 and area less than 11868, then the image is of the inflamed type.

c). If solidity is less than 0.835 and roundness less than 0.079, then the image is of the inflamed type.

d). If solidity is less than 0.835 and roundness less than 0.089, then the image is of the inflamed type.

e). If an area is greater than or equal to 12999, it clearly denotes that the images are of the inflammatory type.

f). If an area is less than 12999, it clearly defines the images as being of the inflammatory type.

Conditions for non-inflamed.

g). If solidity is greater than or equal to 0.835, area greater than or equal to 8995, perimeter less than or equal to 494, and perimeter greater than or equal to 502, then the image is of the non-inflamed type.

h). If solidity is greater than or equal to 0.835 and area greater than or equal to 11868, then the image is of the non-inflamed type.

i). If solidity is greater than or equal to 0.835 and roundness greater than or equal to 0.079, then the image is of the non-inflamed type.

j). If solidity is greater than or equal to 0.835 and roundness greater than or equal to 0.089, then the image is of the non-inflamed type.

Case Studies

The case study should be treated as a process that includes patients who are representatives of the target population so as to evaluate the degree to which the diagnosed dataset meets specific parameters - such as perimeter, area, roundness, solidity and circularity. The following section discusses in detail data profiles, significant levels and statistical analysis of the three types of datasets.

Data Profile

As part of this study, many doctors, clinics and labs have been approached and data certified, inclusive of

- Certified image data from rheumatologists;
- Portability to other tools like Excel & Database, and
- Precise clinical data alone to be taken into consideration.

The datasets are primarily divided into two types:inflamed and non-inflamed. The inflamed type has been further divided into low, moderate and high. The following are the two major types of datasets analysed as part of this case study:

- high-normal dataset
- moderate-moderate dataset

The high-normal dataset has sets of image data covering multiple visits of a patient aged about 32. This particular dataset contains all the required clinical parameters for the badly-affected arthritic patient in question who, having undergone a course of treatment spread over 2 years and 3 months, has made significant progress.

The moderate-moderate dataset contains all the required clinical parameters for a female patient, 63 years old, with a history of moderate RA symptoms. She had undergone medical treatment for a year and 8 months and noticed no improvement whatsoever, continuing instead to be subject to two hours of morning stiffness, flares involving the hands, complaints of swollen, painful joints and fatigue.

Significant Levels

Four significant levels have been identified and proposed for study as part of this research, including classifying and clustering the datasets appropriately so as to better analyse the sample effectively. The clinical dataset contains five levels of measures - such as area, perimeter, circularity, solidity, and roundness - related to RA. The dataset is classified into two types: non-inflamed and inflamed. The non-inflamed are denoted as Level 0 and the inflamed are further classified into low, moderate and high The following presents guidelines, representing images in a specific group, for the range of values for the critical parameters concerned.

The following presents the lower and upper range values for the moderate inflamed type:

Area (P1)	:	9036-12989
Perimeter (P2) :	471-630	
Circularity (P3)	:	0.4084- 0.5116
Solidity (P4)	:	0.8356-0.8866
Roundness (P5)	:	0.79-0.1123

The following presents the upper limit and lower limit values found in the image set corresponding to the low inflamed type:

Area (P1)	:	8639-8970 & 13010 - 13757
Perimeter (P2) :	453-469 & 631 -652	
Circularity (P3)	:	0.4065-0.4133 & 0.5122-0.5290
Solidity (P4)	:	0.8259-0.8352 & 0.8865 – 0.8906
Roundness (P5)	:	0.0748-0.0778 & 0.1084 – 0.1257

The following presents the lower and upper range values for the moderate inflamed type:

Area (P1)	:	7583 – 8599 & 13861 - 14957
Perimeter (P2)	:	398-451 & 652 -676

Circularity (P3) : 0.4054-0.4148 & 0.5301- 0.6013
Solidity (P4) : 0.8107 – 0.8245 & 0.8912 – 0.9040
Roundness (P5) : 0.0670 – 0788 & 0.1148 - 0.1420
The following presents the lower and upper range values for the high-level inflamed type:
Area (P1) : 6581- 7491 & 15106 - 26090
Perimeter (P2) : 359-395 & 677- 894
Circularity (P3) : 0.3955-0.4165 & 0.6030 – 0.6413
Solidity (P4) : 0.6535 - 0.8088 & 0.9052-0.9167
Roundness (P5) : 0.0585 - 0.0654 & 0.1269 – 0.2012

Analysis of datasets

The goal for this case study is to identify similarities, homogeneity and relationships between parameters such as area, perimeter, circularity, solidity, and roundness. Analysis Of Variance (ANOVA) tools have been used for performing a statistical analysis. Table 3 contains the medical visits of the patients and normalized values shown in Table 4.

Table 3 Parameters and Values for CASE I

Image	P1	P2	P3	P4	P5	Level
1	6971	373	.6293	.9118	.0617	High
2	2490	868	.4152	.6847	.2009	High
3	1525	682	.4120	.807	.1253	High
4	1578	695	.4105	.8002	.1269	High
5	1266	622	.4111	.8395	.1071	Level 0
6	1275	624	.4111	.8385	.1075	Level 0

Table 4 Normalized Values for CASE I

Image	P1	P2	P3	P4	P5	Level
1	4	4	3	1	2	High
2	184	170	46	51	58	High
3	87	112	47	24	27	High
4	94	113	47	26	28	High
5	61	88	46	19	20	Level 0
6	62	89	46	18	20	Level 0

NULL HYPOTHESIS (H_0) - There is no difference between the rheumatoid arthritis clinical status for sample values with respect to the five parameters (area, perimeter, circularity, solidity, and roundness) for every visit.
ALTERNATE HYPOTHESIS (H_1) - There is a difference between clinical values on these parameters with every visit. Both H_0 and H_1 are validated for all three different cases.

The following shows the application of ANOVA with the mapped dataset.

$$Q = \sum\sum xij^2 - T^2 / N \quad (8)$$

$\sum\sum xij^2 = 63638$ and $T2 / N = 1.2$

By applying the equation (8), Q is calculated as 63636.8.

$$Q1 = \sum (Ti2 / ni) - T2/N \quad (9)$$

$\sum (Ti2 / ni) = 25437.2$

By applying the equation (9), Q1 is calculated as 25436.

$Q2 = Q - Q1$; Q2=38200.8

Once all the necessary values are calculated by applying ANOVA, the results need to be filled in. In Table 5, the first column has the Source of Variation (SV), the second column has the Sum of Squares (SS), the third column contains the Degree of Freedom (df), the fourth column has the Mean Square (MS), and the last column has the Variance Ratio (F_0). The values for Q1, Q2 and Q are filled in the SS column. The df value for between visits is calculated by subtracting 1 from the number of visits, i.e., 6 -1. The df value for within clinical parameters is calculated by subtracting the number of rows from the total number of elements The stats table can be referred to by using the df value. Referring to the statistical table for F 5%, the corresponding F value for (5, 24) can be obtained by referring to V1 as 5 and V2 as 24. The statistical table value for F (5, 24) is 2.62. Based on the reference with the statistical table, the calculated Variance Ratio (F_0 = 3.19) is greater than the statistical table value F 5% (2.62). Hence the null hypothesis H_0, namely, that the means of the real-time values of the five attributes are homogeneous is rejected and an alternate hypothesis accepted. It shows that the status is likely to change with every visit of the patient.

Table 5 ANOVA Table for CASE I

SV	SS	Df	MS	F_0
Between the patient's visits	25436 (Q1)	5	5087.2	3.19
Within critical parameters	38200.8 (Q2)	24	1591.7	
Total	63636.8 (Q)	29		

Similar to the mapping methodology followed for Case 1, the actual values were mapped for each parameter (starting from 1 and ending at 196) found in Table 6 and Table 7.

Table 6 Parameters and Values for CASE II

Image	P1	P2	P3	P4	P5	Level
1	7583	398	.6013	.904	.067	Moderate
2	7892	410	.5897	.9001	.068	Moderate
3	7921	412	.5861	.8997	.072	Moderate
4	7998	418	.5749	.8988	.076	Moderate
5	8075	422	.5695	.8978	.070	Moderate
6	8090	423	.5679	.8976	0.07	Moderate

Table 7 Normalized Values for CASE II

Image	P1	P2	P3	P4	P5	Level
1	10	14	9	4	4	Moderate
2	14	18	11	4	5	Moderate
3	15	18	11	4	6	Moderate
4	15	20	13	4	8	Moderate
5	15	22	15	5	5	Moderate
6	16	22	15	6	6	Moderate

From the statistics F-tables, F5% (V1=5, V2=24) = 2.62. From Table 8, it is clear that F0 < F5%, hence the null hypothesis $_{H0,}$ - namely, that the means of the real-time values of the five attributes are homogeneous, is accepted. In other words, since the five attributes of rheumatoid arthritis do not differ significantly, H_0 is accepted. This analysis shows that the patient's status still remains unchanged.

A set of 390 images was taken for analysing the condition of RA. Of these images, 227 are inflammatory and 163 non-inflammatory by computational values and, by medical records, 225 are inflammatory and 165 non-inflammatory. The application of the J48 and ADTree classification algorithms from Weka tool shows that J48 is classified at 99% and ADTree at 98.9% for the computational dataset and at 99.49% for the medical dataset Similarly/Likewise, other decision parameters listed in Table 9 show that the medical record dataset and computational classification dataset are matched perfectly – by as much as 99.49%.

Table 8 ANOVA Table for CASE II

SV	SS	DF	MS	F_0
Between the patient's visits	75.47	5	15.09	0.39
Within critical parameters	914	24	38.08	
Total	989.47	29		

Table 9 Relationship between all parameters

Decision-making attributes / Algorithms	Dataset with computational values		Dataset with medical values (ESR)	
	J48	ADTree	J48	ADTree
Correctly classified	99.49	98.97	99.49	99.49
Incorrectly classified	0.51	0.53	0.51	0.51
Kappa statistic	0.99	0.98	0.99	0.99
Mean absolute error	0.01	0.02	0.01	0.01
Root_mean_squared_error	0.02	0.06	0.03	0.04
Relative_absolute_error	1.05	3.14	1.05	2.23
Root_relative_squared_error	4.57	11.21	6.48	7.45

Conclusions

This paper presents a robust segmentation scheme for automatic lymphocytic cell analysis and the probability of detecting the disease, rheumatoid arthritis. Since the results obtained are entirely dependent on the segmented lymphocytes (ROI); the segmentation of lymphocytes from the blood smear image, consequently, is vital. The new edge threshold segmentation with slider control algorithm is used to segment lymphocytes dynamically and features like area, perimeter, circularity, solidity, and roundness found. The ADTree is used to classify features and, based on this classification, decision rules are generated. Our model classifies the given image as inflamed or non-inflamed, using the decision rules generated. Statistical tools like Karl Pearson's correlation coefficient correlation technique and Analysis Of Variance (ANOVA) have been used to performing statistical analyses to discover homogeneity, similarities and relationships between the parameters involved.

Acknowledgements

My sincere thanks to Dr.V.VKausik, MRCP (UK), CCT (Rheumatology), FRCP (London) Arthritis & Rheumatism Centre, Nungambakkam, Chennai for providing the necessary information about Rheumatoid Arthritis , Microscopic and Digital X-ray images without which this research would not have been possible.

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ANALYZING CPU SCHEDULING ALGORITHMS ACCORDING TO WAITING TIMES - A CASE STUDY

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Abstract: In multiprocessing operating systems, maximum CPU utilization is one of the most important goals. To obtain the maximum rate, the processes in the CPU queue must be scheduled properly. There are several scheduling algorithms to decide this process order as First-Come First-Served Scheduling, Last-Come First-Served Scheduling, Shortest Job Scheduling, Random Scheduling etc. This paper presents a case study to examine which of these scheduling methods is the most efficient one between these policies according to total waiting times.

Keywords: CPU scheduling, waiting time, First-Come First-Served Scheduling, Last-Come First-Served Scheduling, Shortest Job Scheduling, Priority Scheduling, Random Scheduling.

Introduction

In multiprocessing operating systems, the system need a method to decide the order of processes. This process is called CPU scheduling. In the literature there are lots of CPU scheduling policies such as First-Come First-Served Scheduling, Last-Come First-Served Scheduling, Shortest Job Scheduling, Random Scheduling and lots of criteria used for examining the efficiency of the algorithms such as waiting time, response time, turnaround time (Beru, 2015; Carithers and Duncan 2013; Singhoff, 2012; Kohout, 2012; Baskiyar and Meghanathan, 2005). Because most of the examinations about CPU scheduling used total waiting times in the literature, we also use this criteria in this study. The explanations of the methods are given below.

First-Come First-Served Scheduling : The first executed process is the first one in the waiting queue (Kumar et. Al, 2014; Rogiest. et al,2015; Huang, 2014).
Last-Come First-Served Scheduling : The first executed process is the last one in the waiting queue (Harchol-Balter, 2013; Jouini, 2012; Lister, 1993).
Shortest Job First : The first executed process is the shortest one in the waiting queue (Ru and Keung, 2013).
Random Scheduling : The first executed process is a random one in the waiting queue (Tsichritzis and Bernstein, 2012).

In this paper, the CPU scheduling algorithms are analyzed according to total waiting times of the processes. For this reason, 30 process set who has 10 processes and whose burst times are randomly generated (less than or equal to 50ms) are used. The arrival times are accepted as 0. The CPU scheduling algorithms are applied to these process sets and the total waiting times are calculated. This study aims to find the most efficient CPU scheduling method for this case-study. To form more general solutions about the policies, these 30 × 10 sets are chosen as different characteristics. For example in some sets, all of the processes have equal burst times, in some cases, some of them are equal and in the remaining ones, there are no equal burst times in the processes.

Materials and Methods

The CPU scheduling policies can be seperated as preemptive methods and non-preemptive methods. First Come First Served, Last Come First Served, Priority Scheduling, Shortest Job First and Random Scheduling are non-preemptive methods while Round Robin, Shortest Remaining Time are preemptive. In this study the non-preemptive policies are handled because preemptive policies need different types of inputs. The policies that are compared to eachother in this study are First Come First Served, Last Come First Served, Shortest Job First and Random Scheduling. As mentioned above, 10 processes are produced with random burst times in his study. This random burst times are shown in Table 1 which also shows the First Come First Served policy order. Table 1 also shows the processes according to First Come Firs Served Scheduling. Table 2, Table 3, and Table 4 are formed by using the same burst values with Last Come First Served, Shortest Job First and Random Scheduling.

Table 1 : Burst times of processes (FCFS)

Case Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	1	4	10	8	2	7	13	24	11	4
2	5	5	5	5	5	5	5	5	5	5
3	10	12	5	27	30	30	30	2	2	2
4	4	8	12	16	20	24	28	32	36	40
5	24	1	1	1	12	30	2	7	30	30
6	37	30	33	5	45	30	5	5	24	24
7	37	24	30	10	40	24	30	30	10	10
8	30	10	24	4	15	10	20	24	5	22
9	40	10	10	24	10	10	5	10	10	10
10	24	11	4	14	4	14	12	4	7	30
11	5	5	5	21	18	8	8	20	9	24
12	2	2	2	40	30	10	8	30	10	10
13	2	2	30	33	40	50	8	13	11	7
14	10	2	24	2	7	13	8	5	4	7
15	30	20	10	5	5	5	8	30	5	7
16	17	20	44	30	30	30	8	28	10	14
17	22	22	15	20	24	28	8	14	5	6
18	10	10	10	10	10	10	10	10	10	10
19	12	24	12	24	12	24	12	24	12	24
20	15	13	12	24	49	17	30	2	14	37
21	21	5	15	13	30	34	28	32	33	37
22	22	30	21	5	49	50	2	7	40	30
23	3	28	22	30	30	50	5	5	28	40
24	24	24	3	28	24	24	24	24	24	24
25	17	40	13	34	28	32	10	8	25	9
26	20	41	5	50	2	7	48	12	12	50
27	28	42	30	50	5	5	5	5	5	12
28	13	43	28	50	30	2	2	2	2	17
29	15	20	10	50	28	4	17	17	10	17
30	15	11	22	33	24	24	24	24	50	40

Table 2 : Processes according to Last Come First Served Policy

Case Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	4	11	24	13	7	2	8	10	4	1
2	5	5	5	5	5	5	5	5	5	5
3	2	2	2	30	30	30	27	5	12	10
4	40	36	32	28	24	20	16	12	8	4
5	30	30	7	2	30	12	1	1	1	24
6	24	24	5	5	30	45	5	33	30	37
7	10	10	30	30	24	40	10	30	24	37
8	22	5	24	20	10	15	4	24	10	30
9	10	10	10	5	10	10	24	10	10	40
10	30	7	4	12	14	4	14	4	11	24
11	24	9	20	8	8	18	21	5	5	5
12	10	10	30	8	10	30	40	2	2	2
13	7	11	13	8	50	40	33	30	2	2
14	7	4	5	8	13	7	2	24	2	10
15	7	5	30	8	5	5	5	10	20	30
16	14	10	28	8	30	30	30	44	20	17
17	6	5	14	8	28	24	20	15	22	22
18	10	10	10	10	10	10	10	10	10	10
19	24	12	24	12	24	12	24	12	24	12
20	37	14	2	30	17	49	24	12	13	15
21	37	33	32	28	34	30	13	15	5	21
22	30	40	7	2	50	49	5	21	30	22
23	40	28	5	5	50	30	30	22	28	3
24	24	24	24	24	24	24	28	3	24	24
25	9	25	8	10	32	28	34	13	40	17
26	50	12	12	48	7	2	50	5	41	20
27	12	5	5	5	5	5	50	30	42	28
28	17	2	2	2	2	30	50	28	43	13
29	17	10	17	17	4	28	50	10	20	15
30	40	50	24	24	24	24	33	22	11	15

As it can be seen from the table, the processes are organized according to their order in the waiting queue, but the first process becomes the last and the last process become the first. This policy is called Last Come First Served scheduling policy.

Table 3 : Processes according to Shortest Job First

Case Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	1	2	4	4	7	8	10	11	13	24
2	5	5	5	5	5	5	5	5	5	5
3	2	2	2	5	10	12	27	30	30	30
4	4	8	12	16	20	24	28	32	36	40
5	1	1	1	2	7	12	24	30	30	30
6	5	5	5	5	24	24	30	30	37	45
7	10	10	10	24	24	30	30	30	37	40
8	4	5	10	10	15	20	22	24	24	30
9	5	10	10	10	10	10	10	10	24	40
10	4	4	4	4	7	11	12	14	24	30
11	5	5	5	8	8	9	18	20	21	24
12	2	2	2	8	10	10	10	30	30	40
13	2	2	7	8	11	13	30	33	40	50
14	2	2	4	5	7	7	8	10	13	24
15	5	5	5	5	7	8	10	20	30	30
16	8	10	14	17	20	28	30	30	30	44
17	5	6	8	14	15	20	22	22	24	28
18	10	10	10	10	10	10	10	10	10	10
19	12	12	12	12	12	24	24	24	24	24
20	2	12	13	14	15	17	24	30	37	49
21	5	13	15	21	38	30	32	33	34	37
22	2	5	7	21	22	30	30	40	49	50
23	3	5	5	22	28	28	30	30	40	50
24	3	24	24	24	24	24	24	24	24	28
25	8	9	10	13	17	25	28	32	34	40
26	2	5	7	12	12	20	41	48	50	50
27	5	5	5	5	5	12	28	30	42	50
28	2	2	2	2	13	17	28	30	43	50
29	4	10	10	15	17	17	17	20	28	20
30	11	15	22	24	24	24	24	33	40	50

In this table the proceses are ordered according to their burst times in the ascending order. This means the shortest job becomes the first and the longest jobe becomes the last. Finally, another policy called Random Scheduling Policy is applied to the processes. Random Scheduling Policy choses processes randomly as the name implies.

Table 4 : Processes according to Random Scheduling Policy

Case Number	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	24	1	10	11	2	7	8	13	4	4
2	5	5	5	5	5	5	5	5	5	5
3	27	2	30	2	30	10	30	12	5	2
4	28	4	40	8	32	20	36	24	16	12
5	24	1	30	1	30	7	30	12	2	1
6	30	5	45	5	30	24	37	24	5	5
7	30	10	40	10	30	24	37	30	24	10
8	22	4	30	5	24	15	24	20	10	10
9	10	5	40	10	10	10	24	10	10	10
10	12	4	30	4	14	7	24	11	4	4
11	18	5	24	5	20	8	21	9	8	5
12	10	2	40	2	30	10	30	10	8	2
13	30	2	50	2	33	11	40	13	8	7
14	8	2	24	2	10	7	13	7	5	4
15	10	5	30	5	20	7	30	8	5	5
16	28	17	14	10	30	20	30	30	8	44
17	22	5	28	6	22	15	24	20	14	8
18	10	10	10	10	10	10	10	10	10	10
19	24	12	24	12	24	12	24	24	12	12
20	24	2	49	12	30	15	37	17	14	13
21	32	5	37	13	30	21	15	33	38	34
22	30	2	50	5	40	22	49	30	21	7
23	30	3	50	5	30	28	40	28	22	5
24	24	3	28	24	24	24	24	24	24	24
25	28	8	40	9	32	17	34	25	13	10
26	41	2	50	5	48	12	50	20	12	7
27	28	5	50	5	12	5	5	30	5	42
28	28	2	50	2	30	13	43	17	2	2
29	17	4	20	10	20	17	28	17	15	10
30	33	24	50	15	11	24	40	24	24	22

Results and Discussion

We constituted computer programs by using MATLAB simulation program and calculated the total waiting times of First Come First Served (FCFS), Last Come First Served (LCFS), Shortest Job First (SJF) and Random Scheduling (RS).

The total waiting times for each process set are calculated according to the algorithms and the results are given below :

Table 5 : Total waiting times

Case Number	FCFS	LCFS	SJF	RS
1	295	461	209	452
2	225	225	225	225
3	749	601	347	790
4	660	1320	660	1024
5	467	775	281	734
6	1228	914	553	1065
7	1251	954	811	1131
8	770	706	499	772
9	789	462	419	662
10	543	573	287	570
11	441	666	359	621
12	572	724	306	706
13	903	861	434	1011
14	411	327	212	404
15	664	461	317	609
16	1161	918	744	934
17	888	588	522	766
18	450	450	450	450
19	780	840	660	852
20	888	1029	601	1016
21	879	1353	886	1048
22	1120	1184	682	1182
23	988	1181	676	1134
24	957	1050	891	940
25	1107	837	659	1043
26	1061	1162	588	1255
27	1173	510	409	832
28	1127	574	380	997
29	916	776	548	686
30	961	1442	911	1272
AVERAGE	814,13	797,46	517,53	839,43

Conclusion

This paper presents a case study to examine which one of the scheduling methods is the most efficient one between First-Come First-Served Scheduling, Last-Come First-Served Scheduling, Shortest Job Scheduling, Random Scheduling according to total waiting times.

As it can be seen easily from the tables, in all the situations Shortest Job First policy is the most efficient one. Because the total waiting time is of course will be the smallest one in all the other policies. Also, when we look at the average times, SJF has the smallest one. The order of the other policies can be changed according to policy but SJF will be the best one in all the cases.

Acknowledgements

The author wishes to thank for the support of the Research Fund of Istanbul University under Project BYP-2016-20712.

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CARBON FOOTPRINT DETERMINATION OF A TURKISH CEMENT FACTORY

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Abstract: Carbon footprint can be defined as the carbon dioxide (CO_2) equivalent of greenhouse gas (GHG) emissions caused by anthropogenic activities (such as transportation, energy generation, services or purchasable products, etc.). The carbon footprint of a facility can be determined due to reasons such as legal obligations, social responsibilities, customer demand, or reduction of GHG emissions. In this study carbon footprint of a cement factory is ascertained. The amount of greenhouse gas emissions from the factory is 1,64 million tons of CO_2 in 2014. 65% of them come from clinker production and the remaining comes from combustion, mainly petroleum coke which has the largest share of approximately 30% of contribution. It will be a good opportunity for the factory to use waste oil and end of life tires (ELT) as alternative fuels to mitigate its the carbon footprint.

Keywords: carbon footprint, cement industry, clinker production, greenhouse gas emission

Introduction

World's rapid industrialization is causing ecologically deterioration gradually. Correspondingly, global climate change has become a major threat to the environment and the economic development of the world (Zhang and Zhang, 2015). In this regard, Kyoto Protocol (KP) is the most important step taken in the worldwide. KP aims to mitigate GHG emissions by obligating developed countries to pay the price for their emissions.

Carbon footprint (CF) can be defined as a measure of total amount of carbon-dioxide (CO_2) released into the atmosphere in the given time frame that is directly or indirectly caused by any activity to provide service or a product. This approach has become a widely used concept in greenhouse gas emissions assessments recently (Andrić, et. Al., 2015).

Carbon footprint calculations are made due to reasons such as legal obligations, social responsibility, customer or investor demands, corporate image, voluntary or mandatory greenhouse gas emission reduction or the participation in the emissions trading mechanisms.

In Turkey calculation of carbon footprint is not an obligation, but it is significant to the facilities for their own emission inventory and to put forward strategies for prevention of climate change. The current legal regulation on the greenhouse gas emissions monitoring is entered into force in 2014 with the name of "Regulation on Monitoring of Greenhouse Gas Emissions (RMGHGE)" (Official Gazette 2014a). This regulation aims monitoring, reporting, and verification of the GHG emissions occurring from the listed activities in its Annex 1.

Turkey's CO_2 emissions were estimated at 363.5 million tons in 2013 and about 18% of it comes from industry. Cement sector is one of the major industrial greenhouse gas emission sources. The aim of this study is to calculate the carbon footprint of a cement factory in Turkey and give suggestions to decrease greenhouse gas emissions. The factory is producing clinker and cement since 2009 with 242,824 m^2 surface area, about 2 million ton/year clinker production capacity and exists in Annex 1 of the regulation (as its capacity exceeds 50 tons daily clinker production.) It is in the top 500 industrial enterprises of Turkey.

Besides Turkish cement sector is in the top 10 in the world and ranked third in Europe with about 71 million tons of production in 2014. Due to the increase of infrastructure and construction activities in Turkey in the last years, cement demand is increasing. Accordingly, the production is expected to be about 100 Mt in 2023 (Url-1)

There are varies international standards and regulations to help users for carbon footprint calculations. However most of the studies in the literature used IPCC Guideline 2006 (IPCC, 2006; Jiang et. Al., 2015; Xu and Lan 2015; Yaka and Güngör, 2015; Cai et al., 2008).

Materials and Methods

For the carbon footprint analysis, all the sources of emissions in the factory have been primarily defined. Emissions are categorized as combustion-sourced and process based. Fuels used for the combustion are domestic lignite, petroleum coke, steam coal, fuel oil, waste oil, end of life tires (ELT) contaminated waste.

Process-based emissions are come from clinker production, the non-carbonate carbon raw material. IPCC (2006) methodology with 2014data is used for the carbon footprint calculations.

Energy balance diagram was set up and accordingly emission sources are defined for the CO_2 emission calculations.
CO_2 emission sources of the factory are given in Table 1.

Table 1: CO_2 emission factors (EF).

Item No	Source	EF	Source
1	Clinker production	0.51 tCO_2/t	IPCC 2006
2	Domestic lignite	99.27 tCO_2/TJ	TURKSTAT, 2014
3	Petroleum coke	92.79 tCO_2/TJ	TURKSTAT, 2014
4	Steam coal	92.79 tCO_2/TJ	TURKSTAT, 2014
5	Fuel oil	76.66 tCO_2/TJ	TURKSTAT, 2014
6	Waste oil	73.3 tCO_2/TJ	Official Gazette 2014b
7	ELT	85 tCO_2/TJ	Official Gazette 2014b
8	Contaminated waste	83 tCO_2/TJ	Personal info, 2016.
9	Raw material: cement clinker non-carbonate carbon	3.664 tCO_2/TJ	Personal info, 2016.

CO_2 emissions are calculated according to IPCC Guideline Tier methodology that is given by Eq. 1 [3].
CO_2 emission=Fuel consumption x emission factor x oxidation ratio Eq.1
where, CO_2 emission, kg emission by fuel type
fuel consumption, consumed fuel, kg, l
emission factor, GHG emission factor by fuel type, kg/TJ
oxidation ratio is assumed 100%.

Results and Discussion

The calculations indicate that the factory released 1.64 M tons of CO2 emissions in 2014, which was %3 of the total industrial GHG emissions of Turkey in 2014. The distribution of the emission sources are given with Fig. 1. 65% of the total emissions come from the process that is clinker production and the remaining 35% comes from combustion, mainly petroleum coke which has the largest share of approximately 30% of contribution. Steam coal is the second important emission source from combustion which has 4% contribution to the total CO_2 emissions.

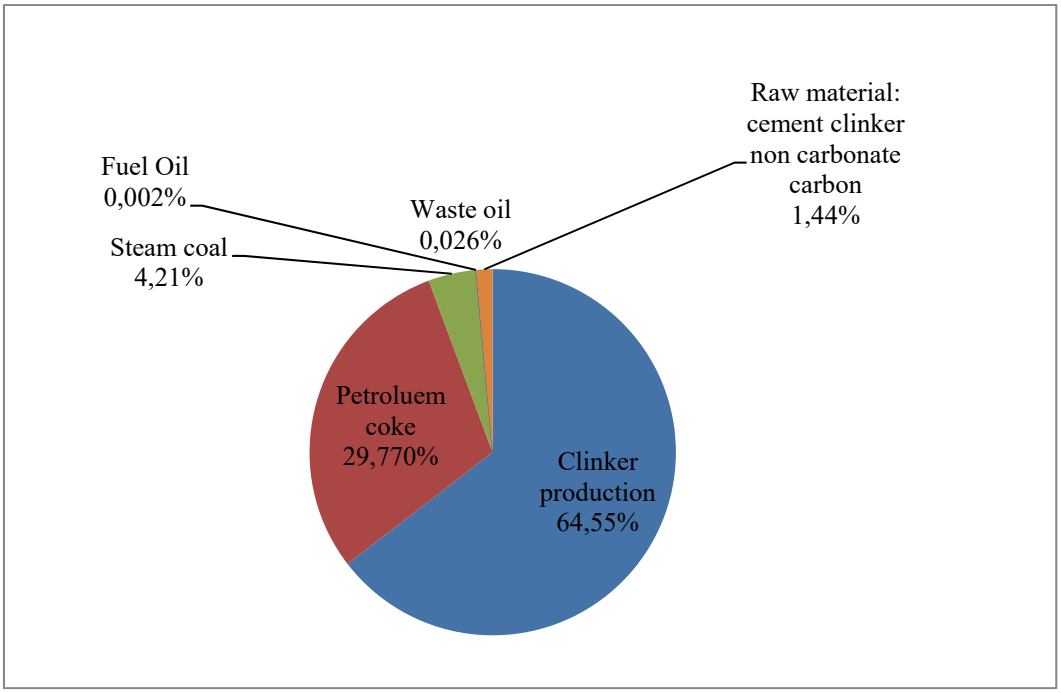

Fig.1: CO_2 Emission distribution of the cement factory.

Conclusion

Cement industry is one of the major industries for mitigation of the GHG emissions since it is the main emission sources in Turkey, as in the world. In this study the emissions are calculated according to the Tier 1 approach of the IPCC methodology. Thus process emission factor of the factory is the default value. In the future study factory specific CO2 emission factor may be calculated to get more certain values to evaluate. Since the major combustion emissions come from petroleum coke and steam coke, it will be a good opportunity for the factory to use waste oil and ELT as alternative fuels to mitigate its the carbon footprint.

Acknowledgements

The author would like to thank Sevgi Üçkan Environmental Chef of Traçim Çimento A.Ş. for the data supply of this study.

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COMPARISON OF SUGAR AND ORGANIC ACID CONTENTS OF TURKISH ORANGES JUICES*

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Abstract: Two different orange juices obtained from *cvs.* Kozan Misket and Kozan Yerli were compared in terms of sugar and organic acid composition. These two parameters are important in determining the ripeness of fruits. Samples were obtained from Cukurova region of Turkey and the analysis was carried out by high-performance liquid chromatographic methods. Four organic acids (citric, ascorbic, malic and succinic acids) and three sugars (sucrose, glucose and fructose) were determined. Sucrose had the majority in sugars in both samples with the concentration of 61.02 g/l in Kozan Misket and 63.23 g/l in Kozan Yerli, respectively. With regard to organic acids, citric acid was found to be present in the largest amounts having concentration of 16.25 g/l in Kozan Misket and 15.90 g/l in Kozan Yerli in both samples.

Keywords: Orange juice, organic acid, sugar, *cv.* Kozan

Introduction

Orange, the third largest produced fruit crop after grape and apple in Turkey, is an important fruit in terms of its high nutritional value and organoleptic properties (Selli, 2011). Turkey has reached an average of 1,277,613 tonnes in orange production according to the data in FAO (FAO, 2014). It is produced mainly in southern and eastern regions of Turkey and Cukurova region is known as the main production area (Kelebek, 2011). In this region, Kozan oranges stand as a native orange variety grown in a large scale. The fruit is generally medium size and has a bright orange flesh (Kelebek, 2009). Kozan oranges are claimed to be of the best quality for processing when harvested in February and March (Selli, 2008). Important parts of oranges are consumed as fresh and the remaining parts are processed into orange juice and concentrated. Organic acids and sugars are in the group of major compounds of oranges varying to the species and environmental conditions. Their concentrations are known to have an important effect on sensory characteristics of oranges and juices (Albertini, 2006). Organic acid is a substantial criterion to ascertain the adulteration in fruits. Citric and malic acids are responsible for the majority of citrus fruits. In addition, benzoic, oxalic and succinic acids were also reported to present in trace amounts (Karadeniz, 2004). Sugars form the greater part of soluble solids in orange juice and it is reported that the sweetness of juice is pertain to the sugar composition (Kelebek, 2009). Glucose, fructose and sucrose are known as main sugars found in orange juices (Albertini, 2006). The aim of this study was to determine and compare these two important parameters in orange juices obtained from *cvs*. Kozan Yerli and Kozan Misket.

Materials and Methods

Kozan Yerli (Figure 1) and Kozan Misket (Figure 2) oranges were obtained from Kozan district of Adana province of Turkey. Oranges were used for each variety with an average of 30 kg and age of the trees as well as the maturity of oranges was paid attention to be similar for picked fruits. Sugar and titration acidity were used in the determination of maturity. The samples were extracted by cutting the fruit in half and carefully hand-squeezing in a household type electric hand juicer (Siemens MC30000, Germany) on the same day of harvesting.

Figure 1. Kozan Yerli oranges

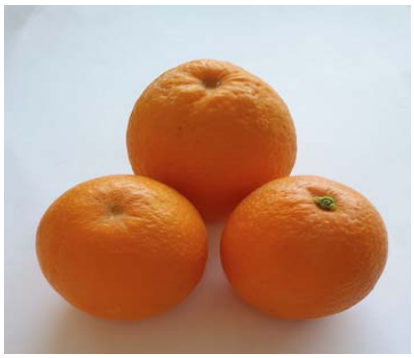

Figure 2. Kozan Misket oranges

Sugar and organic acid analyses of orange juices were carried out according to the methods of Lee and Coates (2000) with a slight modification. 100 ml sample from each variety vas centrifuged at 12000 rot/min and 4ºC, and then supernatants were passed through a 0.45 µm filter. Obtained extract was injected directly to a HPLC (LC-10A HPLC Series, Shimadzu, Kyoto, Japan) including SPD-20A UV/Vis (Shimadzu LC20AD) and RID 10A refractive index detectors. 5 mM sulfuric acid solution was used as mobile phase and flow rate is fixed as 1 ml/min.

External standard method was used in determination of sugar concentrations in samples. Calibration solutions were prepared using five different concentrations of sucrose, glucose and fructose standards and HPLC analyses were carried out. Calibration curves were obtained from the data and with the use of these curves, sugar concentrations of orange juices were determined.

Organic acid analysis was also performed with the same method using citric, ascorbic, malic and succinic acids as standards.

Results and Discussion

Sugar Composition

Sugars are one of the most significant compounds of citrus fruits. Three sugars (sucrose, glucose and fructose) were determined in the samples as displayed in Table 1. Total sugar concentration of Kozan Yerli and Kozan Misket orange juices were 126.52 g/l and 133.44 g/l respectively. Stella et al. (2011) indicated that the total sugar amounts of various ready-to-drink orange juices can change in between 95-165 g glucose/l. As Kelebek (2009) implied, three simple sugars which are sucrose, glucose and fructose are responsible for the main portion of carbohydrates in citrus fruits. It is also pointed out that these sugars form about 80% of the total soluble solids in orange juice. Kozan Yerli orange juices had the sugar composition as sucrose with an amount of 61.02 g/l, glucose with 35.16 g/l and fructose with 30.34 g/l. The sugar concentration of Kozan Misket juices was similar to Kozan Yerli including 63.23 g/l sucrose, 37.45 g/l glucose and 32.76 g/l fructose. Sucrose had the majority in sugars of both samples. As reported, the ratios of sucrose:glucose:fructose are generally about 2:1:1 (Kelebek, 2009). Our results show correlation with this information. As stated in the same study, *cv.* Kozan orange juices were found to have 59.34 g/l sucrose, 32.30 g/l glucose and 28.55

g/l fructose. Another study investigated *cv.* Dortyol orange juices specific to Turkey and determined the sugar composition as 46.60 g/l sucrose, 30.99 g/l glucose and 33.05 g/l fructose (Kelebek, 2011).

Table 1: Sugar composition of Kozan Yerli and Misket orange juices

Sugars	**Kozan Yerli**	**Kozan Misket**	**F**
Sucrose	61.02±0.03	63.23±0.23	*
Glucose	35.16±0.15	37.45±0.02	*
Fructose	30.34±0.16	32.76±0.07	*

Concentrations are given as g/l. *Significance at which means differ as shown by analysis of variance (P<0.05).

Organic Acid Composition

Citrus fruits are known for rich organic acid content. It is also reported that, organic acids and sugar contents are used for the determination of maturity and sensorial quality (Kelebek, 2011). Four organic acids (citric, ascorbic, malic and succinic acids) were separated and identified in both Kozan Yerli and Misket orange juices. As displayed in Table 2, citric acid was found to be present in the largest amounts in both samples having concentration of 16.25 g/l in Kozan Yerli and 15.90 g/l in Kozan Misket. Kelebek (2011) determined the citric acid concentration as 14.22 g/L in Dortyol orange juices. Saavedra (2001) indicated that the citric acid amount change in the range of 8.4-12.6 g/l in freshly hand-squeezed Navelina orange juices. Malic acid followed the lead with an amount of 4.01 g/L and 3.78 g/L in Kozan Yerli and Misket respectively. In the same study of Kelebek (2011), the malic acid concentration is reported to be 3.91 g/L in Dortyol variety. Acidic citrus fruits, especially oranges have high antioxidant activity resulting from the ascorbic acid concentrations. Ascorbic acids are known to be strong antioxidants and used as implication for quality of orange juices (Kelebek, 2011). In the results, Kozan Yerli is shown to have higher ascorbic acid concentration than Kozan Misket with amounts of 0.55 and 0.44 g/l respectively. Reported results show that Navel orange juices also have ascorbic acid in addition to Valencia and Dortyol orange juices. Navel orange juices are stated to have 0.49 g/l ascorbic acid, Dortyol whereas juices have 0.47 g/l and Valencia juices have 0.41 g/l of ascorbic acid (Melendez-Martinez, 2007; Selli, 2011). Ascorbic acid concentrations of different orange juices from Mediterranean region are reported to change between 0.39-0.62 g/l (Melendez-Martinez, 2007).

Table 2: Organic acid composition of samples.

Organic Acids	**Kozan Yerli**	**Kozan Misket**	**F**
Citric Acid	16.25±0.05	15.90±0.13	*
Ascorbic Acid	0.55±0.17	0.44±0.06	NI
Malic Acid	4.01±0.05	3.78±0.13	*
Succinic Acid	1.93	0.88	*

Concentrations are given as g/l. *Significance at which means differ as shown by analysis of variance (P<0.05); NI: Not important in terms of statistical analysis.

Conclusion

In present study, sugar and organic acid compositions of orange juices obtained from *cvs.* Kozan Yerli and Kozan Misket grown in from Cukurova region of Turkey were examined. The results displayed similarity between two varieties. Kozan Yerli had slightly higher organic acid while Kozan Misket had higher sugar concentration. Four organic acids (citric, ascorbic, malic and succinic acids) and three sugars (sucrose, glucose and fructose) were determined in both varieties. Sucrose had the majority in sugars in both samples with the concentration of 61.02 g/l in Kozan Misket and 63.23 g/l in Kozan Yerli, respectively. In terms of organic acids, citric acid was found to be the abundant compound with a concentration of 16.25 g/l in Kozan Misket and 15.90 g/l in Kozan Yerli in both samples. Malic acid was found to have the second highest concentration in all samples. Organic acid and sugar composition and

concentration are important in determination of quality in fruits and juices; hence this research is beneficial about orange juices. However, further investigation is advised.

Acknowledgement:
This research was supported by Cukurova University Research Fund (Project no: ZF2013YL47).

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DETERMINATION OF SURFACE CHARACTERISTIC OF ATMOSPHERIC PRESSURE PLASMA MODIFIED POLYMERIC ULTRAFILTRATION MEMBRANE VIA CONTACT ANGLE MEASUREMENTS

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Abstract: The aim of this study was to improve the surface hydrophilicity of ultrafiltration membrane (UP150, PES, MWCO; 150 kDa) by using atmospheric pressure argon plasma jet (APAPlJ) modification system. Argon was selected as a precursor gas and three different distances between nozzle and substrate surface (25-30-35 mm) and three different exposure period (1-5-10 times) was applied during APAPlJ modifications. The effect of APAPlJ modifications on the membrane surface evaluated by contact angle measurements, surface free energy (SFE) method and xVDLO theory. APAPlJ modification was able to change membrane surface properties. More hydrophilic surface properties were obtained by APAPlJ modifications using 25 mm of distance of nozzle to substrate surface and 5 times of exposure period. Under these conditions, the water contact angle was decreased from 63.5 to 34.6°. The base component of SFE was increased 5 times and Giwi value was increased from -45.0 to 28.7 mJm^{-2}.

Keywords: Ultrafiltration membrane, atmospheric pressure argon plasma jet, modification, contact angle measurement, SFE, xVDLO theory

Introduction

The membrane separation processes is widely used today for separation of wide varying mixtures, purification and concentration of valuable components from industrial wastewater in petrochemical (Ravanchia et al., 2009), textile (Ciardelli et al., 2000), and food (Baldasso et al., 2011; Onsekizoglu 2013) industries. Especially, polimeric commercial membranes such as polyethersulfone (PES), polysulfone (PS), polyvinylidene fluoride (PVDF) are widely used in the pressure-driven membrane processes due to their high thermal, mechanical and chemical resistance (Mulder, 1996) However, they have hydrophobic surface properties, so that it severely limits its long-term membrane separation processes. Therefore, they need to surface modification to enhance hydrophilicity (Demirci et al., 2014).

Plasma modification is one of the modification method to change surface properties of membrane. It has many important advantages such as uniformity, reproducibility, short reaction time, and environmental safety. Plasmas, often considered as the fourth state of matter, are composed of an ionized gas containing a mixture of ions, electrons, neutral and excited molecules, and photons (Kull et al., 2005; Gulec et al., 2006). Plasma treatments can alter the surface energy of most polymers, changing their surface polarity, wettability, and adhesive characteristics without affecting the overall bulk properties. Helium, oxygen, nitrogen, argon plasma are used to modify polymeric membrane surfaces from hydrophobic to hydrophilic increasing the surface polar groups (Saxena et al., 2009). In addition, the changes in the polymeric surface depend directly on the plasma treatment conditions (Wavhal and Fisher, 2005).

The hydrophobicity or hydrophilicity of a solid surface can be determined by contact angle measurement which is a simple, useful and very sensitive method (Gulec et al., 2006). The surface free energy (SFE) and SFE components of membrane can be calculated with different approaches such as Zisman Plot, Equation of State, Fowkes/WORK, Wu and van Oss, Good and Chaudhury. van Oss, Good and Chaudhury's acid–base method is widely used by researchers, because it provide more detailed information about electron-acceptor and electron–donor interactions through membrane and test liquid interface (Cantin et al., 2006; Zenkiewicz, 2007; Damar Huner and Gulec, 2016). xVDLO theory is also used to evaluate interaction between foulant and membrane and it shows surface characteristic and fouling tendency of membrane surface (Subhi et al., 2012; Zuo and Wang, 2013).

Steen et al. (2002) reported that low temperature H_2O plasma treatment improved the hidrophilicity of PES membrane. Their study revealed that the contatct angle of unmodified membrane decreased from 69.5 to nearly

0°. They obtained highly hydrophilic surface. Saxena et al. (2009) used argon–oxygen (Ar–O_2) plasma to modify the PES membrane. Unmodified PES membrane water contact angle value degreased from 56.9 to 8.6° by using Ar–O_2 plasma (%60 O_2 concentration) at 10 min exposure time. These results clearly demonstrated that the plasma treated PES membrane was more hydrophilic surface. Wavhal et al. (2002) modified PES membranes using low temperature Ar plasma, followed by grafting of hydrophilic monomers in the vapor phase. After 90 s plasma treatment, water contact angle of PES decreased from 90 to 40°. In literature, there is limited investigation report about the PES membrane modification using atmospheric pressure plasma jet (APAPlJ) system. And also, this study contributes by using contact angle measurement to determine surface hydrophilicity.

The objective of this study was to improve the surface hydrophilicity of UP150 PES ultrafiltration membrane, by using atmospheric pressure argon plasma jet (APAPlJ) modification system. Initially, different APAPlJ parameters (plasma treatment period: 1, 5 and 10 times, distance between nozzle and membrane surface: 25, 30, 35 mm) were used. The effects of APAPlJ modification on the membrane surface were determined using contact angle measurements. Surface free energy of unmodified and APAPlJ modified membrane were calculated using acid-base methods. The hydrophobicity/hydrophilicity characteristic of membrane was evaluated accordingly xVDLO theory.

Material and Methods

Material

Flat sheet commercial polyethersulfone ultrafiltration membrane (UP150) was used. Specific properties of the ultrafiltration (UF) membrane are summarized in Table 1. Before the plasma treatments and contact angle measurements, membrane was cut into rectangular shapes having size of 76 x 20 mm manually and they were fixed to glass support with double-sided tape.

Table 1: Specific properties of commercial microfiltration membrane

Supplier	Membranes	Material	MWCO (KDa)	Maximum Temperature	pH	Permeability (L m^{-2} $h^{-1}$$bar^{-1}$)
Microdyn-Nadir	UP150	PES	150	95 °C	0–14	286[a]

[a]: according to the indicative properties by the membrane manufacturer

Atmospheric pressure plasma jet system

The atmospheric pressure plasma jet system (OpenAir) manufactured by PlasmaTreat GmbH (Steinhagen, Germany). OpenAir plasma system (Fig. 1.) is equipped with plasma rotary jet (nozzle-RD2004), metallic carrier platform (10 x 20 cm) which allows x-direction of the moving at a parallel speed of 0 to 60 m min^{-1}, manual y-direction of moving column adjust the distance between substrate and nozzle, and plasma generator (FG5001). The membrane was placed in a distance of 25, 30 and 35 mm to the nozzle on metallic carrier platform that was moved with a speed of 1.5 m min^{-1}. Three different treatment times (1, 5, 10 times) were chosen for the plasma surface modification. The precursor gases to be used for plasma modification were selected argon at an input pressure of 3 bar. UP150 membrane was soaked ultra-pure water at 24 h to ensure wetting of membrane structure before and after modification.

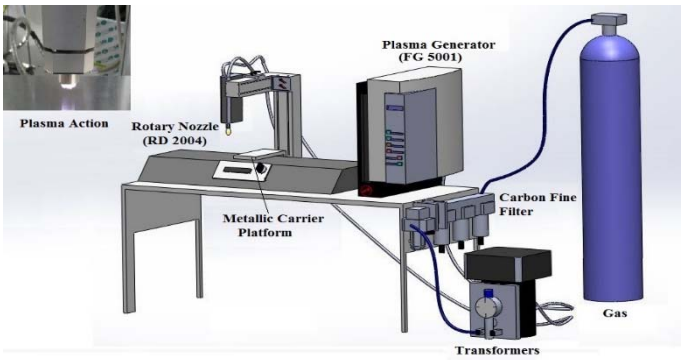

Figure 1. Schematic illustration of the PlasmaTreat OpenAir atmospheric pressure plasma jet system

Contact angle measurements

Theta Optical Tensiometer (KSV Attension Instruments, Helsinki, Finland) was to measure the contact angle. It was equipped with an automated droplet dispenser, a high speed digital camera (60 fps), and image analysis software (OneAttension). OneAttension used Young-Laplace three-phase system consisting of standard test liquid, solid surface and air for contact angle determination (Fig. 2.). Contact angles measurement was performed by sessile drop technique using three standard liquid (ultra-pure water, formamide, diiodomethane). The droplet volume of standard liquids was 2.5 µl and the drop image was captured during 60 s. The contact angle measurements were performed at 5 random locations at room temperature (25 ± 3 ºC).

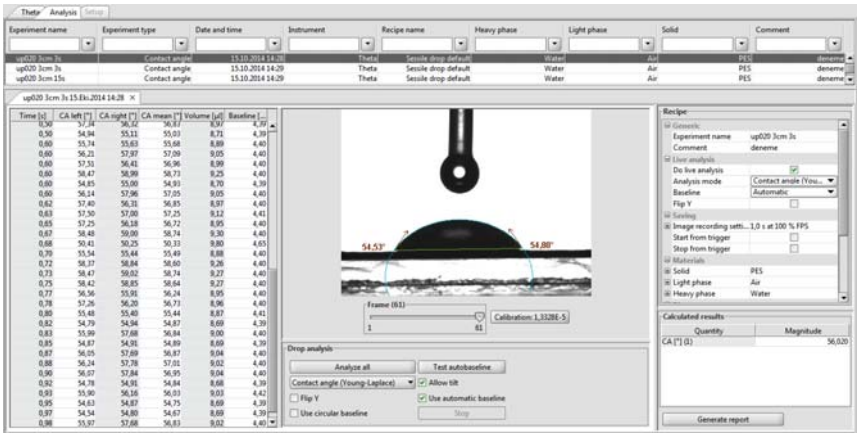

Figure 2. Contact angle in a three-phase system consisting of solid surface, liquid, and air (from OneAttention software)

Calculation of surface free energy

Surface free energy of membrane was calculated van Oss, Good and Chaudhury's acid–base method (van Oss et al., 1988). The surface free energy (SFE) was the sum of two components (Eq. 1), Lifshitsz van der Waals interactions (LW) and Lewis acid–base interactions (AB) according to this method. While, γ^{LW} represents apolar interactions such as London dispersion forces, dipole-dipole Debye and Keesom interactions, γ^{AB} also mentioned as the "polar component" contains, hydrogen bonding, π bonding and ligand formation (Cantin et al., 2006; Rieke 1997).

$$\gamma_{SV}^{TOT} = \gamma_{SV}^{LW} + \gamma_{SV}^{AB} \quad (1)$$

Lewis acid–base interactions are divided within itself, including the electron acceptor (Lewis acid, γ_i^+) and electron donor (Lewis base, γ_i^-) components and expressed as a geometric mean of acid and base force components.

$$\gamma_i^{AB} = 2\sqrt{\gamma_i^+ \gamma_i^-} \quad (2)$$

The solid-liquid interface tension can be expressed as

$$\gamma_{SL} = \gamma_{SV} + \gamma_{LV} - 2\left[\sqrt{\gamma_{SV}^{LW}\gamma_{LV}^{LW}} + \sqrt{\gamma_{SV}^+\gamma_{LV}^-} + \sqrt{\gamma_{SV}^-\gamma_{LV}^+}\right] \quad (3)$$

Combining this equation with Young-Dupre equation (Eq. 3) obtains van Oss, Good and Chaudhury's acid–base equation. The SFE of unmodified and modified membranes was calculated by this equation.

$$\gamma_{LV}(1 + \cos\theta) = 2\left[\sqrt{\gamma_{SV}^{LW}\gamma_{LV}^{LW}} + \sqrt{\gamma_{SV}^+\gamma_{LV}^-} + \sqrt{\gamma_{SV}^-\gamma_{LV}^+}\right] \quad (4)$$

At least 3 different standard liquids of known surface tension components are needed to determine the unknown surface free energy components ($\gamma_{SV}^+, \gamma_{SV}^-, \gamma_{SV}^{LW}$) of the membrane surface. Generally, to solve the equation should be used one dispersive and two polar liquid. In this study, polar liquids ultrapure water, formamide; and non-polar liquid diiodomethane were used as a standard liquid (Table 2).

Table 2: Specific properties of the test liquids used in this study (OneAttention software)

	γ^{tot} [mN/m]	γ^{d} [mN/m]	γ^{+} [mN/m]	γ^{-} [mN/m]	g [g/cm^3]	Ŋ [mPa.s]	T [°C]	Mw [gmol]
Water	72.80	21.80	25.50	25.50	0.998	1.00	20.00	18.01
Formamide	58.00	39.00	2.28	39.60	1.133	3.30	20.00	45.04
Diiodomethane	50.80	50.80	0.00	0.00	3.325	2.80	25.00	267.84

xVDLO theory

In this study, Derjaguin, Landau, Verwey and Overbeek (xDLVO) theory was used to determination of hydrophilicity and hydrophobicity of membrane surface after plasma modification. According to, the total free energy of cohesion (ΔG_{iwi}^{Tot}) between foulant (i) and water (w) is the sum of apolar Lifshitz–van der Waals (LW) and polar acid–base (AB) forces (van Oss, 1993). ΔG_{iwi}^{Tot} can be written as

$$\Delta G_{iwi}^{Tot} = -2\left[\left((\gamma_i^{LW})^{\frac{1}{2}} - (\gamma_w^{LW})^{\frac{1}{2}}\right)^2 + 2\left((\gamma_i^{+}\gamma_i^{-})^{\frac{1}{2}} + (\gamma_w^{+}\gamma_w^{-})^{\frac{1}{2}} - (\gamma_i^{+}\gamma_w^{-})^{\frac{1}{2}} - (\gamma_w^{+}\gamma_i^{-})^{\frac{1}{2}}\right)\right] \quad (5)$$

If ΔG_{iwi}^{Tot} is lower than zero ($\Delta Giwi < 0$), the membrane is considered hydrophobic surface properties. In contrast, if ΔG_{iwi}^{Tot} is larger than zero ($\Delta Giwi > 0$), the membrane shows hydrophilic properties and has less fouling tendency (Subhi et al., 2012; Zuo and Wang, 2013).

Results and Discussion

Contact angle measurements

The aim of this study was to investigate the influence of the treatment parameters on the hydrophilicity and hydrophobicity properties of the membrane surface. The surface properties of the unmodified and APAPlJ modified membranes were characterized by contact angle measurements. Three different treatment times (1-5-10 times) and three different distances between nozzle and membrane surface (25-30-35 mm) were chosen as plasma treatment conditions.

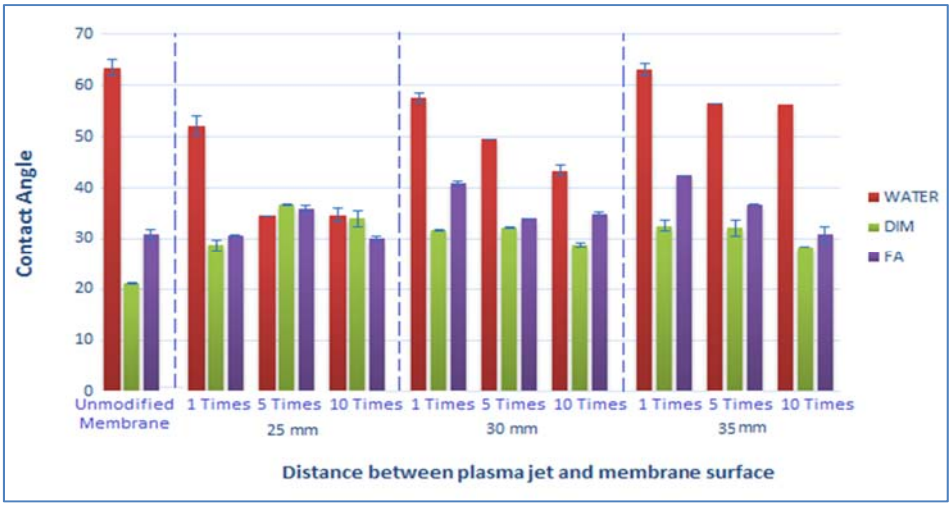

Figure 3. The contact angle measurements according to plasma jet modification conditions

If the water contact angle (θw) is higher than 65°, the surface is considered hydrophobic and if θw is lower than 65°, it is considered hydrophilic (Sadiki et al., 2014). According to the results presented in Fig. 3., θw showed that unmodified UP150 PES membrane has moderately hydrophobic surface (θw = 63.5 ± 1.6°). Similar results

were reported by Steen et al., (2002); Kim et al., (2009). They were evaluated the hydrophobic character of the PES membrane (θw = 69.5°, θw = 69.0° respectively).

The contact angle results of unmodified membrane were changed depending on plasma treatment conditions (Fig. 3.). The results revealed that, θw decreased with plasma treatment in all parameters. However, a slight decrease of θw was observed at the distance of 30 and 35 mm. In addition, θw decreased with increasing treatment times for the same distances. This can be attributed to high interaction between plasma ions and membrane surface with increasing treatment times. For plasma treatment, the lowest θw (θw =34.6±0.0°) was obtained at the distance of 25 mm and 5 times treatment (Fig. 4.).

Although, many other studies explained that the surface hydrophilicity related to the water contact angle value (Steen et al., 2002; Wavhal et al., 2002), diiodomethane and formamide contact angle values also can give an information about hydrophilicity. The surface hydrophilicity increases with decreased formamide contact angle (θf) and increased diiodomethane contact angle (θd). In this study, while θd increased in all plasma treatment conditions, the significant increase was observed at 25 mm 5 times (θd =36.6±0.1°). The lowest contact angle of formamide was obtained at 25 mm distance 10 times (θf =30.1±0.5°).

Figure 4: Water droplet image on UP150 PES unmodified (a) and APAPlJ modified membrane 5 times at 25 mm (b)

Saxena et al. (2009) used argon–oxygen (Ar–O2) plasma to modify PES membranes. They found that the contact angle decreases from 57.0° (untreated membrane) to 8.6° (Ar–O2 plasma treated membrane). Their study revealed that higher exposure time increases the hydrophilicity. Contrarily, in this study, the highest exposure period (10 times) did not decrease the water contact angle value as in 5 times treatment condition. This was mainly attributed to using only argon as a precursor gas in this study.

Calculation of surface free energy

The surface free energy was calculated from acid-base method. Total (γ_S^{tot}), disperse (γ_S^d), polar (γ_S^p), acid (γ_S^+) and base (γ_S^-) components of unmodified and modified membrane were given Table 3.

Table 3: The SFE components of unmodified and APAPlJM membrane

Distance (mm)	Times	γ_S^{tot} [mJm^{-2}]	γ_S^d (γ_S^{LW}) [mJm^{-2}]	γ_S^p (γ_S^{AB}) [mJm^{-2}]	γ_S^+ [mJm^{-2}]	γ_S^- [mJm^{-2}]
Unmodified Membrane		64.9±1.2	47.6±0.2	17.3±1.4	1.2±0.3	8.1±2.4
25	1	73.8±0.4	44.8±0.4	29.1±0.8	0.7±0.1	21.4±2.2
	5	50.7±1.8	41.3±0.0	9.4±1.8	0.1±0.0	47.5±0.5
	10	69.0±4.2	42.5±0.7	26.5±4.8	0.3±0.1	42.9±1.5
30	1	52.0±0.2	43.5±0.1	8.6±0.3	0.2±0.0	20.5±1.0
	5	66.7±0.1	43.3±0.0	23.4±0.2	0.4±0.0	26.3±0.0
	10	52.0±1.4	44.7±0.2	7.3±1.6	0.1±0.0	35.4±0.3
35	1	52.9±0.1	43.1±0.5	9.8±0.6	0.3±0.0	14.5±1.2
	5	63.2±1.8	43.3±0.7	19.9±2.5	0.5±0.0	19.3±1.4
	10	74.3±4.0	44.9±0.0	29.5±4.1	0.9±0.2	16.6±0.7

According to van Oss, Good and Chaudhury's method, especially higher base component value (γ_S^-) shows hydrophilicity character of surface (Sadiki et al., 2014). The results presented in Table 3, the γ_S^- component of SFE of UP150 showed a significant increase at 25 mm distance and 5 times treatment conditions. The γ_S^d component decreased from 47.6 to 41.3 mJ m^{-2} at the same treatment conditions. These results clearly indicated that APAPlJ modified membrane had more hydrophilic surface than unmodified membrane.

xDVLO theory

xVDLO theory was performed to state the change of surface hydrophilicity. While positive Giwi value indicates the hydrophilic surface, negative Giwi value refers hydrophobic surface properties. The effects of plasma modification on Giwi value were evaluated by MINITAB and presented in three dimensional graphs (Fig. 5.).

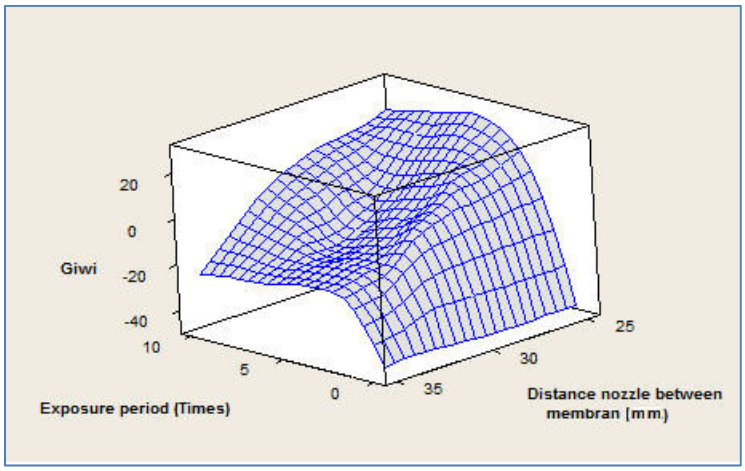

Figure 5: 3D graph depicts exposure period - distance nozzle to membrane surface - Giwi value

As shown in Fig. 2, Giwi value of unmodified membrane was lower than zero (Giwi=-45.8), it had a hydrophobic surface. While the treatment provided a positive effect on hydrophilicity of membrane in exposure period at 35 mm distance, Giwi did not take a positive value for this condition. This may be attributed to the weak interaction between the ions and electrons generated by plasma and the membrane surface. In contrast to this, the ions and electrons generated by plasma reacted easily with reactive groups on PES membrane surface at 25 mm distance. The highest positive value (Giwi=28.7) which indicates the hydrophilic property was observed at 5 times of exposure period and 25 mm of distance.

Conclusion

The main goal of this study was to determine change of hydrophilicity of UP150 PES membrane surface under various APAPlJ treatment conditions. The contact angle measurements, SFE method and xVLDO theory were used to evaluate the APAPlJ modification effect on the UP150 PES membrane surface. The results revealed that the use of APAPlJ to modify the PES membrane is an effective way to improve its surface hydrophilicity. The more hydrophilic surface properties (the lowest water contact angle, the highest base value of SFE and the highest Giwi value) were obtained by APAPlJ modifications using 25 mm of distance between nozzle and substrate surface and 5 times of exposure period.

Acknowledgment

This research was supported by the Scientific and Technological Research Council of Turkey (TUBITAK, Grant No: 112O836) and The Fund of Scientific Research Projects of Trakya University (TUBAP; Grant No: 2014/75).

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FRICTION AND WEAR BEHAVIOR OF PLASMA TRANSFERRED ARC COATING ON AISI 4140 STEEL OF BORON CARBIDE AND NICKEL POWDER MIXTURE

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Abstract: Reducing effect of wear and friction is an important research area in machine design. In order to reduce these effects; lubrication, heat treatments and coatings are used on machine parts. Hard coatings are used in wear intensive environments and Plasma Transferred Arc (PTA) Coating is an innovative hard coating method. PTA coatings are used in applications such as automotive valves, glass and ceramic molds and plastic extrusion dies. PTA coating properties are gained from coating powder, thus coating powder research is an important aspect. In this study microstructure and wear behavior of AISI 4140 steel surface coated by Boron Carbide was inspected. Two different mixtures was prepared, Ekabor II ™ powder that contains Boron Carbide and pure Boron Carbide was mixed with a Nickel base to produce two different coating powder recipes. Wear tests were conducted on a Ball-on-Disk device with circular geometry. Optical and Electron Microscopy was used to characterize microstructure of coating layer formed on the surface of AISI 4140.

Key Words: Boron Carbide, PTA, Tribology, Ball-on-Disk

Introduction

Industrial applications cause friction and wear on parts. An important research field is the reduction of wear and friction. Lubrication is the first method used to reduce friction and wear. When lubrication cannot achieve required properties surface modification techniques are used. An important surface modification technique is Plasma Transferred Arc (PTA) coating that can reach high temperatures up to 30000K and has a relatively ease of use (Liu, Liu, Xu, & Yang, 2010). Low thermal stress on material, high coating thickness and high energy density makes PTA coatings a suitable method for glass and ceramic molds, automative valves, petro-chemical vanes, lamination cylinders, plastic extrusion molds and plastic extrusion screws (Gatto, Bassoli, & Fornari, 2004). PTA coating powders are composed of a base and additional materials. Base powders are usually composed of Cobalt and Nickel powders, where as WC, NiCrWC, Cr3C2, TiC and VC additives are used on steel to achieve required properties (Deuis, Yellup, & Subramanian, 1998).

In this study effect of B4C addition on PTA coatings was examined. Two different B4C sources were used and their effect on coating properties were inspected. Coating samples than tested on Ball-on-Disk machine. Both wear test samples and metallography samples were inspected by SEM and EDS.

Materials and Methods

In this study Ekabor II (that contains 5% B_4C, 5% KBF_4 and 90% SiC (Suwattananont, n.d.)) or Boron Carbide (B_4C) was mixed with Nickel in weight ratios given at Table 1 to produce PTA powder. The coating powder produced was put on a channel prepared on 100x40x20mm AISI 4140 steel with 1 mm depth and 3 mm width. A binding agent was used for binding powder to sample surface and samples were left to dry for 24 hours in a shaded moisture controlled environment. PTA coating is conducted at 100A current with a 3mm electrode and working distance of 4mm after 24 hour period and samples were preheated at 300ºC. Argon was used as shielding and plasma gas at 25 l/min and 1.0 l/min flow rates respectively.

Sample	Powder	Ratio	Mixing Method
N1	Ekabor II	4%	Manual
N2	Ekabor II	8%	Manual
C1	Ekabor II	6%	Manual
C2	Ekabor II	10%	Manual
C3	Ekabor II	12%	Manual
C4	Ekabor II	4%	Mill
C5	Ekabor II	6%	Mill
D1	Ekabor II	8%	Mill
D2	Ekabor II	10%	Mill
D3	Ekabor II	12%	Mill
E1	B4C	4%	Mill
E2	B4C	6%	Mill

Table 1 PTA Powder Mixtures

Cross sections of PTA coated samples were taken for metallography analysis. Metallography specimens were prepared by standard sample preparation techniques and etched with 2% Nital etchant for 40s.

Ball-on-Disc wear tests were conducted on CSM tribometer at 3N load, 2.5 cm/s speed for 80m. Samples surfaces were prepared to 0.6μm average surface roughness prior to test. Counterpart for Ball-on-Disc tests were 3mm diameter WC balls and all tests were conducted at 25ºC ambient temperature and 35% relative humidity. In order to calculate specific wear rate wear track profiles were measured using Mutitoyo SJ-400 surface profilometer. Ball-on-Disc test results were analyzed using trib R package developed by authors (AY, 2015).

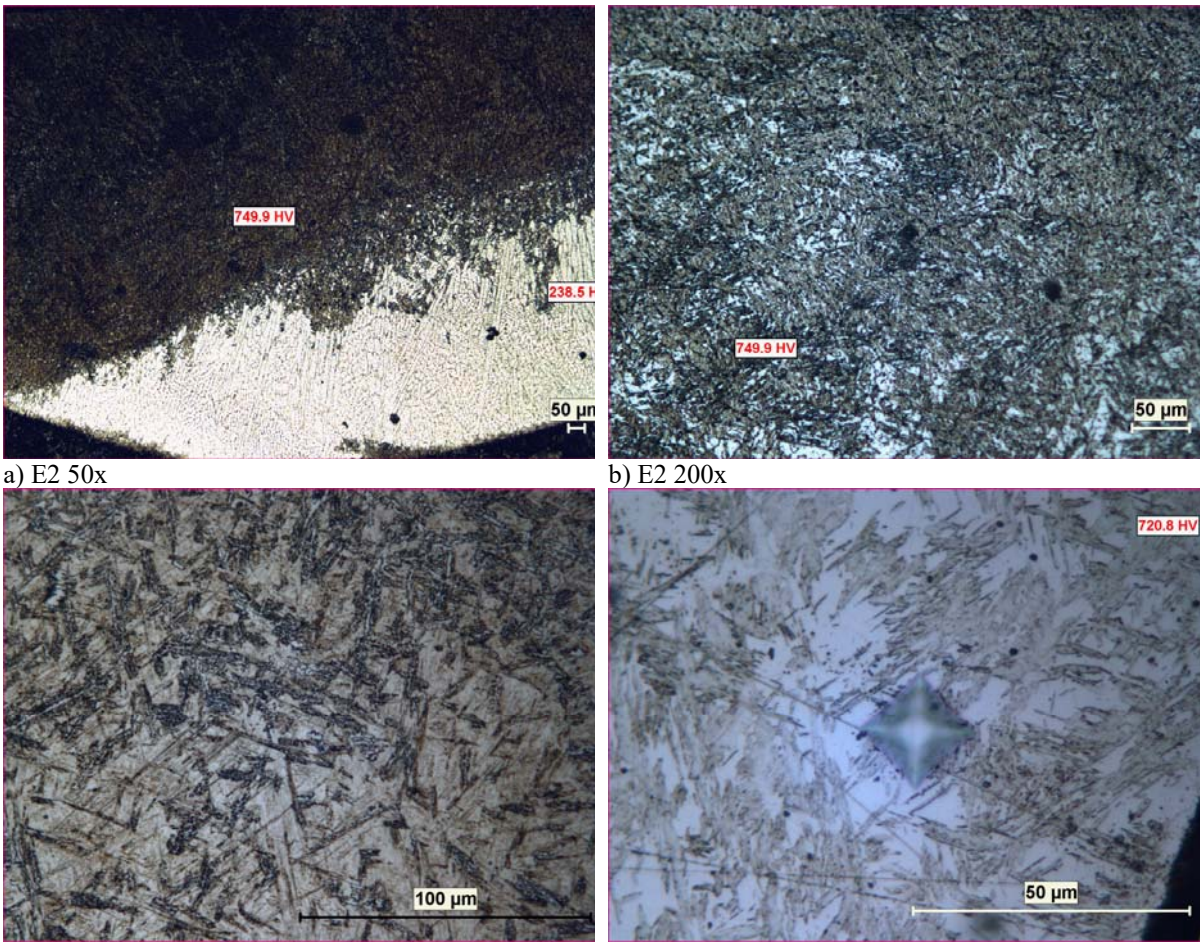
Results and Discussion

Microstructure

In order to understand coating a panoramic image of etched samples were obtained. As can be seen from **Figure *1***, coating produced different phase structures. These phases have varying hardness.

Figure 1. Panoramic view of D1

Figure *2* a, shows hardness values of different phases differ between 750HV and 240 HV. As seen in **Figure *2*** b, c and d; high hardness phases have more dendritic formations.

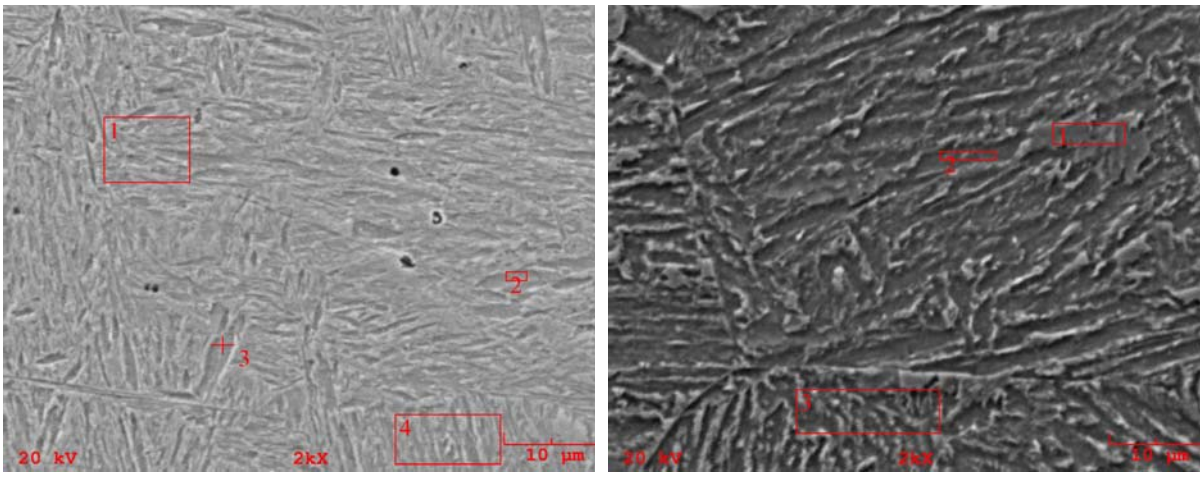


a) E2 50x b) E2 200x

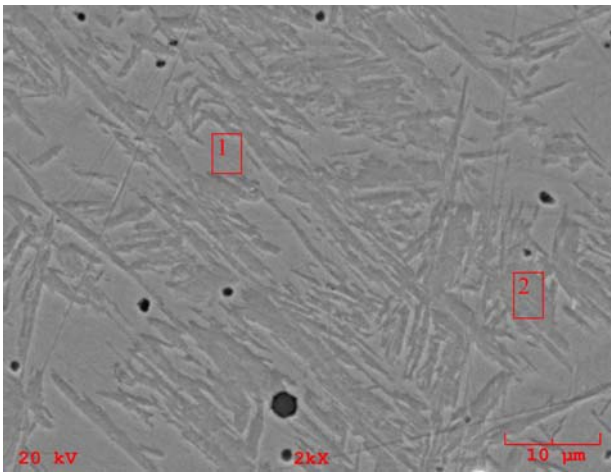
c) C1 500x d) D3 1000x

Figure 2. Samples etched with Nital 2% 40s

SEM and EDS analysis of samples were conducted. As a representation SEM images and EDS results of sample D3 is given at **Figure *3*** and **Figure *4*** respectively. SEM results show there are dendritic formations and carbide phases. EDS analysis determines Cr and Mn from substrate mixed into the coating.

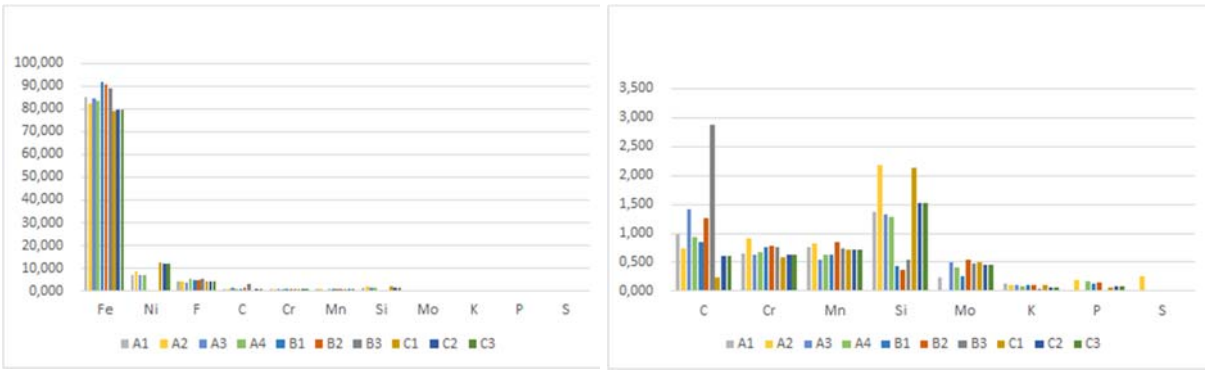


a) SEM image of D3 b) SEM image of D3



c) SEM image of D3

Figure 3. SEM images of sample D3

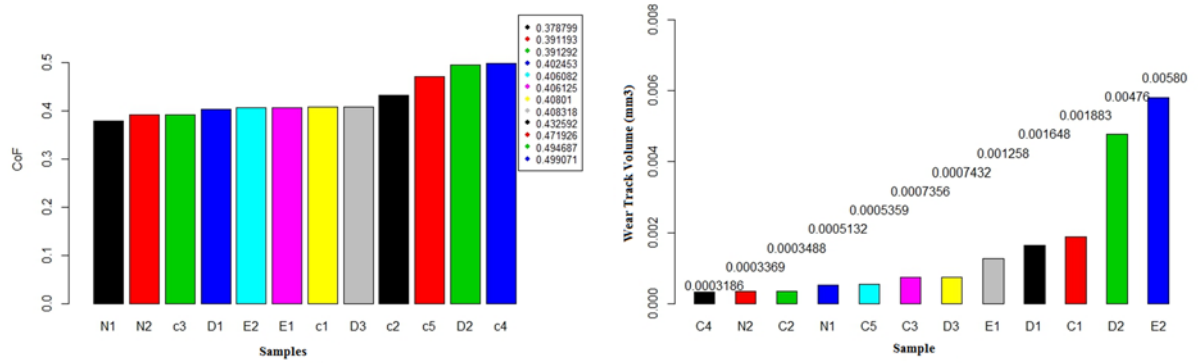


a) Element Weight Ratios of sample D3 b) Element Weight Ratios of sample D3 lower values

Figure 4. EDS Analysis of sample D3

3.2 Ball-on-Disk Test

The results of ball-on-disk tests were analyzed using trib on R. Coefficient of friction and wear track volumes of samples are given at **Figure *5***. The sample with the least amount of wear track volume, C4 has the highest CoF.



a) Coefficient of Friction of Samples b) Wear Track Volume of Samples

Figure 5. Coefficient of Friction and Wear Track Volume

In order to understand wear characteristics, change in friction force with respect to distance graph given at **Figure *6*** should be inspected. As seen from figure C4 sample that contains 4% Ekabor II and was prepared at mill reached steady state around 30m like the other samples but then friction force started to increase. As seen from **Figure *7*** C4 has the smallest wear track of all samples.

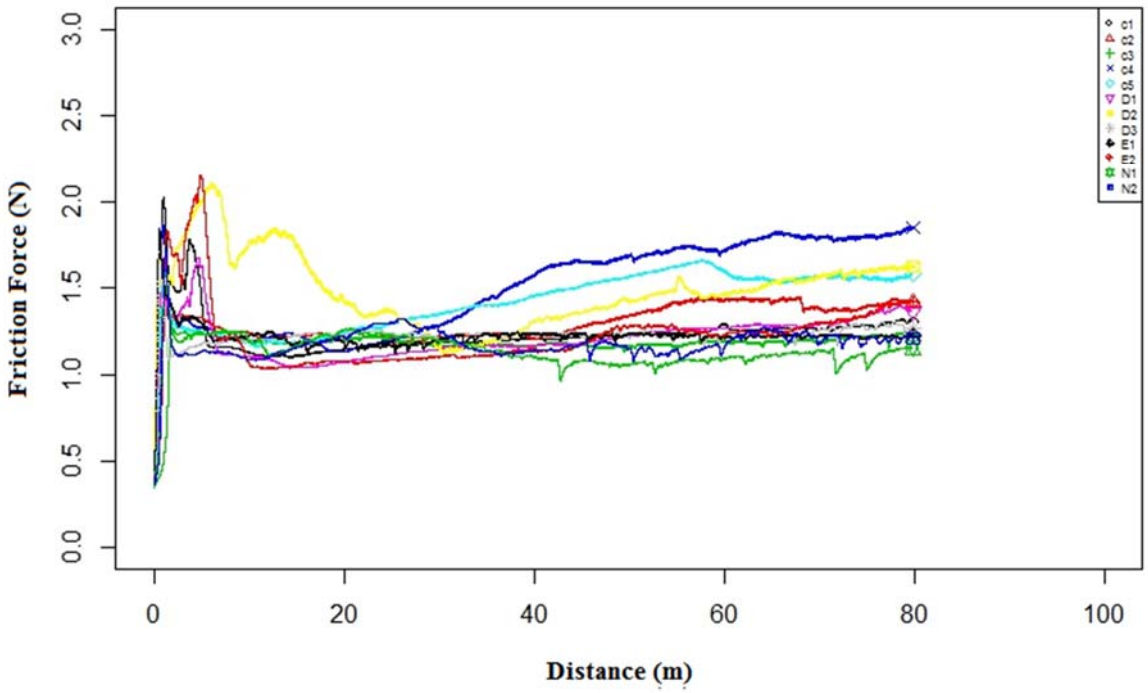


Figure 6. Friction Force vs Distance graph

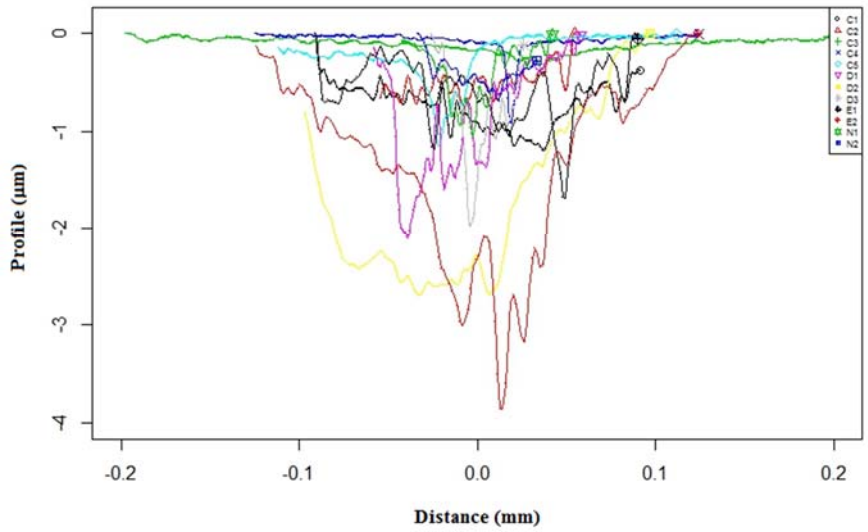
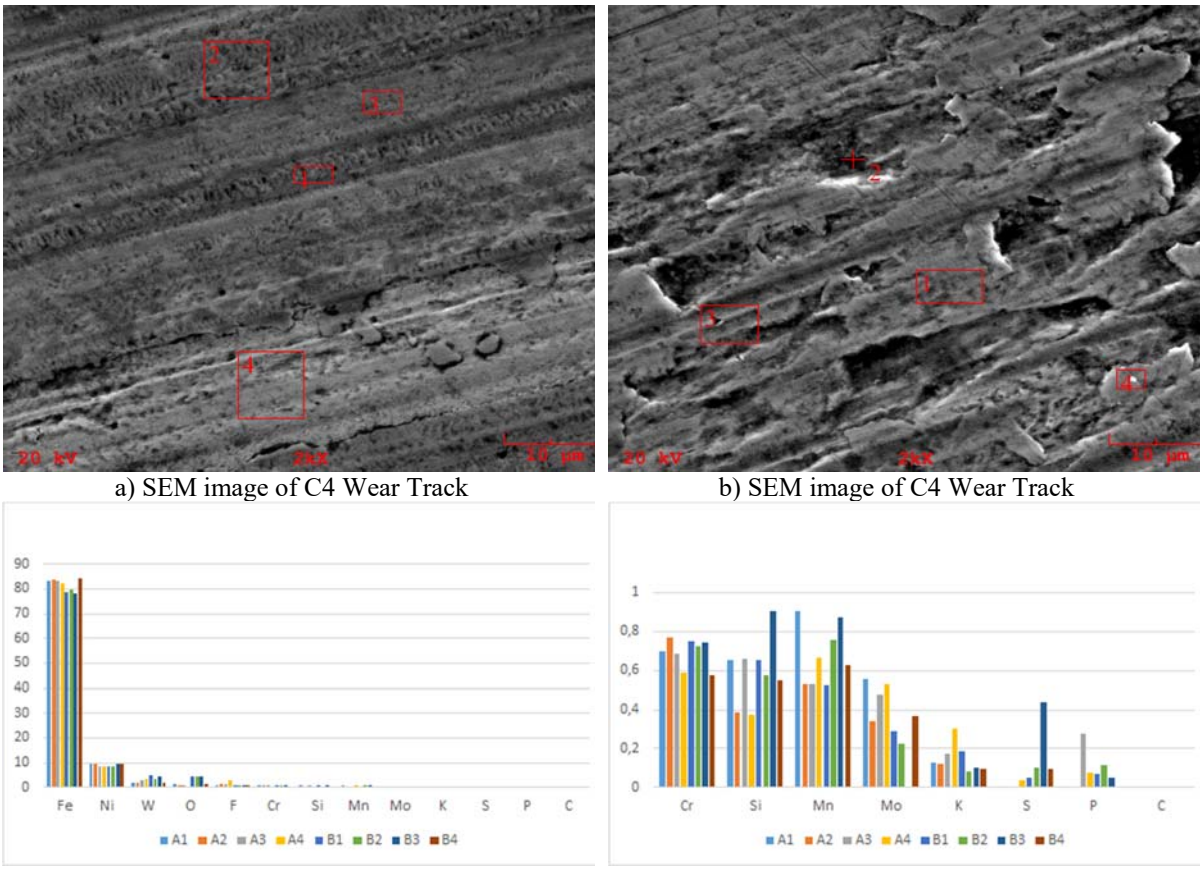


Figure 7. Wear Track Profile

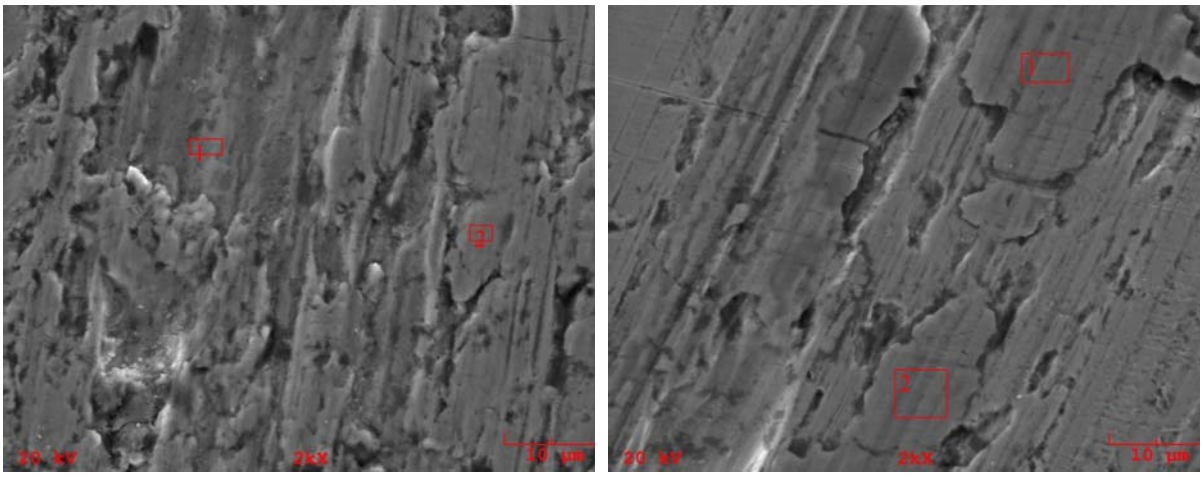
So as to understand wear mechanism SEM and EDS analysis of wear tracks of samples were conducted. C4 shown adhesive and abrasive wear behavior and as seen from **Figure *8***. D3 however show mostly abrasive wear as seen at **Figure *9***.



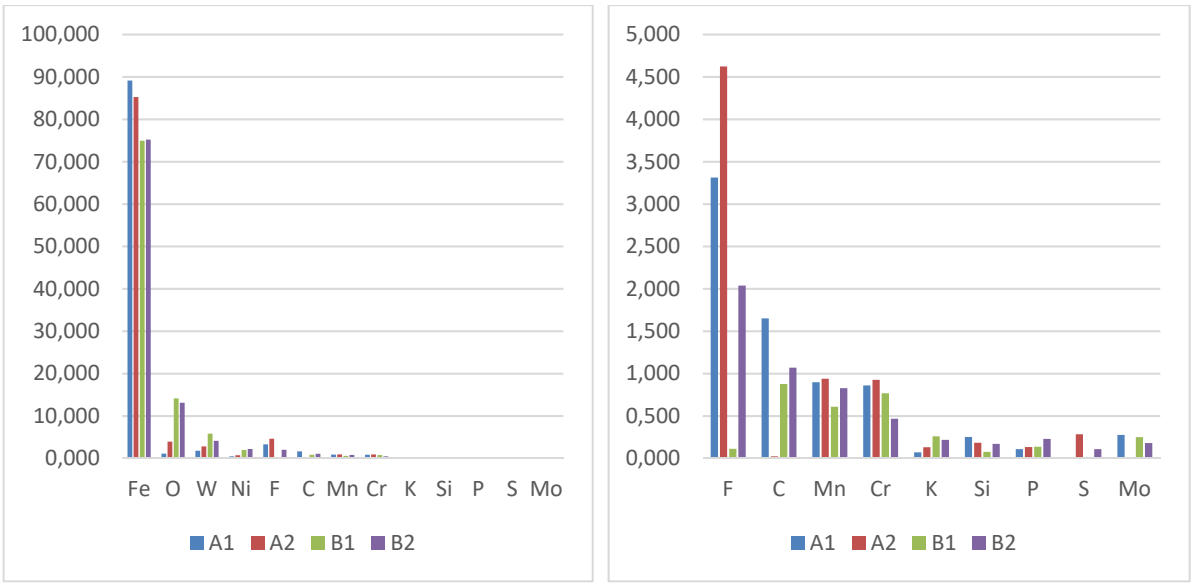
a) SEM image of C4 Wear Track b) SEM image of C4 Wear Track

c) EDS analysis of C4 Wear Track d) EDS analysis of C4 Wear Track Lower Values

Figure 8. SEM and EDS of C4 wear track



a) SEM image of D3 Wear Track b) SEM image of D3 Wear Track



c) EDS analysis of D3 Wear Track d) EDS analysis of D3 Wear Track Lower Values

Figure 9. SEM and EDS analysis of D3 Wear Track

High percentage of Tungsten (W) content in EDS results show that there exists higher adhesive wear on samples. This is the result of two mechanisms working on samples. First the wetting angle of Nickel to Tungsten is 0 (de Macedo, da Silva, & de Melo, 2003). Zero wetting angle means Nickel will coat WC if melts while wear tests. In studies conducted on WC cutting tools on Nickel alloys it was found that WC diffuses to Nickel and tool wear is observed (Xue & Chen, 2011), (Liao & Shiue, 1996). A study on NiCrSiB coating found that Nickel adheres to WC and hard carbides or borides remove that layer of Nickel and cause adhesion (da Silva & D'Oliveira, 2016). These studies confirm that adhesive wear is main wear mechanism on these samples.

In order to understand the relations between wear track volume, coefficient of friction and mixture ratio a 3d graphic was plotted. As seen from ***Figure 10***, 2 samples are out of pattern. Those were E2 (6% B4C) and D2 (10% Ekabor II ™). These are result of increased abrasive wear on samples. Adhesive wear generated particles and those particles act as third body and caused an increase in abrasive wear.

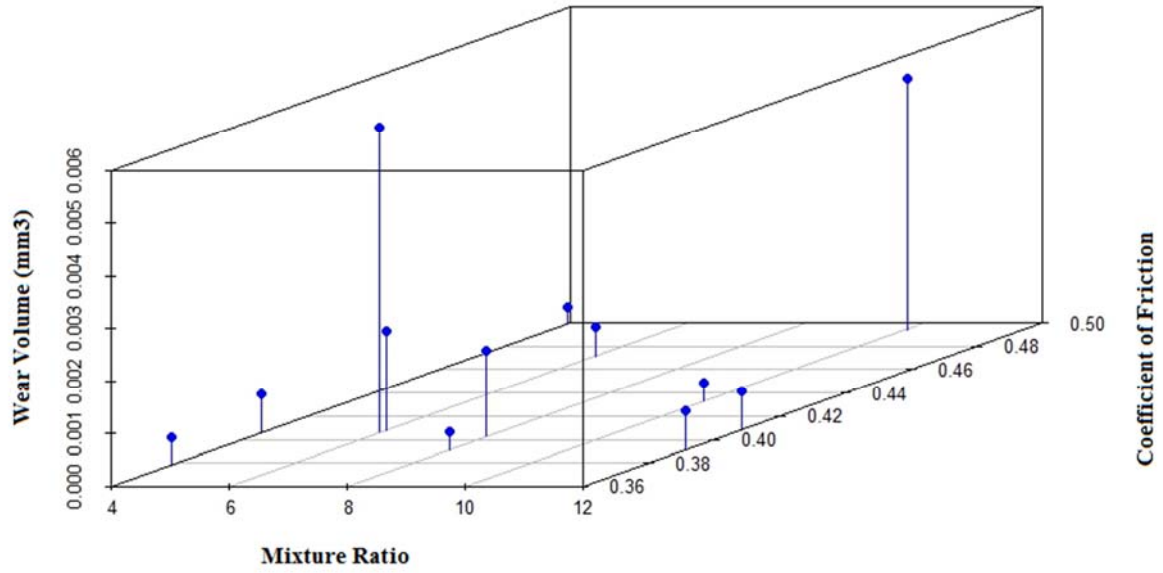


Figure 10. 3D plot of variables.

Inspecting Coefficient of Friction versus Wear Volume Plot at **Figure *11*** shows that N1, N2, C3, E1 and D3 result in best Coefficient of Friction and Wear Volume.

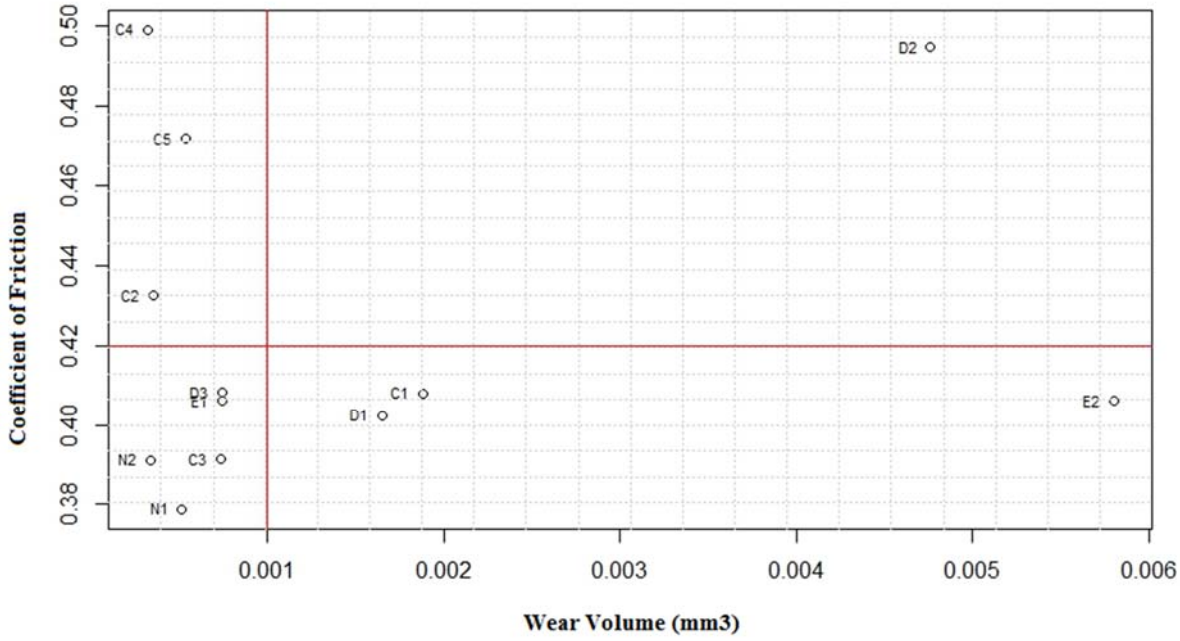


Figure 11. Coefficient of Friction versus Wear Volume Plot

Conclusion

The results show that

- Although B4C in coating increased surface properties, more than 4% B4C causes a decrease in surface properties, thus should be avoided.
- Nickel base shouldn't be used for low temperature environments because of adhesive wear properties. Thus Nickel base should be used in high temperature environments where Nickel Oxides can form.

Acknowledgements

This study was funded by TUBITAK 2211 and Eskisehir Osmangazi University Scientific Research Commission Project 2014-599.

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INVESTIGATION OF TENSILE STRENGTH AND ELONGATION PROPERTIES OF BASALT FIBER-PUMICE REINFORCED POLYPROPYLENE COMPOSITES

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Abstract: Basalt fibre is obtained from volcanic basalt rocks. The manufacture of basalt fiber requires the melting of the basalt rock to about 1400°C. Its chemical structure is nearly related to glass fiber. It has slightly better mechanical properties than glass fiber. Basalt fiber has great potential application to composite manufacturing. In this study, multiaxial fabrics were produced from basalt filaments. Multiaxial basalt fabric and pumice stones were used as reinforcement material for the production of the composite structures. Polypropylene was used as resin. Finally multiaxial basalt fabric-pumice stone reinforced polypropylene composites were produced by using hot press compression machine. Then modulus of elasticity, tensile strength and elongation properties of the thermoplastic composites were investigated.

Keywords: Basalt fibre, composite, polypropylene, pumice

Introduction

Production and using of fiber reinforced composite structures is very attractive and developing subject for few years. Fiber reinforced composite structures have very important advantages such as low weight, low cost, high strength, resistance to flame and corrosion, etc. Due to their advantages, fiber reinforced composites are used instead of conventional structural parts especially in construction, automotive and industrial applications. Basalt fiber is a newly developed inorganic fiber which produced from molten volcanic basalt rocks (Shi, 2015). It is similar to carbon fiber and glass fiber, having better mechanical properties than glass fiber, but it is significantly cheaper than carbon fiber and little more expensive than glass fiber. Its chemical structure is nearly related to glass fiber. The most important components of basalt fiber are SiO_2, Al_2O_3, CaO, MgO, Fe_2O_3 and FeO. The manufacture of basalt fiber requires the melting of the basalt rock to about 1400°C. They are not required any additional additives during the production process, so their production cost is low. The molten rock is then extruded through small nozzles to produce continuous filaments of basalt fiber. The fibers typically have a filament diameter between 9 and 13 micrometres. Compared with glass fiber, basalt fibers are more resistant to strong alkali and less resistant to strong acids. Basalt fibers can be used over a wide range of temperature, from 200°C to 600°C. They are resistant to high temperatures. Basalt fiber has great potential to be used in composite structures. The basalt filaments are more ductile than glass and carbon fibers (Sun, 2010; Deak, 2009; Militky, 1996; Czigány, 2007; Sim, 2005).

Materials and Methods

Materials

In this study basalt filaments (400 Tex) were used for the reinforcement of the composites. In order to use basalt filaments in composite structures, multiaxial fabrics were produced. Multiaxial fabrics were manufactured by using basalt filaments in 0°, 90°, and ±45°. Photo of the multiaxial fabric is given in Figure1. Also pumice stones were used as filling material. Used pumice stones were in 3 different sizes. Particle sizes of the pumice stones were 0-1 mm, 1-2.5 mm and 2.5-4 mm.

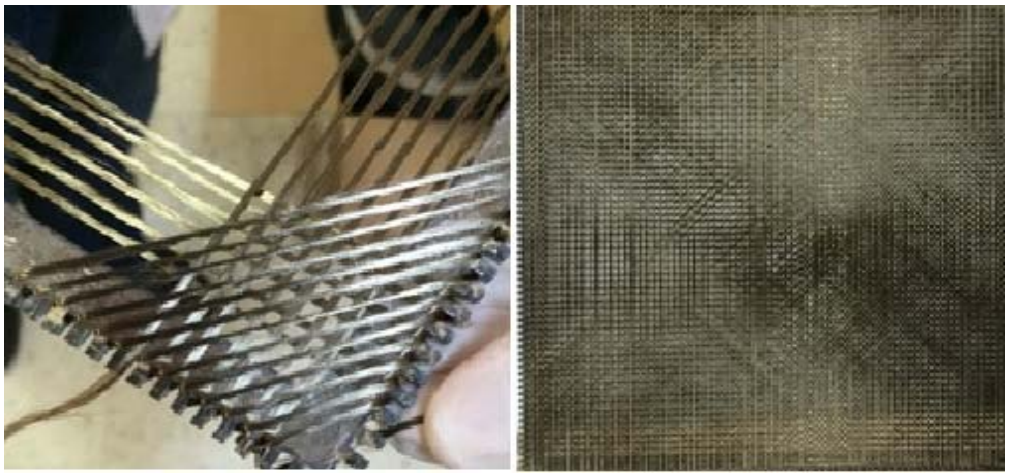

Figure 1. Produced Multiaxial Basalt Fabrics

Production of Composite Structures

Multiaxial basalt filament- pumice stone reinforced polypropylene composites were produced by using hot press compression machine. Production of the composites were performed under 200 °C and 100 bar pressure. Polypropylene resin was used in granule form. Properties of the produced thermoplastic composites are given in Table 1. Photo of the hot press compression machine and produced composite structure are given in Figure 2.

Figure 2. Hot press compression machine and cross sectional view of the composites

Table 1: Properties of the Produced Basalt Filament-Pumice Reinforced Polypropylene Composites

Composites	Ratio of Polypropylene (%)	Ratio of Pumice Stone (%)	Ratio of Basalt Fibre (%)	Pumice Particle Size (mm)
C 1	72	-	28	-
C 2	56	18	26	2.5-4
C 3	56	18	26	1-1.5
C 4	56	18	26	0-1

Results and Discussion

Tensile Strength and Elongation Analysis

Elasticity modulus, tensile strength and elongation at break properties of the multiaxial basalt filament-pumice stone reinforced polypropylene composites were investigated by using Zwick Z010 testing instrument. Tensile strength and elongation analyses of the composites were performed according to ASTM D 3039/D3039M–07 standard.

Elasticity modulus, tensile strength and elongation at break properties of the thermoplastic composites are given in Figures 3, 4 and 5 respectively.

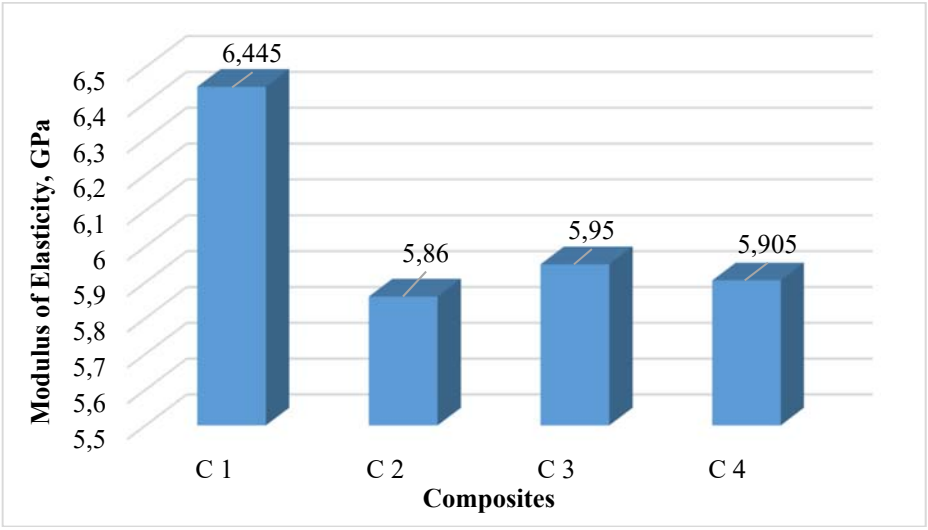

Figure 3. Elasticity modulus properties of the produced composites

Addition of pumice stones decreased the modulus of elasticity properties of the composites. The highest elasticity of modulus properties were obtained by using 1-2.5 mm pumice stones. 2.5-4 mm pumice stone added composites have the lowest elasticity of modulus properties.

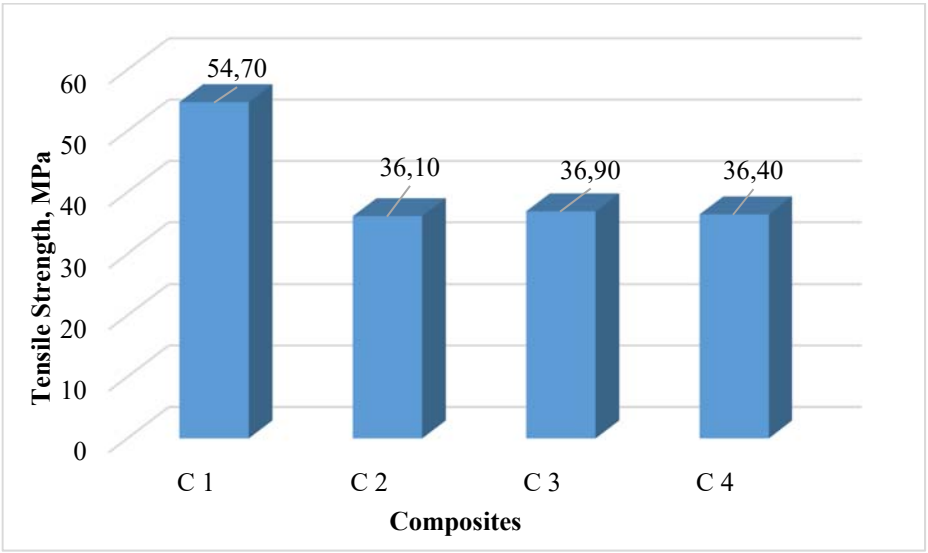

Figure 4. Tensile strength properties of the produced composites

Addition of pumice stones decreased the tensile strength properties of the composites. The highest tensile strength properties were obtained by using 1-2.5 mm pumice stones. 2.5-4 mm pumice stone added composites have the lowest tensile strength properties.

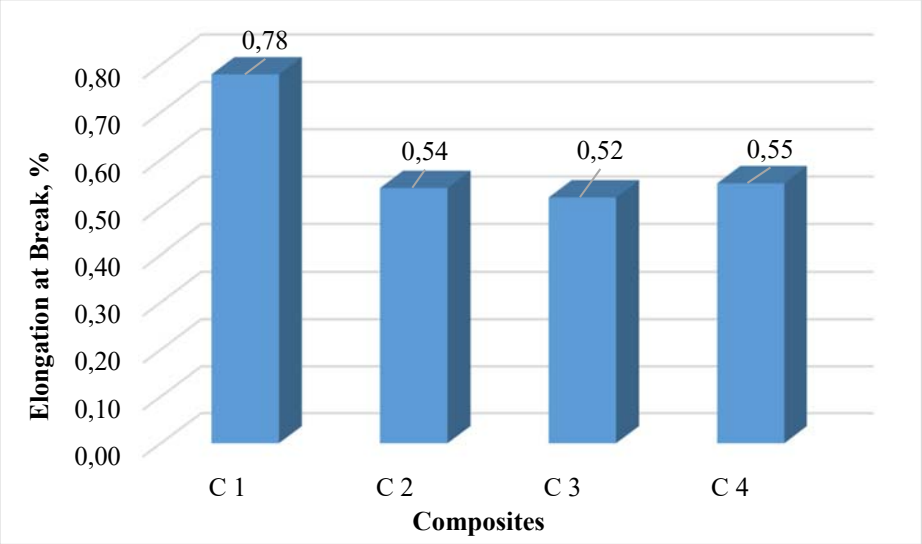

Figure 5. Elongation at break properties of the produced composites

Addition of pumice stones decreased the elongation at break properties of the composites. The effect of the pumice stone sizes on the elongation at break properties of the composites is negligible.

Morphology of the composite structures

Morphology of the produced multiaxial basalt filament-pumice reinforced polypropylene composite structures were analysed by using JEOL JSM-5410 LV Scanning Electron Microscope. SEM micrographs of the composites are given in Figure 6.

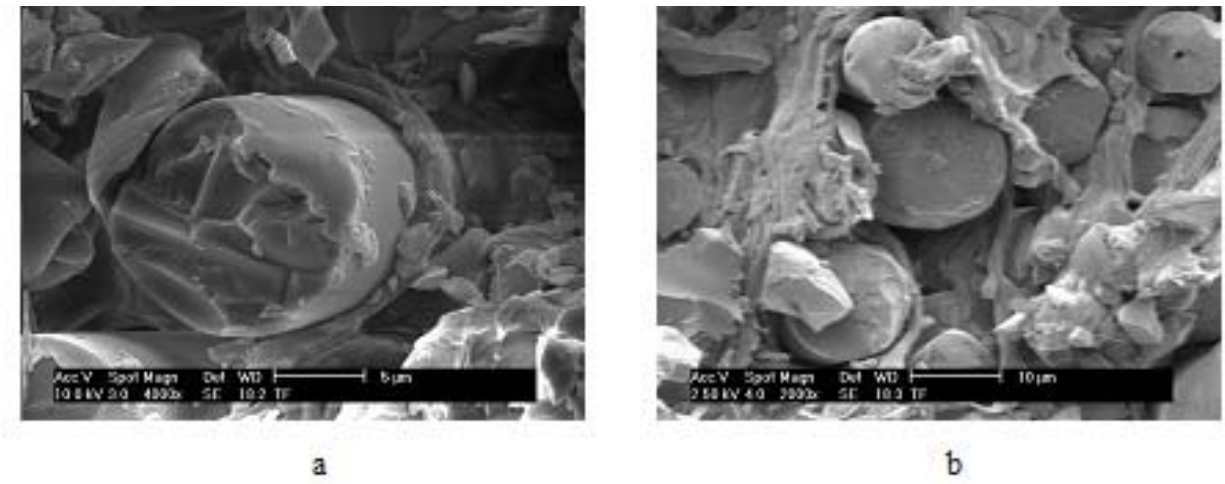

Figure 6. SEM Micrographs of the a)Multiaxial basalt filament reinforced composite b)Multiaxial basalt filament-pumice stone reinforced composite

It is seen from the Figure 6, good adhesion occurred between the basalt fibre and polypropylene resin, it is also observed that pumice stones were slightly bonded to the polypropylene resin.

Conclusion

In general, addition of pumice stones decreased the modulus of elasticity, tensile strength and elongation at break properties of the composites. Better modulus of elasticity and tensile strength properties were obtained by using 1-1.5 mm pumice stones. It is seen that pumice stone size is effective on modulus of elasticity and tensile strength properties of the composites. And good adhesion was occurred between the basalt fiber-polypropylene resin and

pumice stones – polypropylene resin. As a result, pumice stones can be added to the fiber reinforced composite structures as filler to obtain moderate tensile and improved insulation properties.

Acknowledgements

Authors thank to Academician Training Program (OYP) of YOK, Turkey for its support.

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MICROSTRUCTURE AND MECHANICAL PROPERTIES OF FRICTION WELDED IRON ALUMINIDES

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Abstract: Fe–40Al alloy were welded by the friction welding technique. Samples were welded for different welding time under a constant forging and friction pressure at 1000 rmp. Microstructures of the welds were examined by optical microscopy. The results showed that the welded samples were free of any pore or crack along the weld interface except for 3s. The micro hardness of the welded samples was measured. The strength of the welds was determined by the shear tests. It was observed that the shear strength of the welds depended on the welding time. The maximum shear strength was 466, 8 MPa.

Keywords: Iron aluminides, friction welding, shear strength

Introduction

Iron aluminides based on Fe_3Al and FeAl are excellent candidates to be used as structural materials for high-temperature service conditions. The advantages of these materials include their low cost, low density, and high sulfurizing and oxidizing resistance at high temperatures (Liu 1997, Stoloff 2000, Deevi 1997, Deevi 1998). These advantages have led to the identification of several potential uses, including heating elements, furnace fixtures, heat-exchanger piping, and sintered porous gas-metal filters, automobile and other industrial valve components, catalytic converter substrates and components for molten salt applications (Stoloff, 1998). However, these alloys have poor ductility at the room temperature, relatively poor high- temperature strength and creep resistance (McKamey, 1991). The development of a joining process is very important in the application of iron aluminides, but the study of welding and/or brazing iron aluminides is very limited in literatures. Welding of iron aluminides plays an important role in practical application of such alloys. Welding of iron aluminides is difficult due to its inherent low temperature ductility and poor weldability (Fasching 1995, Lee 2003). Friction welding is one of the available joining techniques, and it has been used successively in metals and alloys (Ozdemir 2005, Ateş 2007, Tao 2015, Della 2013, Winiczenko 2013, Kırık 2013). There has been several published works on the friction welding of Fe_3Al - FeAl type alloys. Sketchley et al. investigated the friction welding of Fe_3Al-based oxide dispersion-strengthened (ODS) alloy and B.J. Inkson et al. studied on friction welding of FeAl40 Grade 3 ODS alloy. They achieved good bonding (Sketchley 2002, Inkson 1998). In addition, author and co-workers reported the successful friction welding of Fe_3Al and dissimilar Fe–28Al alloy and AISI 316 L (Torun 2011, Çelikyürek 2011). In this paper, cast Fe-40Al alloys were welded by friction welding. Effect of welding time on the microstructure and mechanical properties of the cast Fe-40Al alloy were investigated.

Materials and Methods

The alloy Fe-40Al was prepared with vacuum arc melting under an argon atmosphere from iron and aluminum with 99.99 wt. % and 99.7 wt. % purity, respectively. The samples were homogenized at 1100 ◦C for 50 h and cooled in a furnace. Cylindrical cast alloy samples 8 mm in diameter and 50 mm in length were prepared. The friction welding experiments were carried out by a continuous-drive friction welding machine (Fig. 1) for 3, 5 and 7 s friction time under a constant rotational speed, a constant friction and forging pressure (Table 1). After welding, the welded samples were cut perpendicular to the welding interface. The surfaces of the welded samples were ground with 1200 grinding paper and polished with 1 µm diamond paste, then the samples were etched with a mixture of H_2O (30 ml), HNO_3 (30 ml), HCl (20 ml) and HF (20 ml). The microstructures were observed with light microscopy Microhardness values were measured on the welded samples by means of Vickers

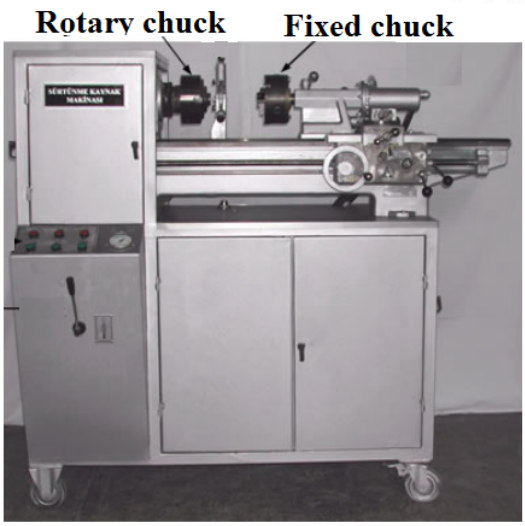

Figure 1.A continuous-drive friction welding machine

indenter with a load of 100 g. Shear tests were performed to determine the strength of the weld interface using an electromechanical universal test machine (Shimadzu AG-IS-250) at room temperature. A specially designed specimen holder was used to measure the shear strength. Three samples were tested for an each welding condition.

Results and Discussion

Flash formation was observed in all welded samples because of plastic deformation during welding. The friction time play an important role in flash formation. The burn-off increased with increase in friction time. More plastic deformation occurs because of the longer friction time, which produces higher heat in the weld interface. Thus, the burn-off (axial shortening) increases with the increase in plastic deformation (Table 1).

Table 1.Parameters of the friction welding.

Friction Speed (rmp)	Forging Pressure(MPa)	Friction Pressure (MPa)	Friction Time (s)	Burn-off (mm)
1000	140	140	3	4.2
1000	140	140	5	10.9
1000	140	140	7	18.5

Microstructural observation was carried out for the weld interface using an optical microscope. Fig. 2 shows the optical micrographs of the weld interface of welded samples for 3, 5 and 7 s.

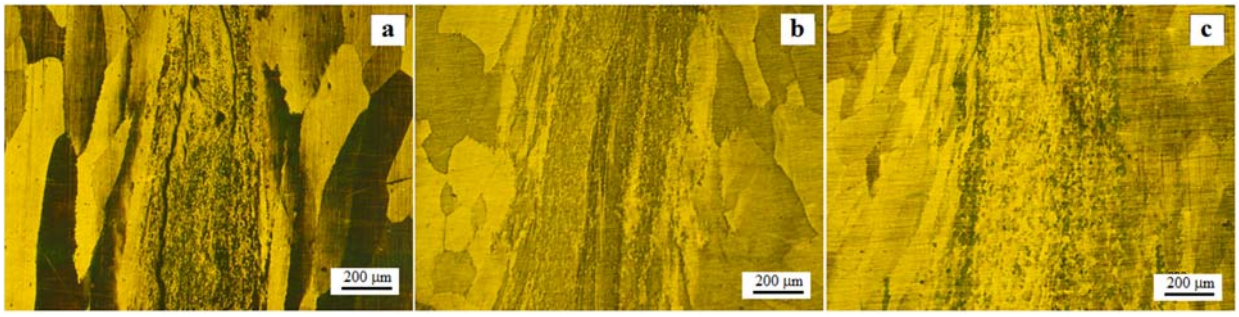

Figure 2. Optical micrographs of the weld interface of welded samples. a)3 s b) 5 s and c) 7 s.

As seen micrographs, the welded samples were of sound quality and they did not exhibit any voids or crack formation along the weld interface except for 3s. Two main regions are observable on the interface of all of the welded samples: a dynamically recrystallized zone with very fine grains and a plastically deformed zone. The

width of the recrystallized zone for all of the welded samples was approximately between 400 and 600 µm. Micro hardness welded samples for 3, 5 and 7s is given in Fig. 3. According to the results of measurements, micro hardness profiles for all welding times are found to be similar.

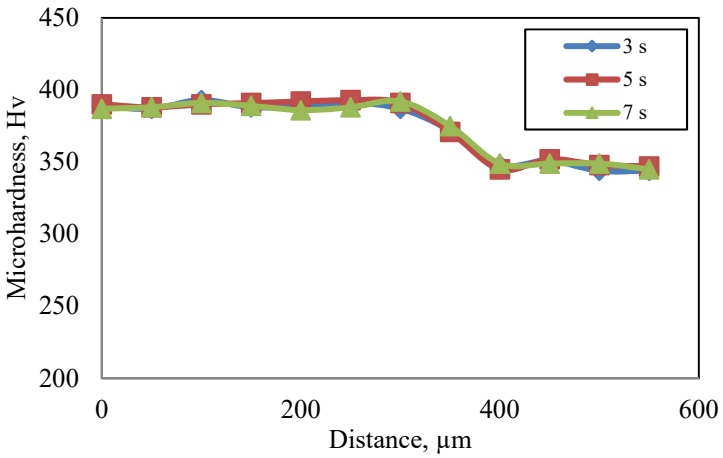

Figure 3. Micro hardness welded samples for 3, 5 and 7s

The shear strengths of welded samples were determined by using a specially designed testing apparatus. The shear of the welds and the base alloy are shown in Fig. 4. Test results demonstrated that the values of the shear strength of the welded samples were increase in increasing of the friction time. It can be said that the shear strength of welds was dependent on the friction time under the experimental conditions. The welded samples for 3s are not high enough to generate the required heat for friction welding. The shear strength of welded samples for 3s has lower due to voids at the weld interface. Test results demonstrate that the shear strength values of the welds are greater than the base metal. This situation shows that the structure with very fine grains formed due to dynamic recrystallization during the friction welding has more strength than the matrix.

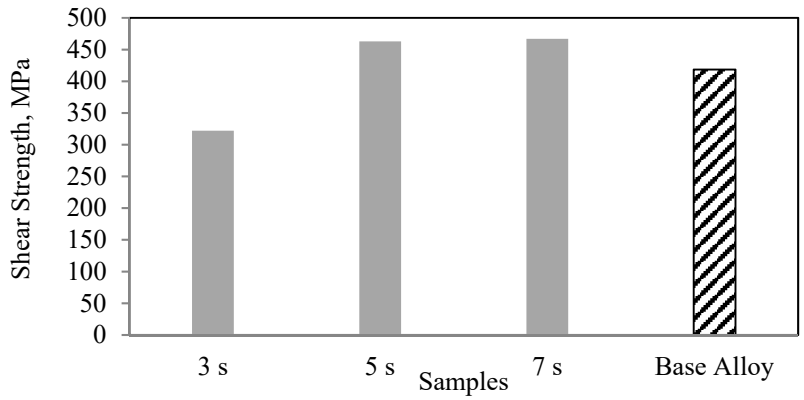

Figure 4. The shear of the welds and the base alloy

Conclusion

In this study, cast Fe–40Al alloy was welded under different conditions by friction welding method. Microstructure studies showed the presence of two different regions at the weld interface: the recrystallized zone and the deformed zone. There was variation in the width of the recrystallized zone and the deformed zone with an increase in the friction time. The micro hardness profiles for all the friction welding times. The shear strengths of the welds increased with increase in the process time. The maximum shear strength was 469,5 MPa.

Acknowledgements

The author is grateful to Afyon Kocatepe University Scientific Research Committee since this study is supported (Project No: 10.BOLMYO.01).

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ON THE HISTORY OF SOME LINEAR ALGEBRA CONCEPTS: FROM BABYLON TO PRE-TECHNOLOGY

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Abstract: Linear algebra is a basic abstract mathematical course taught at universities with calculus. It first emerged from the study of determinants in 1693. As a textbook, linear algebra was first used in graduate level curricula in 1940's at American universities. In the 2000s, science departments of universities all over the world give this lecture in their undergraduate programs.

The study of systems of linear equations first introduced by the Babylonians around at 1800 BC. For solving of linear equations systems, Cardan constructed a simple rule for two linear equations with two unknowns around at 1550 AD. Lagrange used matrices in his work on the optimization problems of real functions around at 1750 AD. Also, determinant concept was used by Gauss at that times.

Between 1800 and 1900, there was a rapid and important developments in the context of linear algebra. Some theorems for determinant, the concept of eigenvalues, diagonalisation of a matrix and similar matrix concept were added in linear algebra by Couchy. Vector concept, one of the main part of liner algebra, first used by Grassmann as vector product and vector operations. The term 'matrix' as a rectangular forms of scalars was first introduced by J. Sylvester. The configuration of linear transformations and its connection with the matrix addition, multiplication and scalar multiplication were studied first by A. Cayley.

After the 1900s, the improvement of linear algebra was more technique and in a way that more correlative with other disciplines of mathematics than past. Heisenburg used matrix algebra for quantum mechanics. Von Neuman and Turing introduced stored-program computers.

Keywords: linear algebra, history, matrix, vector, determinant, linear equation

Introduction

It is a general and an open-ended question that when and where did mathematics begin? The answer is depended on what do you mean by the word 'mathematics'? Then, we restrict 'mathematics' to logical-deductive tradition. In ancient times, written materials of new mathematical developments have come to known only in a few places (Avital, 1995; Boyer, 1985; Freudenthal, 1991; Jons, 1995 & Katz, 1995). As a scientific discipline, mathematical studies began in the middle of sixth century (Freudenthal, 1991 & Sfard, 1991). The old mathematical materials were registered in mathematical papyrus between 2500-1700 BC. The context in these material were designed with geometry as Pythagorean Theorem and some relations about lines. In the modern ages, mathematical developments had a periodic time points as the golden age of Islamic mathematics in the 11th century and renaissance mathematics in the 16th century.

According many mathematicians, we couldn't see a consensus on the history of linear algebra (Dorier, 2000; Freudenthal, 1991; Katz, 1995 & Kleiner, 2007). Some of them say that linear algebra history starts with matrix and the others say that main starting point is vector spaces. But we see a main linear algebra concept in these approaches that the formulation of linear system of equations and their solutions. In this study we give some basic points of the history of linear algebra concepts. The concepts are linear equations, matrices, determinants, vector spaces.

Linear Equations

System of linear equations are not only the basic concept of linear algebra but also it has a wide using area in many sub branch of mathematics. Moreover, solving of linear equations with two or three unknown and 2-5 equations is a basic part of middle school algebra and college mathematics.

The study of system of linear equations first introduced by the Babylonians around at 1800 BC. For solving of system of linear equations, Cardan constructed a simple rule for two linear equations with two unknowns around at 1550 AD. Cardano (or Cardan), an interesting and colorful personality, published the mathematics book "Ars Magna". In this book, Cardano with Tartaglia first used the numbers which are known as complex numbers. Lagrange used matrices in his work on the optimization problems of real functions around at 1750 AD. Metric systems, some of mathematicians consider Lagrange as the founder of the metric systems, was used widely in the context system of linear equations. Also, determinant concept was used by Gauss at that times. He formulated the set of errors to be minimized as a system of linear equations.

In ancient China at BC, it was used different ways of solving system of linear equations system (Shen, Crossley & Lun, 1999). These solution methods were not fully different each other and some of them could be used only for two or three equations whit the same number unknowns. Also ancient Chinese made some correlations between the number equations and the number of unknowns for unique solutions and more than one solution. According to the authors, there are many examples, application problems and their solutions in the old text books.

Matrices

The history of matrix goes back to ancient times at BC. But we can say that the word "matrix" was not used clearly until 1855. İt was born from the formulating of the system of linear equations by English mathematician Sylvester. Sylvester and Cayley published their famous text on matrices at these times. In this text, they used matrices by means of system of linear equations (as seen below) and introduced some theories and relation in the context of matrix as matrix addition, multiplication and inverse.

$$X = ax + by + cz$$

$$Y = dx + ey + fz$$

$$Z = kx + ly + mz$$

and

$$(X, Y, Z) = \begin{pmatrix} a & b & c \\ d & e & f \\ k & l & m \end{pmatrix} (x, y, z).$$

Gauss gave some elementary formulations for solving system of linear equations but do it without using matrices. When the mathematicians focused on studying determinants, this motivation turned out to be the term 'matrix'. At the end of the 1900's, Matrices were used not simply for solving systems of linear equations, but also in concepts of liner algebra. Moreover, they have wide speared of using in physics, engineering and some social area as phycology. By the effective using of technology in linear algebra, all solution methods created by Cayley, Gauss, Sylvester moved backward benefiting them in linear algebra lectures.

Determinants

J.L. Dorier (2000) stayed that the concept 'determinant' was used separately in different two places in both Asia and Europe. Also Dorier stressed that in ancient times at BC for solving system of linear equations was benefited from some geometric figures as called counting boards to represent problems. Mikami (1974) claimed that a special version of determinant to solve nonlinear system of equations at 1700's. According to him, this solution method was formulated in a way that registered in a rectangular array the positions of coefficients of equations. Mikami redesigned this formulation from the historical text for 2x2 and 3x3 square matrices (figure1)

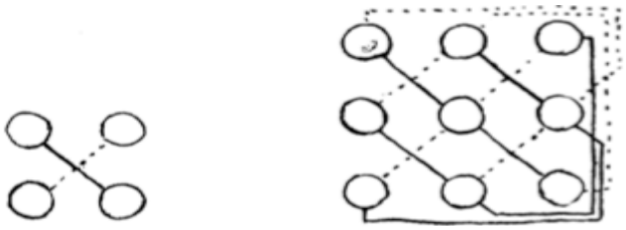

Figure 1. Mikami's redesign of determinant of matrices 2x2 and 3x3.

Determinants were used by Leibnitz, known as the founder of calculus, in 1700's. Lagrange used determinants in his working on Lagrange multipliers about maximum and minimum problems. In 1750's, Cramer formulated solution of some special system of linear equations, called 'Cramer's rule', and used determinant as a variable in this characterization.

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

By analyzing historical text, we can say that there are four mathematical subject which are directly connected determinants; matrices, solution of system of linear equations, elimination of a matrix of a system of linear equations and linear transformations. But, it is not clear to give any definite connection between general determinant formulas and the other linear algebra subjects. After the Cramer, determinants of the square matrix were used first time as known modern characterization.

Vector Spaces

In geometrical format, vector spaces in R^2 and R^3 were firs represented by Descartes and Fermat. Italian mathematician Peano defined the known modern definition of vector space concept in 1900's (Katz, 1995). After Peana, another Italian mathematician Weyl used vector spaces more efficiently and attractively in his studies that registered 'vector spaces and transformations view' of linear algebra and 'our axioms characterize the basis of our operations in the theory of system of linear equations by composing the coefficients of the unknowns in a system of linear equations as vectors. Lebesgue used real function spaces as vector space in his work. After than Lebesgue, Hilbert and Banach formulated and developed functions spaces as 'Hilbert and Banach spaces'.

Bourbaki (1975) stayed that Hawkin suggested a reasonable and methodological presentation for the matrix theory, from starting with systems of differential equations by lagrange to theoretical presentation by Weierstrass. According to Baurbaki, the theory of vector spaces had the same methodological procedure. For the explicit formulation of vector spaces, studies on the systems of linear differential equations played basic role (Helgason, 977). As mentioned above, Piano made the axiomatic formal definition of vector spaces over real number fields. We understand that the study of differential equations helped to formulating of vector space concept. Bourbaki (1975) stated that the study of function spaces formulated by Hilbert, but he focused on the kernels of integral equations and generalizations of their matrices. Also, we can say that the difficulty and complexity of infinite vector space directed mathematicians to focusing on the finite dimensional vector spaces.

Famous Frenchman mathematician Galova used the finite dimensional vector spaces to formulate his famous theory called Galois Theory. The linear combinations of algebraic numbers was an extension of the rational numbers. This mean that the defining of vector space over the field of real numbers was a methodological result (Kiernan, 1971). Kiernan expressed that Dedekind motivated seriously at the structure of fields, the number theory. According to him, by the effect of this motivation, he formulated the similarity of algebraic numbers and algebraic function theory. He remarked that the vector space theory played an essential role for the modern reformulation of Galois Theory.

Result

It is not possible to give all historical developments with a research paper about linear algebra concepts. We only dealt with some basic point of linear algebra concepts in this paper. More general search could be available from history of linear algebra text books or research papers (Benzi, 2009, Dorier, 2000 & Kleiner, 2007). It is clear that there is a powerful connection between mathematics concepts especially linear algebra concepts. And we can see this connection in the ancient times in which mathematicians formulated or characterized this concepts. Maybe, mathematicians had become infatuated with the connection of the concepts of mathematics.

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PHYSICAL AND ECONOMIC ANALYSIS OF THE POTENTIAL WIND ENERGY PLANT IN SINOP/ TURKEY

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Abstract: The use of renewable energy sources is rapidly increasing in the world and in Turkey. Wind energy from these sources, is more attractive to investors when compared to other renewable energy sources due to the installation and operation costs. Electrical energy from wind sources in the coastal area usually has production potential. For instance, if the wind map of Turkey is examined it can be seen that electrical energy production from the wind sources in the coastal area has production potential. Sinop, which is located in the Black Sea coastline, is an efficient point for wind energy investment because of its geographical structure. In this study, in order to be a model, potential points for the electric power from wind sources in the Sinop have been identified. Then, the scale and size of a potential power plant from wind energy which can be installed in Sinop have been investigated. Lastly, its installation and operation costs have been calculated.

Key words: Sinop province, Wind power plant, Physical Analysis, Economic Analysis, Renewable Energy

Introduction

Today, electric power is a kind of energy needed continuously as well as being the main input for industry and is an indispensable factor for quality of life (Saidur et al., 2011). Need for electricity is increasing with each day due to the rapid growth of human population in the world (Hepbasli and Özgener, 2004). Due to many factors such as depletion of fossil fuel resources on Earth, the rising costs of energy production and environmental pollution, it has been increased the orientation for new sources (Kenisarina et al., 2006*).* Renewable energy sources are defined as the kind of energy sources which present in the next day due to the nature of its cycle even if it is consumed every day. Solar, wind, hydroelectric, geothermal, wave, ocean, hydrogen and biomass energy are some forms of renewable energy in this class (Acaroğlu, 2013). Being in many parts of world, having low cost, being clean, not being harmful to the environment are the some important features of these resources (Köse et al., 2004). In many countries in the world, a growing orientation toward these sources are in existence (Bacak et al., 2009). In these resources, wind energy has the most convenient forms in terms of commercial and feasibility (Oner et al., 2009). Therefore, in recent years many studies on wind energy have been done. Studies have generally focused on the importance, the potential and the evaluation of wind energy (Hayli, 2001, Bilgili et al., 2004, Togrul and Ertekin, 2011, Genç and Gökçek, 2009, Güler, 2009). Sinop that is located in the Black Sea coastline is considered to have efficient points for wind energy investments because of its geographical structure. In this study, in order to be a model, potential points for the electric power from wind sources in the Sinop have been identified. Then, the sc
ale and size of a potential power plant from wind energy which can be installed in Sinop have been investigated. Lastly, its installation and operation costs have been calculated.

Materials and Method

Provincial Based Wind Energy Potential Atlas (REPA) is used as the main tool, in order to determine the place for the establishment of WPPs in our country (Anonim1, 2016). In Figure 1, shown the areas that are not suitable for HPP

investments in Sinop (gray). In determination of prohibited areas; Hunting and Wild Animals and Their Habitat Protection Implementing Regulation, Procedures and Principles of Pest Combating Implementing Regulation (Anonim2, 2016) the Environmental Noise Assessment and Management Regulation (Anonim3, 2016) the Military Forbidden Zones and Security Zones Regulation (Anonim4, 2016) have been used. As the material in study, REPA point source information is used, that was obtained from the Ministry of Energy and Natural Resources Renewable Energy the Directorate General dated 27/02/2013 (Anonim1, 2016). In information of point sources, primarily the coordinates of a point is determined from REPA. Average wind speed and wind directions is determined on specified point, at 30-50-70-100 meters (m) heights (Anonim1, 2016).

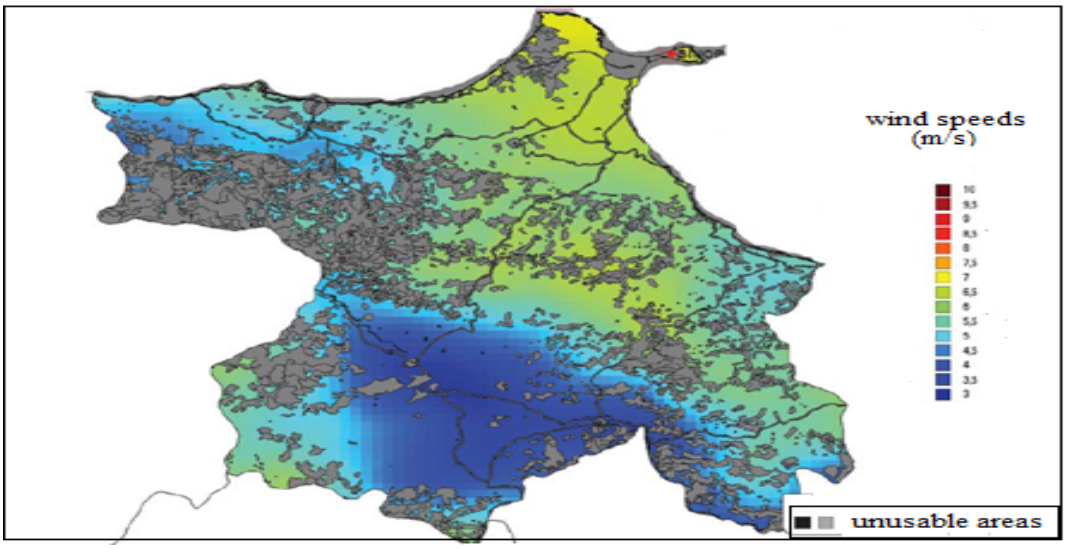

Figure 1: Wind Energy Potential Atlas (Anonim1, 2016).

In this height, the detected average wind speed and wind directions have been calculated with the Weibull distribution method (Anonim1, 2016). This distribution is composed with the scale and shape parameters is a two-parameter distribution (Anonim5, 2013). Weibull distribution function, which is in general form, is given in

$$f(v)=\left(\frac{k}{c}\right)\left(\frac{v}{c}\right)^{k-1}\exp\left[-\left(\frac{v}{c}\right)^{k}\right] \quad (1)$$

For wind speed. In this function, f (v), k and c shows the probability of observing wind speed v, Weibull shape parameter and reference value of wind speed respectively. C is also said Weibull scale parameter (Zeytinoğlu, 2009). Then the 50m and 100m annual power density (W / m²) and annual capacity factors (%) are obtained. In line with these values, electricity production has been calculated by taking up reference Suzlon S64 / 1000 turbine model at 50m height (Anonim1, 2016).

While making an economic analysis, are taken into consideration of average investment cost which variable differ from as a nature of the establishment place, distance from the substation, pre-feasibility costs, and design costs etc. The average investment cost wind energy production is considered to be 1000-1200 US dollars / kW (Bayraç, 2011). If the number of turbines is less, the initial investment cost is more than about 10%
(Taşkın, 2013). Therefore, a 1 MW wind turbine has been recognized as a cost of US $ 1,320,000. The investment of working-life has estimated as a 25. year. Calculations have been made through two different funding models. Firstly, it has assumed invested as 100% elf-funded equity and calculations have been made. Secondly; it has been assumed invested 25% equity 75%. Credit and calculations have been made. Repayments totally 10 years, have been considered

as 2 years grace period and 8 years payback period, and calculations have been to be paid annually. Credit financing model is based on data of the Energy Market Regulatory Authority (EMRA) (Erdem et al., 2015). Operating costs have been determined as 1.2% (Anonim6, 2016). The corporate income tax has been taken as base 20% (Anonim7, 2016). If the electricity has been produced within the scope of renewable energy sources (RES), sales price is taken 7.3 US $ / kW, and sales revenues have been calculated annually.

Results

Sinop, in the middle of the Black Sea, is located between 41 ° 12 'and 42 ° 06' north latitude and 34 ° 14 'and 35 ° 26' east longitude (Anonim8, 2016). Altitude of the province from sea level is just 50m and longitude of province at Black Sea coastline is 175km long (Ceylan, 2010).

Sinop has been established between the two capes named Inceburun and Boztepe. Sinop as can be seen in Figure 2; is founded on a tombolo formed by a merging island and mainland (Ceylan, 2010). To as an example, suitable areas for installation of wind power plant in Sinop can be in figure 2.

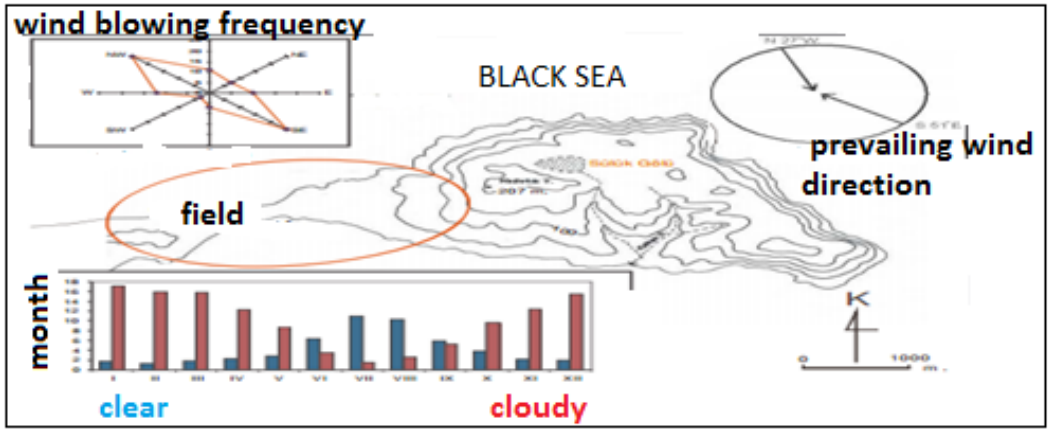

Figure 2: Sinop topography and wind direction (Şahin and Kaya , 2011).

Figure 3 illustrates the distribution of mean wind speeds of 50m. For economic investment, 7 m / s wind speed or over is required. Wind speed in areas with Yellow is 7 m / s. This rate is seen more dominant mostly in north-facing part of the Sinop coast.

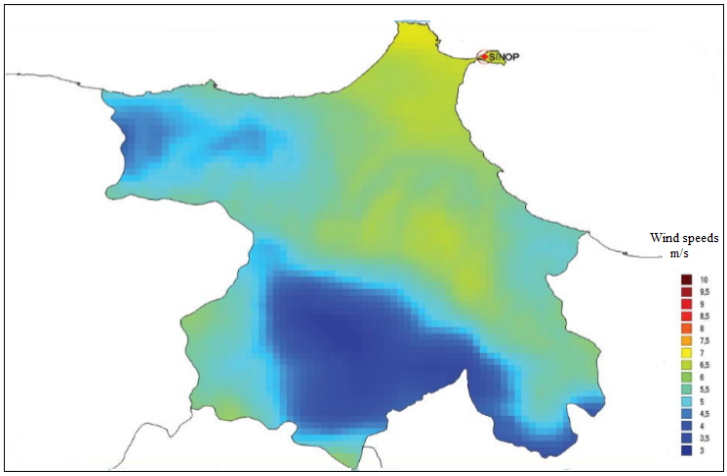

Figure 3: illustrates the distribution of mean wind speeds of 50m (Anonim1, 2016).

Although dominant direction is differ from seasons ,it's blows of annual average is northwest and %25.7 In Sinop, it was observed that dominant direction wind. Planning of the wind power plant depends mainly on the amount of energy that can be generated from the power plant site selected. In this study, a point has been determined in Sinop Dibekli village in North Latitude 42.0025513345238 Longitude 35.0127371674451 East coordinates. This point is at an altitude of 78m above sea level and the direction of the point is north-west (Anonim5, 2013).

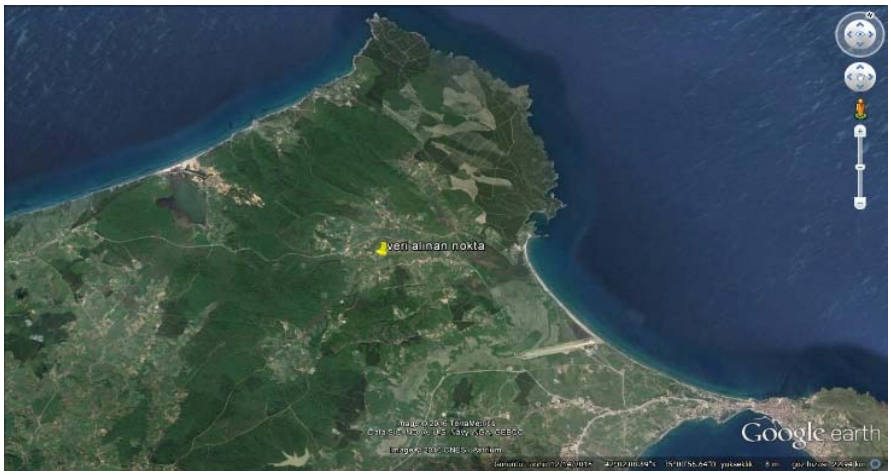

Figure 4: Is given the satellite view of point.

The construction of WPP, wind capacity factor is an effective distribution parameter as well as the wind speed distribution in Sinop, wind capacity factor distributions are shown in Figure 5.

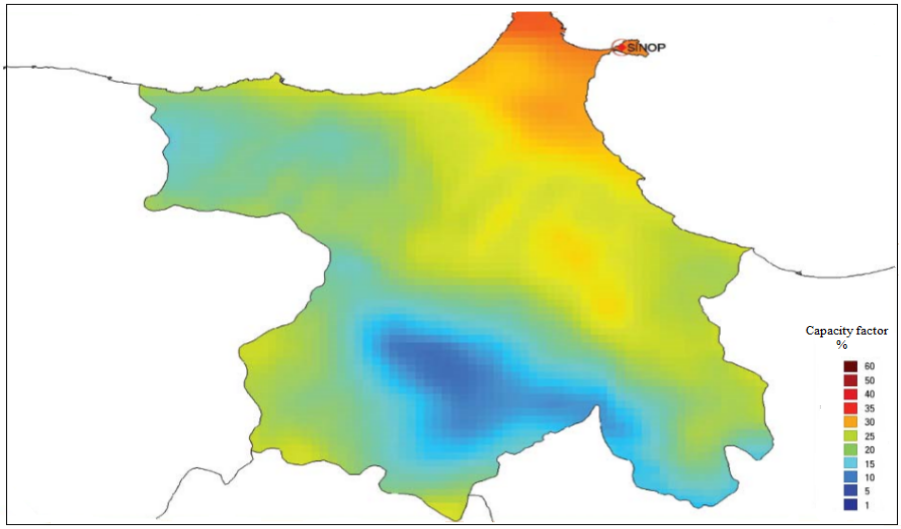

Figure 5: capacity factor distribution in 50m height (Anonim1, 2016).

The average wind speed of Sinop has been calculated as; 5.84 m / s at 30m, 6.42 m / s at 50m, 6,69 m / s at 70m, 6.99 m / s at 100m. With the rise from sea level, wind speed has increased directly proportional. In Figure 6, the prevailing wind direction and frequency information is shown for the relevant point.. In Figure 6, red color shows wind power and the blue color shows the wind blowing frequency. Prior to the installation of wind turbines, one of the important steps is to determine the prevailing wind direction. It is shown in Figure 6 that the prevailing wind direction for the province of Sinop is northwest (NW) and southeast (SE).

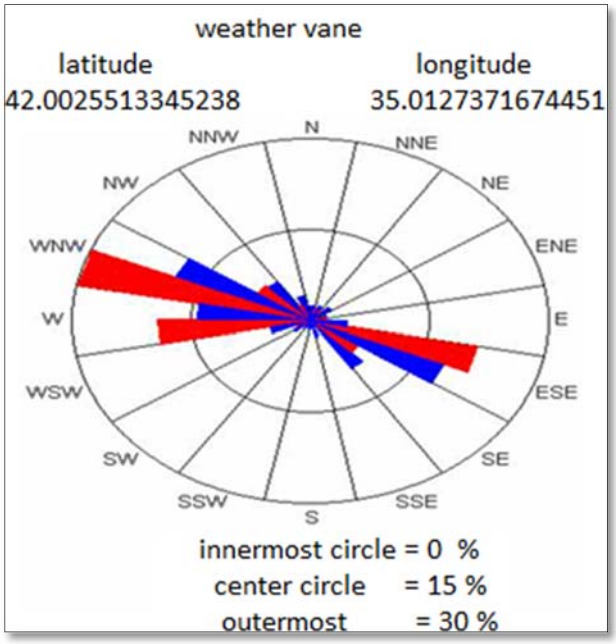

Figure 6: Dominant wind intensity of getting data (Anonim5, 2013).

Weibull C-parameter is; 6.80532 at 30m, 7.24459 at 50m, 7.54666 at 70m and 7.87815 at 100m. Weibull scale parameter (c)'s, is observed to be high similar to the average wind speed at the same height. Weibull k-parameter is 2,12802 at 30m, 2,01701 at 50m, 1,94953 at 70m and 1,88172 at 100m.When the Weibull's parameter is high without too many changes at wind speed shows that the wind blows as a fixed. In wind's force line with the changes occurring in the day, the change in the average power density occur. For Sinop the annual power density 50m and 100m was recorded as 305.12 W / m², 421.27 W / m² respectively. Annual capacity factor; for 50m was realized as 32.471% (Anonim1, 2016). This value is an acceptable level for sustainable Economic WPP investment. For Sinop, energy production based on wind data taken at 50m height is calculated 2,844,492 kWh / year (Anonim5, 2013). Total paid corporation tax realized as 1.038.240 US dollars and it has been reduced from gross income. The net income has been calculated as USD 4,152,598 of WPP considered for establishment in Sinop.

Discussion

In this study, a point has been determined in Sinop Dibekli village in North Latitude 42.0025513345238 Longitude 35.0127371674451 East coordinates. It has been taken annual with speed and direction information of this point. With received data; average speed, direction and energy calculations were performed. It has been investigated as a sample can be installed in a wind power plant in Sinop installation and operating costs have been calculated. Resource (Anonim5, 2013) has been used for place selection of WPP which considered to be established in Sinop. While doing cost analysis at economic analysis are taken into consideration of the nature of the place was founded,distance from the substation,pre-feasibility costs,design costs and so on.It is assumed two different financing models as 100% equity and 25% equity - 75% investment credit would be done and calculations have been made.
In 100% self-owned investment; it has been estimated that fixed investment costs are $ 52,800 per year while annual operating costs are $ 15.840. Annual net profit after expenses are expected to be 97 478 USD. Total profit for 25 years for $ 2,436,958 is to occur, breakeven point will be the 9th year. In 25% equity,75% investment credit model, investment cost varies according to year, realizes as $ 195,360 annually between 3th and 12th years, other years realizes $ 13,200. The net profit calculated on the total income is estimated to be $ 1,605,358, excluding capital increase. The breakeven point is envisaged at 14. years, excluding the capital increase.

Conclusions

As a result of the study, it can be said making an investment using 100% equity would be more profitable WPP investment determined at the point of in Sinop Dibekli village, than 75% credit-based financing model.
For Sinop, energy production based on wind data taken at 50 m height, is calculated 2,844,492 kWh / year.
With the installation of wind power plants; they will reduce dependence on foreign sources to meet Turkey's energy needs and are expected to contribute to increased energy diversity.

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POSTAL MARKET LIBERALISATION AND ITS IMPACT ON THE MAIL SUPPLY CHAIN: THE CASE OF TURKEY

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Abstract: As a candidate country for European Union membership, Turkey is on the way towards liberalising its postal market. Not only will such liberalisation introduce competition in the postal market in which Post and Telegraph (PTT) Corporation, was the monopoly, but also it will result in spreading out of the new entrants into the PTT Corp's supply chain in several ways. The literature has barely touched upon the impact of the technological substitution and incoming liberalisation on the supply chain of the Turkey's ex-monopoly. Providing examples from the ex-monopolies of the European Union, the purpose of this study is to examine the effects of the liberalisation of the postal market in Turkey on the PTT Corp's supply chain. The study highlights the ways in which the new entrants penetrate into the postal market using desk-based research. Moreover, it investigates the competition from a supply chain perspective.
Key Words: Liberalisation, Postal Market, Turkey, Supply Chain, Turkish Post and Telegraph Corporation, Mail

Introduction

Turkey, a candidate for the European Union (EU) membership, is adapting its bodies and legislation to the EU. The accession negotiations started in 2005 and Turkey aims to keep up with all the EU acquis, before the membership and even before opening chapters, to accelerate the negotiations (Ministry for EU Affairs, 2014). While the country was busy with reforms, EU started to liberalise its postal market gradually to complete the single postal market project in 1998 and finished it in 2013.

The liberalisation process aimed to open the postal market to competition and introduced Universal Service (US) for postal services, independent regulation authority and ways to compensate the US burden. With three directives along the way, the postal market was changed dramatically. Today, the EU postal market is mostly competitive and innovative. Ex-monopolies, mainly with Universal Service Obligation suffered from competition with supply chain disruption and technological substation in this period.

After the liberalisation, several EU country's examples illustrate that either the incumbent was forced to open its supply chain to the new entrants for a price less than the uniform one by regulation authorities or the new entrants bypassed it in the free market conditions. Additionally, with the declining mail demand and the competition, the incumbents lost market share and revenue.

All these developments in Europe will have reflections to the Turkish postal market. Already, the liberalisation process has begun, and Turkish postal legislation is affected by the European counterparts. Add to these; several acts came into force in recent years and more to come.

In the light of European experience about the liberalisation and competition, it would be possible to make some predictions about race and its effect on the PTT Corp.'s supply chain.

Using desk based research and EU member and company examples, objectives of this paper are:

- What would be the effects of liberalisation of the postal market to the PTT Corp.?, and
- How its supply chain would be affected by this process?

This paper gives insight information about the types of market entry in the EU postal market with illustrating the postal supply chain and Turkish market situation to address these questions. In the discussion part, the paper tries to stimulate the future situation in Turkey which the literature scarcely mentioned. Moreover, it highlights the competition on the mail supply chain and focuses on its effects on the supply chain.

Types of market entry in the EU

The Postal sector as a network industry employs more than 1.2 million people across the Europe, and only the letter post itself accounts 0.34 of the GDP (European Commission, 2016a). It is a quite important part of the

economy. As a consequence, the Europe has recently liberalised this market to acquire an efficient market and now many companies are competing in it. In this, the companies are operating their supply chain and the product's value chain plays an important part as well.

Jaag (2014) divides the postal value chain into four sections which are the collection, sorting, transport and delivery. He also emphasises that none of them are essential, and the competitors can duplicate it easily. As a result, the new entrants can enter the market quickly. On the other hand, De Donder (2006) argues that the delivery network is a bottleneck in the supply chain and needs the economies of scale to be profitable. Therefore, not so easily to duplicate. The postal supply chain can be simply illustrated as follows:

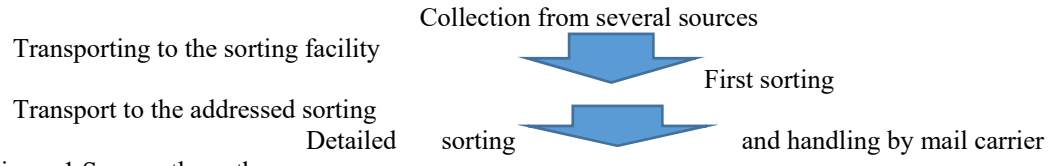

Figure 1 Source: the author.

Mail collection can be done from several places such as post boxes, post offices. Bulk mail customers tend to use the first sorting facilities directly. After first sorting, the mail goes to the secondary sorting places for the detailed sorting and there a mail carrier handles it.

EU published three directives (Directive 97/67EC), (2002/39/EC), (2008/06/EC) for the liberalisation of the postal market which led to a gradual liberalisation and opened it to the competition. The directives defined the universal service, liberalised it and created national regulation authorities (European Commission 2016b). The process was finished in the year 2013. All of them affected the mail supply chain illustrated above and allowed new entrants to compete with the incumbents. The mail supply chain disruption can be defined as follows:

- *Bypass*: It is the entry type that the new entrant bypasses the incumbent's supply chain where it is profitable and establishes its own. De Donder (2006) points out that it is usually not profitable to serve in the low-density areas, and new entrants choose to provide services to the high-density ones such as the major cities. The writer points out that doing this will cause economies of scale. Additionally, Schuster (2013) emphasise that supply chain infrastructure cost would be lower in the high populated areas. Therefore, after the liberalisation of the postal market, many new entrants started to compete in the high-density cities by bypassing the incumbent's supply chain.

Where the Universal Service obligation forces its provider to serve all of the countries without any discrimination, the new entrants are free of the USO and can serve in only profitable areas. This action is called "cream skimming". De Donder calls it as a selective bypass. The Royal Mail (US Provider of the U.K. competes in its big cities such as London and Manchester with TNT Post, the same competition occurs in Sweden by City Mail.

Quiros's (2011) study illustrates that there is a high correlation between the market opening, independent regulation authority and the efficiency increase. These factors lead to the second type of entry to the market by the regulations.

- *Access:* The second type of entry is access. The third directive (2008/06/EC) article 11a forces the countries to allow fair competition and to protect the user's rights by opening the postal infrastructure and the postal network to the new entrants without any discrimination. As a consequence, this article leads to *access* type of entry where the incumbent is forced to open its supply chain to the competitors. Mostly, it is linked with the cream-skimming effect where the new entrant uses incumbent's infrastructure to distribute the mail to the small populated areas while using its downstream supply chain where profitable. Villemeur et al. (2007) explain that as the competition only occurs in the downstream of the supply chain where the incumbent distributes the mail for a uniform price.

New entrants use access type of entry because of the cost advantage. The Uniform mail rates consist of all of the upstream and the downstream cost of the mail (Armstrong 2008). However, in access, only one part of the incumbent supply chain is used so the price would be lower than the uniform price. In this respect, if the cost of the one part of the supply chain is cheaper than the incumbent, the new entrant can acquire an advantage in the competition.

In Europe, access can be done to several postal infrastructures such as postcodes, post office boxes, delivery boxes, address database, change of access database, USP redirection and return services, downstream access (Wik Consult, 2013). Several countries allow different access levels, and it mostly depends on the regulation authority.

Case of Turkey

Legislation and the Current Situation in the Market

Turkey is updating its legislations for a more liberalised postal market and recently it changed some of the primary laws. One of this legislation is 6475 Postal Services Legislation. It came into force on the May 2013 and started the renewal process. With this, PTT Corp. became the postal monopoly by law and was assigned as Universal Service Provider. The reserved area is limitless now.

The company acquired many rights such as the monopoly on communication mail's all supply chain, letter of notification supply chain, Turkish Army's postal services and stamp services.

Additionally, BTK (Information and Telecommunication Technologies Authority) was assigned as the regulation authority to oversee the market and acquired the right to give the licence to operate in the postal market.

A compensation fund was established as the %2 of the revenue of all permit holders. Ministry of Transport, Maritime Affairs and Communications manages this fund, and it aims to compensate the Universal Service Cost of the PTT Corp. Most of the countries have Universal Service Fund. However, it is not usually activated by the authorities. As an example, Germany hasn't enabled the Universal Service Fund.

After this, in February 2016, The Postal Universal Service legislation came into force to define the Universal Service Obligation (USO) of the provider. It represents the USO, how to acquire money from the fund and the calculation of the US Cost.

So far, with these two legislations, PTT Corp. is the USP of Turkey and postal service monopoly. The gradual liberalisation is about to start. However, there is no mentioned weight limit which ensures the monopoly in the market.

BTK is still giving licenses for the incoming liberalisation. Until now, 28 company acquired the licence. Of them, four is for İstanbul, one for İzmir, one for Ankara and the rest is national licenses including PTT Corp.
Despite the current monopoly situation and the reserved area is not mentioned in the legislation yet, Some competitors have already active in the market especially in İstanbul and breaching the law using their cost advantage.

PTT Corp.

PTT Corp. is the government-owned postal monopoly of Turkey. Established in 1840, the postal giant employs around 40,000 people with more than 4482 offices in Turkey which are consist of self-operated stores and agencies.

There are three operation sides of the company First and the most important one is Post Division (1,500 million TL in 2014) which it creates most of its revenue. The others are Logistics Division (200 million TL) and Postal Payment system.

The postal division operates in a monopolistic market while the logistics sector conditions were liberal. Therefore, it can be seen that the postal market is critical for the company.
The addressed bulk mail demand is decreasing rapidly around 10%. On the contrary, the revenue is increasing mostly due to the price increasing and increase in the registered mail and the letter of notice.

Discussion

After the liberalisation, it could be seen that the supply chain of PTT Corp. will be disrupted by two type of market entry.

In bypass type, the new entrants will choose big cities such as İstanbul, Ankara and İzmir. From these three, İstanbul will be the most important one because nearly all of the bulk mail customers such as banks and telecommunication companies based on there. Additionally, it is the densest area in the country. With the increase technological substitution, this would be a double revenue and volume loss for the company. So far, with the price increases, the amount lost seems to be compensated. However, after the liberalisation, it won't be easy to raise prices because of the competition. The Uniform Price tag could be an obstacle in this situation. It can be said that,

as in United Kingdom or Sweden, the cream-skimming effect can be seen in İstanbul Ankara as well. It is also important that 4 of the 28 licences are for İstanbul only, and the competition is ready to start.

High competition means lower volumes because the market is not growing. These small amounts would make the incumbent's supply chain less profitable and it can even put the US in danger if the company can't compensate it with the E-Commerce increase.

The second disruption will come from the access type of entry. Where the new entrants find unprofitable to operate, they would use the incumbents supply chain. In this scenario, it would be mostly the downstream supply chain of the PTT Corp.. These would cause incumbent to lose more revenue because the price of the access would be lower than the uniform price.

Overall, the liberalisation will affect the PTT Corp.'s mail supply chain from two sides. First, the new entrant could bypass the incumbents supply chain and establish its own in densely populated areas. Second, they can use PTT Corp. supply chain where they find unprofitable such as downstream in the small populated areas. These facts could lead to loss of revenue. With the technological substitution, even the universal service would be in danger. PTT Corp.'s should, therefore, focus on more efficient and lean supply chain. It should also listen to customer expectations more carefully and design the post offices for that reason.

Conclusion and Further Study

While this study does not give an exact answer to the future event, it gives some clear answers about what would happen to the PTT Corp.'s supply chain in the case of liberalisation and the possible types of market entry using the examples from EU cases. If the policy makers knew what would happen to their supply chain and how to react it with a plan, it would be easier to compete and they can be ready for the incoming liberalisation. Therefore, this paper would fill the gap on the deregulation effect of the mail supply chain in Turkey and give additional options for policymakers. The further study would include the calculation of the future demand and prediction of the competition by using mathematical models.

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PREDICTION OF ASH CONTENT FOR COARSE CLEAN COAL PREPARED WITH HEAVY MEDIUM DRUM BY ARIMA(1,0,1) MODEL

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Abstract: The aim of this research is to model the ash content of +18 mm clean coal product obtained by a heavy medium drum at Dereköy coal preparation plant in Turkey by a time series model. The drum was operated 355 days in 2010 and its one year of daily as-received ash content data of +18 mm clean coal was used for evaluation by an ARIMA time series model. The ash data was found non-normal distribution and to fit log-normal distribution well. The ARIMA(1,0,1) time series model determined for the log-transformed data was the best model to represent the ash content of +18 mm coal. This model was shown to be used conveniently within the 95% confidence interval for estimating the ash contents that will be produced in short time period.

Keywords: Coal preparation, heavy medium drum, ash content, lognormal distribution, ARIMA(1,0,1) model

Introduction

Coal is one of the most important energy sources in the world. Turkey has about 12.88 billion tons of coal reserves (Özbayoğlu, 2013). The 11.56 billion tons of these reserves are low quality lignite and the rest is bituminous coals (Özbayoğlu, 2013). Prior to usage of coals, it is necessary to remove some constituents which cause problems during their combustion process in terms of recovery and environmental aspects. This is done by applying coal preparation techniques. Coal washing is the most important method to improve coal quality. In general, coals are washed by using density differences between coal and ash bearing constituents. Depending on the particle size of coals, heavy medium drums and vessels are used for the coarsest coals, heavy dense cyclones are used for relatively fine coals and spirals are used for the fine coals treatment.

During the desired quality coal production, it is necessary to estimate the coal quality for near future and hence to model the coal quality data obtained. The data structures in nature obtained from mineral processing are suitable for time series modeling since data characteristics are random and probabilistic (Ketata and Rockwell, 2008; Ganguli & Tingling, 2001) and these continuous processes can be considered discrete processes (Trybalski & Cieply, 2000). Some examples of time series model applications on coal production have existed in the literature (Cheng, et. al., 1982; Ganguli & Tingling, 2001; Gleit, 1985; Huang, et., al., 2002; Taşdemir, 2012; Taşdemir, 2013; Taşdemir, 2016a and 2016b).

In this research, ash content data obtained from heavy dense drum device at Dereköy coal washing plant in Soma, Turkey were used. Previous studies that carried out for Dereköy coal preparation plant showed that ash content of coals could be modelled successfully by ARIMA(1,0,2) model for -0.5+0.1 mm clean coal product of spiral (Taşdemir, 2013), ARIMA(2,0,0) or AR(2) model for the -18+10 mm and -10+0.5 mm clean coal products of the first heavy dense cyclone (Taşdemir, 2016a and 2016b). In addition, moisture content and ash contents of -18+0.5 mm middling product of second heavy dense cyclone have been found to be modelled by ARIMA(1,0,1) and ARIMA(0,1,2) time series model respectively at Tunçbilek coal washing plant in Turkey (Taşdemir, 2012).

Since, there is no information about time series models in literature that can be used for the estimation of ash content for the coals prepared with heavy medium drums, this research aims to model ash content data of clean coarse coals produced by a heavy medium drum at Dereköy coal preparation plant. By using one year ash content data of +18 mm clean coals prepared by heavy media drum, the most suitable time series model that can be used for the prediction of ash content have been determined and actual ash contents are compared with ash contents predicted by ARIMA model.

Materials and Methods

Daily ash content of +18 mm coarse clean coals were obtained from Dereköy coal preparation plant in Soma, Turkey. The ash content data belong to 2010 year. Simplified flowheet of plant is presented in Figure 1. This flowsheet is modified from Şengül (2008). As seen, particle size of run of mine coals is first reduced to -150 mm and then screened by 18 mm sieve. The +18 mm fraction is washed by a heavy medium drum with two

compartments. The cleanest coals are produced in the first compartment of drum and the materials which are sunk in the first compartment are send to second compartment to obtain middling and shale products. In this research, the ash content of +18 mm clean coal data was used. Sample point of this product is shown as star symbol in Fig. 1. The data 355 ash content data in total were used in this work.

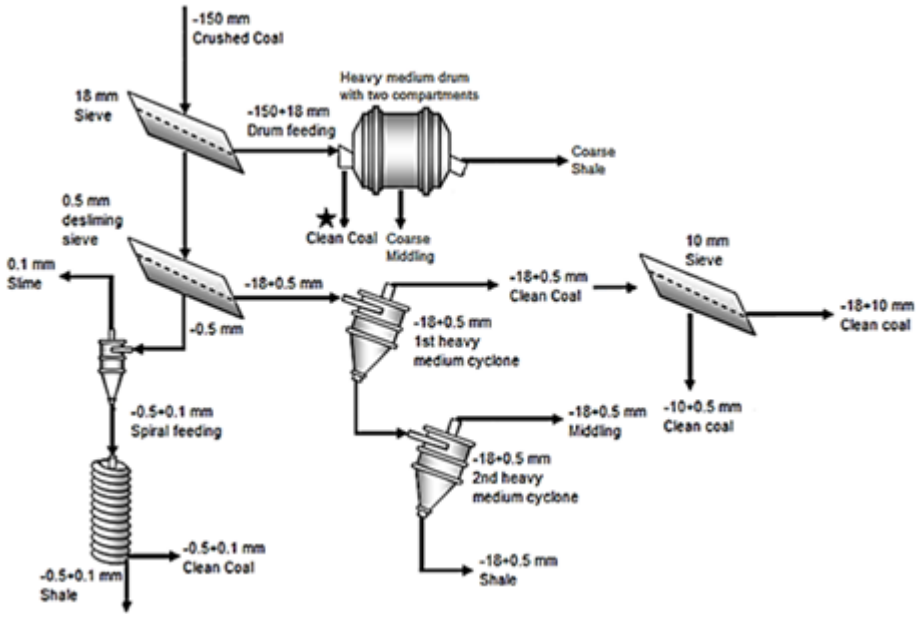

Figure 1. Flowsheet of Dereköy coal washing plant showing +18 mm coarse clean coal product of heavy medium drum which is shown as a star symbol. Modified from Şengül (2008).

The ash content data were evaluated by ARIMA(*p,d,q*) time series models. The model which gave the lowest AIC (Akaike information criterion) was chosen as the best describing time series model for the +18 mm clean coals. Many published books exist about data analysis by ARIMA models. Detailed information about ARIMA time series models and model selection methods can be found in books of Montgomery et al., (2008) and Montgomery & Runger (2011) therefore more information will not be presented again in detail here. Trial versions of Statgraphics XV and Minitab 16.0 software were used for determining of data properties and time series model.

Results and Discussion

Data Properties of +18 mm Ash Content Data

Summary of ash content of +18 mm data is given in Table 1.As seen in Table 1, average of one year ash content data produced by heavy dense drum is 12.85 with a standard deviation of 1.90. The standardized skewness and standardized kurtosis values can be used to determine whether the sample comes from a normal distribution. For a normal distribution, values of these statistics should be inside the range of -2 to +2. Standard skewness and kurtosis values of +18 mm coal ash content were 7.89 and 13.99 respectively. These results indicate that ash content data departure from normality significantly.

Table 1: Summary Statistics for the ash content of +18 mm clean coal

Count	355
Average	12.85
Standard deviation	1.90
Coeff. Of variation	14.78%
Minimum	8.41
Maximum	23.72
Range	15.31
Stnd. skewness	7.89
Stnd. kurtosis	13.99

Box-Whisker and histogram plots for +18 mm ash content are given in Fig. 2. These plots show that the data have important outliers

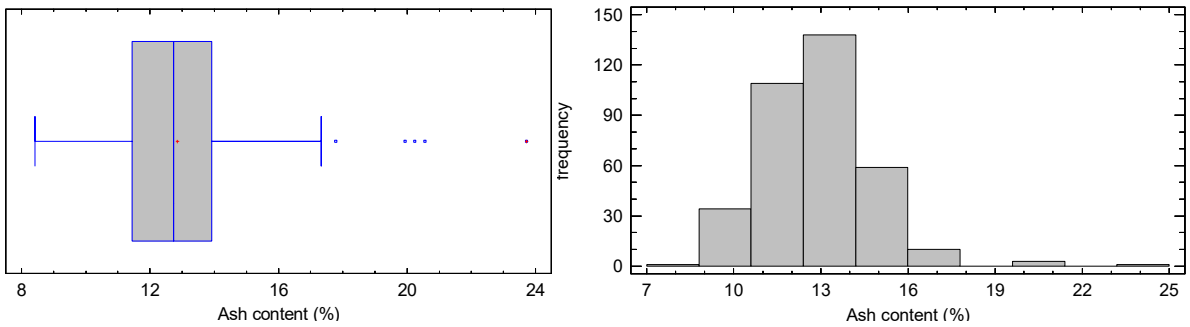

Figure 2. Box-Whisker and histogram plots for +18 mm ash content

Normal probability and symmetry plots of ash content are presented in Fig. 3. Whole plots in Fig. 2 and Fig. 3 support the information in Table 1. As seen in Box-Whisker plot in Fig. 2, there are many outliers and it can easily skew normally distributed data. This may be the reason for non-normality distribution of ash content data. Both normal probability plot and symmetry plots in Fig. 3 support this. The ash content data skewed to right (Fig. 3b) and Anderson-Darling (AD) test confirm non-normality since *p* value of AD test is <0.005 (Fig. 3a).

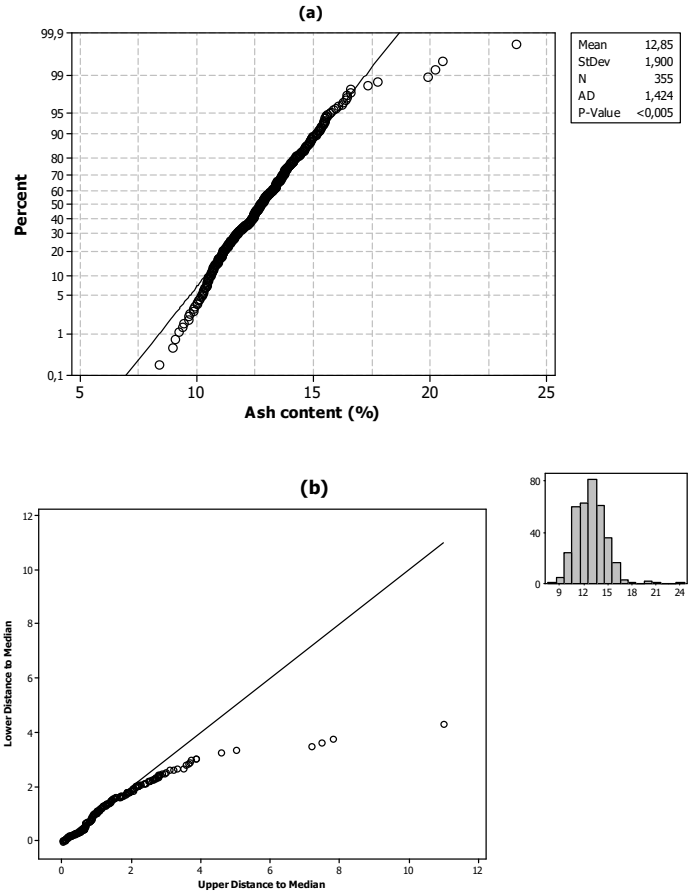

Figure 3. Normal probability (a) and symmetry (b) plots for +18 mm ash content

The ash content data were tested by some distribution functions and transformation methods. The probability plots of results obtained are given and compared with normal distribution plot and Anderson Darling (AD) test results in Fig. 4. Lognormal distribution, Box-Cox and Johnson transformation have *p* values higher than 0.05 (Figs. 4b, 4c and 4d). However, both lognormal distribution (Fig.4c) and Johnson transformation (Fig.4d) have the same *p* values of 0.176 and give better results than Box-Cox transformation (Fig.4b). In this research, lognormal distribution was chosen since it is more simple transformation method than Johnson transformation.

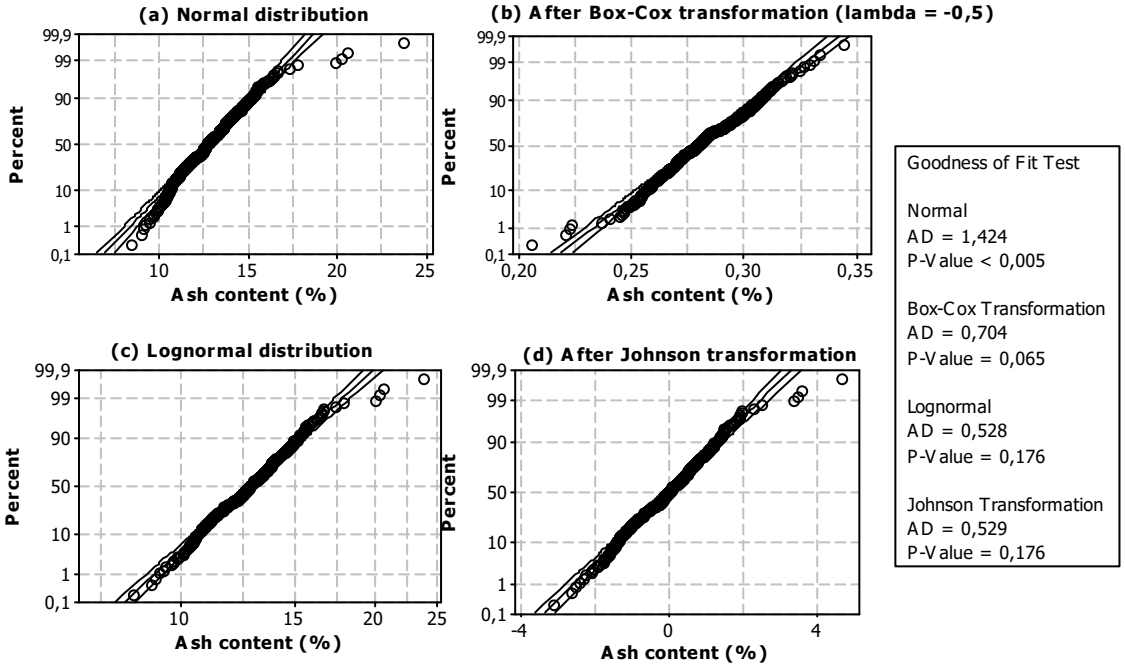

Figure 4. Probability plots for +18 mm clean coal with 95% confidence interval

Time Series Analysis of Ash Data

Time series plots of original and log transformed ash content data are comparatively presented in Fig. 5a and 5b respectively. Since original ash data do not obey normal distribution, log transformed ash content data in Fig. 5b will be considered during the determination of ARIMA(*p,d,q*) time series model. As seen the data are stationary indicating that there is no need to take any difference to make data stationary. Therefore, the *d* value is zero (0) in the ARIMA(*p,d,q*) model, i.e. the model will be ARIMA(*p,0,q*).

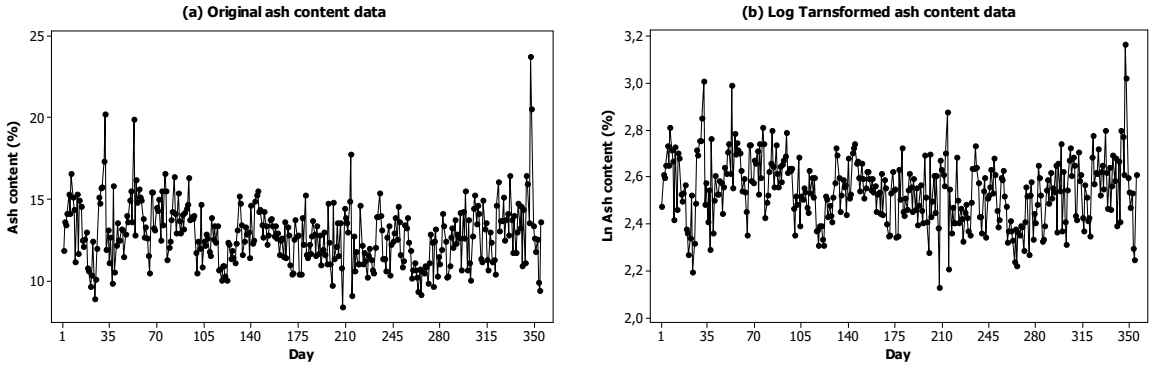

Figure 5. Time series plots of original (a) and log transformed (b) ash content data

Fig. 6 show scatter plot presenting the possible correlation of current log transformed ash data value (*T*) with its previous log transformed ash data (*T-1*). As seen clearly, there is a considerable correlation between two consequent ash data values. In order to determine the correlation degree, autocorrelation function (ACF) and partial autocorrelation function (PACF) plots were generated for 60 lags. The results of ACF and PACF plots with 5% significance level are shown in Fig. 7a and 7b respectively. According to PACF plot in Fig 7a, autocorrelation decays after few lags and then remains 95% confidence limits indicating the data stationary as determined previously. Fig. 7b shows that the ash content data have one important autocorrelation at first lag and then at the second lag. We estimated autocorrelation coefficients of ash content data at first lag is 0.388 and second lag is 0.325 (Fig. 7a). These results indicate that ash content data have considerable autocorrelation and should be taken into account.

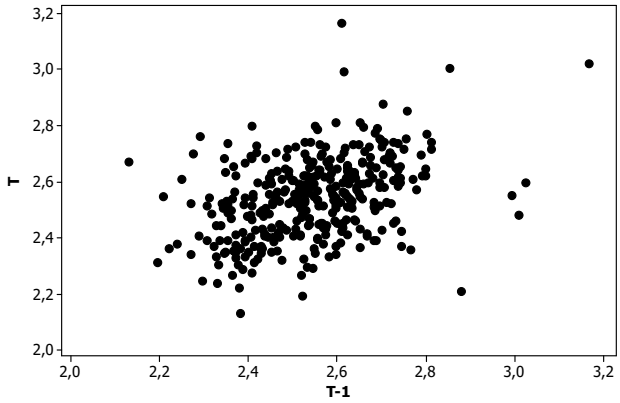

Figure 6. Scatter plot of ash content data, *T* versus *T-1*

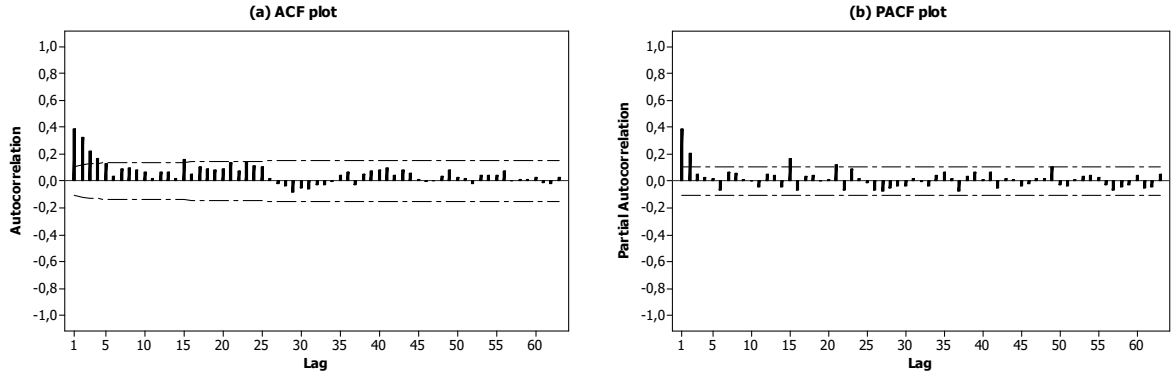

Figure 7. Autocorrelation function (ACF) (a) and partial autocorrelation function (PACF) (b) plots of log transformed ash content data with 5% significance limits

Table 2 compares the results of fitting different time models to the ash content of +18 mm clean coal data. As seen in Table 2, ARIMA(1,0,1) model is the lowest value of the Akaike Information Criterion (AIC), therefore it has been selected to generate the ash content forecasts. Parameters of ARIMA(1,0,1) model is shown in Table 3. Table 3 summarizes the statistical significance of the terms in the forecasting model of ARIMA(1,0,1). Terms with *p* values less than 0.05 are statistically significantly important at the 95% confidence level. The *p* values for the AR(1), MA(1) and mean terms were found less than 0.05, all of them are significantly different from 0 (Table 3). The estimated standard deviation of the input white noise equals 0.1289.

Table 2: Time series model comparisons for ash content estimation

Models	*RMSE**	*AIC*
ARIMA(1,0,1)	0.129306	-4.07425
ARIMA(2,0,0)	0.129393	-4.07289
ARIMA(2,1,1)	0.129451	-4.072
ARIMA(1,1,2)	0.129592	-4.06983
ARIMA(2,0,1)	0.129366	-4.06769

**: Root Mean Squared Error*

Table 3: ARIMA(1,0,1) Model summary

Parameter	*Estimate*	*Stnd. Error*	*t*	*p value*
AR(1)	0.768799	0.074445	10.3271	0.000000
MA(1)	0.46089	0.102183	4.51042	0.000009
Mean, μ_0	2.54279	0.015762	161.324	0.000000
Constant, δ	0.587895			

Estimated white noise variance (σ_a^2)= 0.0166; Estimated white noise standard deviation (σ_a)= 0.1289

For a good time series model, the residuals should be independent and identically distributed (*i.i.d*). To determine these properties, diagnostic tests were carried out whether the residuals of the model obey normal distribution and have no autocorrelation to determine the model adequacy for the ash content data. Fig. 8 shows the normal probability ARIMA(1,0,1) model residuals. The model residuals fit the normal distribution very well according to the AD normality test result (*p*=0.640) (Fig. 8). Residuals were also controlled for the autocorrelation. The generated ACF and PACF plots for the model residuals within the 5% significance limits are presented in Fig. 9a and 9b respectively. As seen clearly, the autocorrelations are within the 95% confidence intervals suggesting that there are no autocorrelations between consecutive residual values. All these results indicate that the ARIMA(1,0,1) model is adequate enough to forecast ash content of +18 mm coals obtained by heavy dense drum.

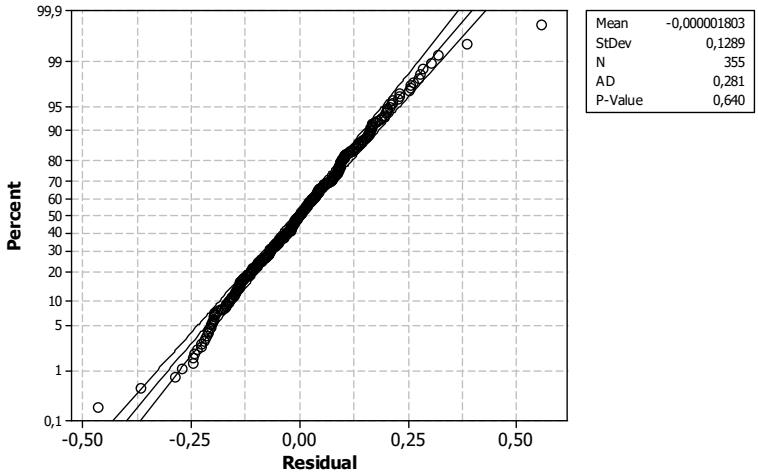

Figure 8. Residual normal probability plot of ARIMA(1,0,1) model for log transformed ash data

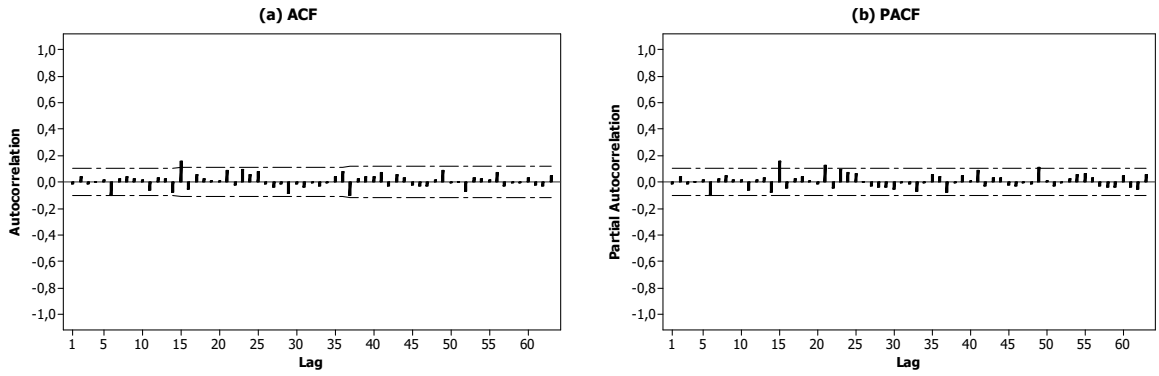

Figure 9. Autocorrelation function (ACF) (a) and partial autocorrelation function (PACF) (b) plots of residuals for ARIMA(1,0,1) model with 5% significance limits

As stated above, the ash content of +18 mm clean coal produced by heavy medium drum, X_t, can be modelled by ARIMA(1,0,1) or ARMA(1,1) model well. General description of ARIMA (1,0,1) model is (Castagliola and Tsung, 2005):

$$X_t = (1-\phi)\mu_0 + \phi X_{t-1} + \theta a_{t-1} + a_t \qquad (1)$$

Where X_t is the observation at time t=1, 2, ,…, a_t is the random noise or white noise at time =1, 2, ,… which is assumed to have mean of zero (0) and standard deviation of σ_a, ϕ is the autoregressive parameter of the model which corresponds to p term in the model, θ is moving average parameter which corresponds to q term in the model and μ_0 is the nominal mean of the process and δ is the constant calculated from $\mu_0(1-\phi)$, (Castagliola and Tsung, 2005).

The ash content data can be modelled by applying ARIMA(1,0,1) process with $\mu_0 = 2.5428$, $\phi = 0.7688$, $\theta = 0.4609$, where the a_t have a normal distribution with mean of zero and $\sigma_a = 0.1289$. Therefore, the ARIMA(1,0,1) time series model that can be used for the ash content of +18 mm clean coal produced by heavy medium drum is:

$$X_t = 0.5879 + 0.7688X_{t-1} + 0.4609a_{t-1} + a_t \quad (2)$$

Where, X_t is the log transformed ash value at time, a_t is the random noise which have distribution of N(0, 0.1289). Fig. 10 shows the actual and forecasted log transformed ash contents by ARIMA(1,0,1) model (Eq. 2). There are good agreement between the actual and forecasted ash content values in Fig. 10. This result indicates that ARIMA(1,0,1) model determined is adequate enough for the near future prediction of ash content.

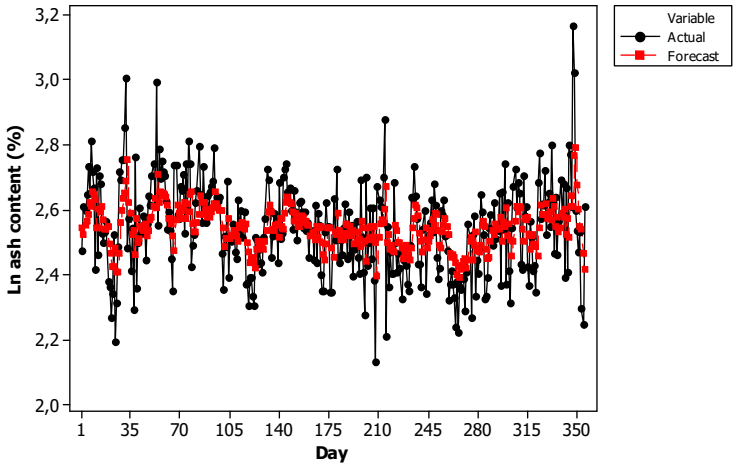

Figure 10. Actual Ln ash content versus forecasted ash content by ARIMA(1,0,1) time series model

Conclusion

Detailed examination of daily ash content of +18 mm clean coal product produced by heavy medium drum showed that ash content data obtained were not obey normal distribution due to the outliers. The ash content data were determined as skewed to the right. The normality can be achieved by both lognormal distribution and Johnson transformation. Since taking natural logarithm was easier than Johnson transformation, ARIMA time series model selection was applied log transformed ash values. No differencing operation was applied to ash data since the data were stationary with time. According to the AIC values of times series tested, the ARIMA(1,0,1) or ARMA(1,1) was determined the best time series model to forecast of ash content values for +18 mm clean coal product. The residuals of model have a distribution of $N(0, 0.1289)$ and no autocorrelation. Since the actual and forecasted ash values are good agreement, the ARIMA(1,0,1) model can be used conveniently for near future estimation of the ash content of +18 mm clean coal to be produced by heavy medium drum. It is suggested that time series models that can be used for the other quality characteristics of coal such as moisture, calorific value, sulphur content etc. can be developed to forecast them.

Acknowledgements

The TKİ Ege Linyitleri İşletmesi (ELİ) is gratefully acknowledged for supplying and giving permission of ash content data used in this study.

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QUANTUM SHAPE KINEMATICS

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Abstract: Shape dynamics is a theory first proposed by Julian Barbour which states that physics happen uniquely in the reduced configuration space of a theory. So far, studies in the area have focused on gravitational systems. Here we first contemplate on the implications of this idea on quantum mechanics. We summarize the idea of shape dynamics and then give physical configurations of multi qubit systems. Our aim in the grand picture, is to initiate a research program translating classical shape dynamics to quantum realm.

Keywords: Shape Dynamics, Qubits, Relational Physics

Introduction

Mach's principle may refer to many ideas. Hermann Bondi and Joseph Samuel list eleven distinct versions of the Mach's principle that can be found in the literature (Samuel, 1997). We adopt the Julian Barbour's definition (Barbour, The Definition of Mach's Principle, 2010).

First of all there is the configuration space of a theory. By removing the gauge degree of freedoms we obtain the reduced configuration space of a theory where all degrees of freedom are physical. This space is called the *shape space*. The Mach's principle states that (Barbour, The Definition of Mach's Principle, 2010) a point and a direction or a tangent vector in shape space determine the evolution of the system uniquely.

According to classical shape dynamics, in the Newtonian N-body problem the physical configurations are obtained when the rotation and scale degrees of freedom are removed (Barbour, Shape Dynamics. An Introduction, 2011). Hence for one or two particles in an empty universe there is no degree of freedom. Non-trivial Shape dynamics apply to the cases of three or more particles. For an introduction to shape dynamics, reader may refer to (Barbour, Shape Dynamics. An Introduction, 2011) and (Mercati, 2014).

So far the studies on shape dynamics focused on gravitational (Henrique Gomes, 2015) and classical aspects such as the arrow of time (Julian Barbour, 2014). Beginning with this paper, we would like to initiate a research endeavor that investigates consequences of classical shape dynamics in quantum phenomena.

Shapes of Qubits

We discuss quantum shape kinematics of multi qubit systems beginning with the cases of a single and double qubit systems. In this section qubits do not occupy positions in spacetime. Hence they have only internal degrees of freedom.

Single qubit system
We consider there exists only one qubit in the Minkowski spacetime and nothing else. The quantum state of the particle can be written as:

$$|\psi\rangle = \alpha|\uparrow\rangle + \beta|\downarrow\rangle, \exists \alpha, \beta \in \mathbb{C}.$$

However by rotating the coordinates and multiplying with a complex number we can always map $|\psi\rangle \mapsto |\uparrow\rangle$. Therefore we conclude that for one qubit there is no physical degree of freedom apart from its mere existence.

Double qubit system
Here we suppose there are two qubits in the universe. The basis vectors are $|\uparrow\uparrow\rangle$, $|\downarrow\downarrow\rangle$, $|\uparrow\downarrow\rangle$ and $|\downarrow\uparrow\rangle$. Because all we have is the angles between spins, the first two correspond to parallel spin case, $|parallel\rangle$, and the last two correspond to anti-parallel spin case, $|anti-parallel\rangle$. We can always rotate the state of first qubit into $|\uparrow\rangle$.

Hence the direction of the first spin is used to fix a direction in space. The physical basis vectors are $|\uparrow\uparrow\rangle$ and $|\uparrow\downarrow\rangle$.

Multiple qubit systems

In this part we suppose there are N qubits in the universe. The basis vectors of the system are $|a_1\rangle \otimes |a_2\rangle \otimes \cdots \otimes |a_N\rangle$ where $|a_i\rangle$ for $1 \leq i \leq N$ can be either $|\uparrow\rangle$ or $|\downarrow\rangle$. Whatever the value of $|a_1\rangle$ we can always rotate it to $|\uparrow\rangle$. Hence we reduce one degree of freedom. We call the first qubit as *the reference qubit*. N qubit system has the degrees of freedom of $N-1$ qubit system. This is true for all $N \geq 1$.

Possible Objections

Interactions

One may object to this classification with the counter example of interacting two qubits via the Hamiltonian $-\gamma \overrightarrow{\sigma_1} \odot \overrightarrow{\sigma_2}$. The eigenstates of the systems are $|\uparrow\uparrow\rangle$,$|\downarrow\downarrow\rangle$ and $|\uparrow\downarrow\rangle + |\downarrow\uparrow\rangle$ with energy eigenvalue $-\gamma$, whereas the state $|\uparrow\downarrow\rangle - |\downarrow\uparrow\rangle$ has energy 3γ. The seemingly paradoxical point is that the states $|\uparrow\downarrow\rangle - |\downarrow\uparrow\rangle$ and $|\uparrow\downarrow\rangle + |\downarrow\uparrow\rangle$ have different energies though they should correspond to the same $|anti-parallel\rangle$ state vector.

We need to note that in order for two qubits to *interact*, we need to introduce additional structure. In quantum shape dynamics, time evolution should be reached by considering the whole state of the universe. It will be a holistic theory.

For simplicity suppose that the interaction between the qubits requires another qubit. All in all the system becomes a triple qubit system. Here the physical states are such that the additional qubit has always the state $|\uparrow\rangle$. Basis vectors are $|\uparrow\rangle \otimes |a\rangle \otimes |b\rangle$ where $|a\rangle$, $|b\rangle$ can be $|\uparrow\rangle$ or $|\downarrow\rangle$. It is now that the states $|\uparrow\uparrow\downarrow\rangle - |\uparrow\downarrow\uparrow\rangle$ and $|\uparrow\uparrow\downarrow\rangle + |\uparrow\downarrow\uparrow\rangle$ are physically different and there is no paradox for them having different energy values. The problem is solved once we take into account the whole system.

Choice of the reference qubit

The choice of the reference qubit, the qubit whose state is fixed, is arbitrary. By definition it has no dynamics, though it may evolve relative to subsystems.

Conclusion

In this study, we removed the rotation gauge degrees of freedoms from multi qubits systems and what have remained are the quantum shapes of the system. We observed that one qubit can be put in a fixed state by rotating the space, hence it has no degree of freedom. In the general case of an N qubit system, the degrees of freedom turned out to have the degrees of freedom of $N-1$ qubit system.

Future works may expand our discussion by including quantum shape kinematics of molecules or higher spin systems. Quantum shape dynamics solution for the Hydrogen atom would be an interesting example to see. It seems that there will be a difference on the formation of a single hydrogen atom in the universe compared to formation of $N \gg 1$ hydrogen atoms.

Acknowledgements

F.S.D. would like to thank Julian Barbour for useful discussions.

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RSSI BASED CLUSTERING ALGORITHM FOR WIRELESS SENSOR NETWORKS

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Abstract: Technological developments on wireless communication systems and sensors productivity-enhancing wireless sensor networks have led the development of new algorithms. Wireless sensor devices (nodes) were developed along with the use of these two cases, and data collected has been achieved forwarded to a central location. Studies in the literature were shown that, WSN (wireless sensor networks) systems are focused on the detection the position of the nodes in the network and worked for energy efficiency. One of the major activities in the wireless sensor network is to create their own organizing clusters with selected cluster head, each cluster can send the data. Cluster head selection is based on a random number that is above the threshold value is calculated by the addition of the number, etc. parameters of nodes in the network or having highest energy value. In this study, the cluster head selection is performed by calculating a distance between nodes in the cluster. Distance information is obtained from RSSI (Received Signal Strength Indicator). Each node in the network, all nodes can communicate with them on the record and finds the average RSSI level. The highest average per cluster node is selected and published in this case to the other node. The cluster head node will include its own cluster the node that is lower than the average RSSI. Cluster head selection and clustering process continues with iterations until all nodes clustering in the network. Experimental studies conducted with simulation program developed C # .net environment and network efficiency are investigated. In the results, the cluster is first created which settled in the center of the network, and the center population was determined to be more than others. In this case, a threshold value must be determined for correcting the data next to the average RSSI. So, accordingly the necessity of re-aggregation network is detected.

Keywords: RSSI, clustering, Wireless Sensor Network

Introduction

Wireless Sensor Networks (WSN) that on sensor, battery, processor and communication unit which is to collect data from the environment they have created networks of small nodes. Wireless Sensor Networks aim of Madiran delivered to the collection point of data collected from the environment. The studies in the literature on this topic can be collected in the localization and energy efficiency, data routing. One of the important work areas in WSN is to select a cluster head (CH) in self-organized clusters create their own clusters and each cluster can send the data. Clustering algorithms basic principle, the energy of the nodes in the network to select a CH in order to use the highest efficiency and the data are included in the set is based on its submission to him. If the selected cluster head transmits data from the central node.

Cluster head (CH) selection on the calculated energy to generate a random number with the participation threshold of parameters such as the number of nodes in the CH node or that the network is based on a high. But choosing themselves a CH node of a clustering algorithm clusters close to each other based on the distance from the node would lead to less energy will be more accurate than logically. When analyzed studies on the subject, which appears to be related to the selection algorithm Leach per cluster. LEACH algorithm was developed in 2002 by Heinzelman and CH selection was built. In another study that was made by Heinzelman in the same year, due to the not to be homogeneous distance between CH and nodes in cluster, the CH of the energy efficiency of the nodes has been mentioned is low (Heinzelman, 2002). There are studies about the measurement of the battery capacity with distance information and the distance estimation between nodes and determine the position of movable objects in confined spaces with RSSI. (Arias, 2004, Saxena, 2008, Chung, 2009, Wessels, 2010, Blumrosen, 2010, Faheem, 2010, Blumrosen, 2013, Chakrabortya, 2013, Zheng, 2011, Heurtefeux and Velois, 2012).

In a study conducted in 2015 by Kannan, RSSI value between the central station and node is taken and the average RSSI value has been calculated for the selection of CH. Energy levels and the average RSSI value of the node to

obtain a threshold value are added together. If the average RSSI per cluster node is above this threshold value is selected. Clustering is carried out by the center (Kannan,2015).

An alternative method is presented for the selection of clusters head in the network with RSSI data in a study conducted by Fazackerley. Simulation studies related to work was performed and was compared with Leach algorithm. Nodes was calculated the average RSSI data from the node in around and gets the P_{fact} value. If P_{fact} value is above the predetermined value $RSSI_{thres}$ then this node is the CH node (Fazackerley, 2009).

As a result of analysis of the literature, RSS data between nodes in a wireless sensor network; routing the data transmitted to the central station, finding location of the nodes in the network and is used for the purpose of election of the head of the network cluster to cluster. In this study, a clustering algorithm is proposed for CH selection and clustering with RSSI values of the network. The proposed algorithm consists of two main parts. The first part, the selection of CH node will be the creation of clusters and the other. CH selection was provided with development of Kannan (2015) algorithm.

Materials and Methods

Cluster Head Selection

CH selection algorithm implemented at once spread to areas of the network has been developed in accordance with self-organizational approach. For CH selection, each node communicates with other nodes for obtaining average value of $RSSI_{avrg}$. Value $RSSI_{avrg}$ is obtained by the equations given in Equation 1.

$$RSSI_{avrg} = \begin{cases} \sum_{k=1}^{n} \frac{RSSI_k}{n} & n > 0 \\ \infty & n = 0 \end{cases} \quad \text{(1) Kannan(2015)}$$

Here; n the number of nodes being communicated, the $RSSI_k$ value represents the RSSI value of *k.th* nodes. Nodes that calculate average $RSSI_{avrg}$ transmits their average to network. All nodes repeat the same process and records the average $RSSI_{avrg(i)}$ values from the other nodes. This is an average; it is likely to be the most effective parameters of the CH node. If $Node \quad RSSI_{avrg} < RSSI_{avrg(i)}$, $i.th.$ node becomes the CH node.

Clustering Algorithm

In this phase, the selected CH defines its own set. CH, compares the value of $CH_{RSSI_{avrg}}$ with $RSSI_i$ values between other nodes that are stored in the memory. If $RSSI_i < CH_{RSSI_{avrg}}$, $i.th.$ node would be included in the cluster nodes. This process continues until all nodes clustering in the network. Clustering algorithm flow chart is given in Figure 1.

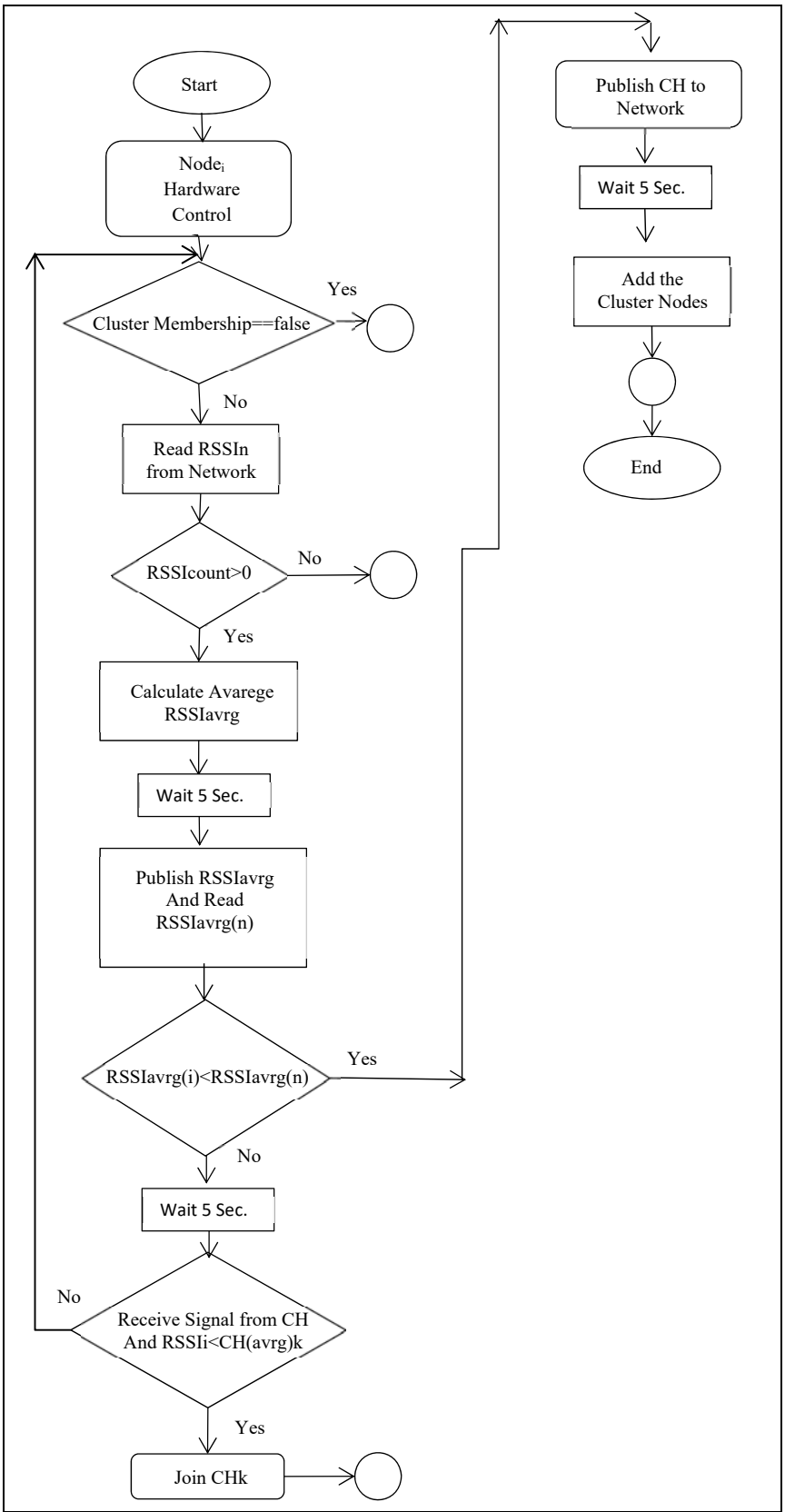

Figure 1. Flow Chart of Clustering Algorithm

Results and Discussion

Experimental studies in order to see quick results of the algorithm are made by developed simulation program. Nodes are derived by adding the memory unit, the microcontroller and transmitter / receiver units. The register units are planned in the memory unit containing the identification information, the distances between other nodes and CH ID information. Randomly distributed nodes simultaneously employ algorithm specified in the Material and Methods section. Experimental studies were performed on four different networks consisting 10, 20, 50 and 100 nodes. Each node was assumed to be able to communicate there between. Distance between nodes is treated as RSSI data. CH selection and clustering capacity of 4 different networks consisting of 10, 20, 50 and 100 nodes is shown in respectively Figure 2, Figure 3, Figure 4 and Figure 5. Selected CHs in the network are indicated with a circle formed. Also cluster heads and with the number of nodes that are subject to them, and as Table 1, Table 2, are given in Table 3 and Table 4.

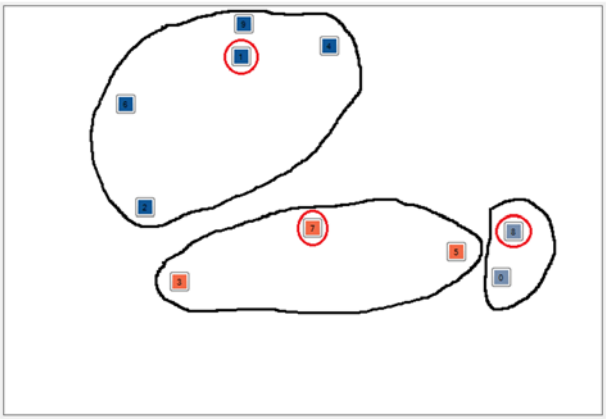

Figure 2. Network Map and Clustering with 10 Nodes

Table 1: Cluster Table with 10 Nodes

CH ID	CH Color	Cluster Members
7		3
1		5
8		2

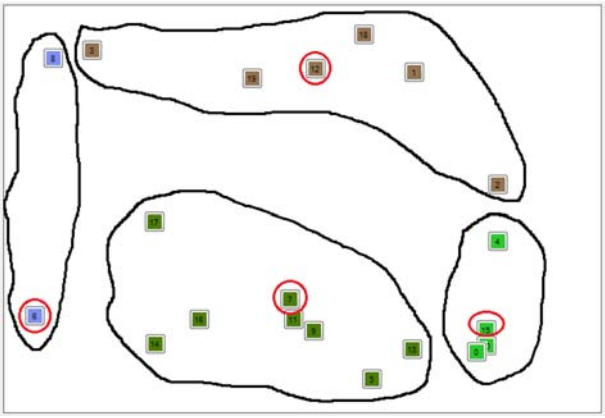

Figure 3. Network Map and Clustering with 20 Nodes

Table 2: Cluster Table with 20 Nodes

CH ID	CH Color	Cluster Members
7		8
12		6
15		4
6		2

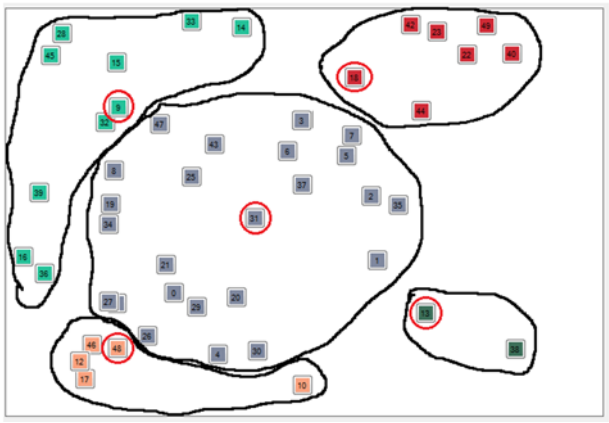

Figure 3. Network Map and Clustering with 50 Nodes

Table 3: Cluster Table with 50 Nodes

CH ID	CH Color	Cluster Members
31		25
9		10
18		8
48		5
13		2

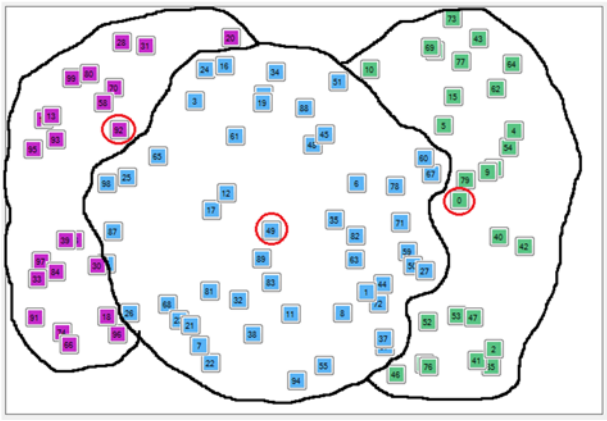

Figure 4. Network Map and Clustering with 100 Nodes

Table 4: Cluster Table with 100 Nodes

CH ID	CH Color	Cluster Members
49		50
0		27
92		23

The simulation results of clustering and network characteristics are examined, it is seen that in a number of different iterations of the network cluster. Looking at the corresponding table showing the distribution of the network node of the cluster was observed within the first iteration of the population is higher than others. This will increase the data density of traffic throughout the cluster and the CH job. It will also cause decreased efficiency of the network and will negatively affect the energy efficiency of nodes. Also, in previous iterations of the nodes included in a cluster, in subsequent iterations have been observed at a distance closer to the other CH is selected.

Conclusion

In this study, an algorithm has been developed to selection of CH with RSSI values and clustering of the network. Algorithm results have been observed that in a successful by not leaving outside any node cluster in the network. However when node count increases in the network, the node populations of the first cluster were found to be too high of the others. In addition, the number of clusters to be created cannot be interfered with. In addition, the number of clusters to be created cannot be interfered with. For optimizing the number of nodes in the cluster to remove and eliminate these drawbacks, which must be on the set $Node \quad RSSI_{avrg} < RSSI_{avrg(i)}$ it has been identified the need to update the rules. In future studies, the desired number of clusters to be created, a threshold value is calculated using the number of nodes in the cluster so the network parameters to be included in the rules is planned to examine the clustering efficiency.

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SCREENING OF PKS/NRPS GENE REGIONS ON MARINE DERIVED ACTINOBACTERIA

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Abstract: Marine derived actinobacteria are very valuable organisms because of unique abillities. The goal of this study was to investigate potential of production bioactive metabolite from marine derived actinobacteria. Eight actinobacteria were screened by PCR based techniques. Results showed that many isolate positive for NRPS (62,5%) and PKS (37,5%) genes. According to the PCR screening marine erived actinobacteria from Black Sea have significant biosynthetic potential. As a results highlighted that marine sediments represented potential sources for discovery of bioactive secondary metabolites.

Keywords: PKS,NRPS, PCR screening, actinobacteria

Introduction

Actinobacteria are gram positive bacteria wih high G+C content. Actinobacteria are known for their unique ability to produce novel compounds of clinical and pharmaceutical importance (Li&Vederas,2009). Through the many actinobacterial genera, *Streptomyces*, *Micromonospora*, *Nocardiopsis*, and *Rhodococcus* are the most efficient producers of secondary bioactive metabolites (Reimer et al., 2015). Actinomycetes are found in a variety of habitats and are particularly abundant in soil. Because of the exhaustion of the usual terrestrial sources, the discovery rate of new compounds from actinobacteria has steadily decreased and the re-isolation of known compounds was subsequently increased. This progress has led to a declining trend in the discovery of unknown natural products derived from microorganisms (Khan et al., 2010; Lam, 2006; Watve et al., 2001) For this reason, efforts focused increasingly on expanding the isolation sources beyond just terrestrial soils.

The marine biosphere is one of the earth's richest innumerable habitats and is expected to be an excellent sampling point due to microbial diversity in the seawater and sediment (Berdy, 2005; Fenical and Jensen, 2006). It has been shown that marine actinobacteria species are physiologically and phylogenetically distinct from their terrestrial relatives, and were found to represent a rich source for novel, chemically multifarious bioactive secondary metabolites with potential applications in antimicrobial and anticancer therapy (Bull et al., 2005; Lam, 2006; Maldonado et al., 2005). Marine actinomycetes produced a multitude of novel lead compounds with medicinal and pharmaceutical applications (Becerril-Espinosa, 2013). Although research on marine actinobacterial natural products is still at its early stage compared to what is known about terrestrial relatives, the enormous potential of marine strains as producers of bioactive secondary metabolites has already been proven and till date it remains matchless (Lakshmipathy et al., 2010).

Various natural products belong to the chemical families polyketides and non-ribosomal peptides (Droghazi & Metcalf, 2013). Polyketide synthases (PKS) and nonribosomal peptide synthetases (NRPS) are multi-domain megasynthases that are involved in the biosynthesis of a large fraction of diverse microbial natural products known as polyketides and nonribosomal peptides, respectively (Donadio et al., 2007). Besides, PKS and NRPS gene region screening on genome use for determine bioactive secondary compounds. In this way, ability of bioactive compounds production of microorganism are determined (Pathom-Aree, 2006). Marine derived actinobacteria have PKS and NRPS pathways for secodary metabolite production. For this reason they have ability of production diverse components as terpens, terpenoids, polyketides, peptids, caprolactones, quinons and alkaloids (Solanki et al., 2008).

Marine derived actinobacteria that obtained from Black Sea sediments were investigated in terms of potency of secondary metabolite pruduction by using PCR based approach in this study.

Materials and Methods

Actinobacteria strains

Eight marine derived actinobacteria strains that have antimicrobial activity in our lab were selected for PCR screening

DNA isolation

DNA isolation from actinobacteria was done by using Fast Spin DNA Isolation Kits (MP) with instruction manual.

PCR screening

i. NRPS gene region screening

Two primer sets A3F/A7R and ADEdom5/ ADEdom3 (Table 1) were used for PCR screening of NRPS gene region. All PCR reactions were performed 50 µl total volume. The PCR mixture was contained 10 µl 10X PCR buffer, 2 µl each primer (10 pM), 2 µl dNTPs (10 mM), 3 µl $MgCl_2$, 0.25 µl Taq DNA polymerase (5 U/µl; GoTaq Hot Start DNA polymerase), 1 µl genomic DNA, and 5 µl DMSO. To amplify the 450 bp segment encoding the NRPS, we used the primers ADEdom5 (5'- ACSGGCNNNCCSAAGGGCGT-3') and ADEdom3 (5'-CTCSGTSGGSCCGTA-3') (Busti, 2006). PCR conditions that after a 5 min incubation at 94 °C, 10 cycles (each of 1 min at 94 °C, 45 s at 50°C and 1 min at 72 °C) were followed by 20 cycles under identical conditions, except that the annealing temperature was raised to 55 °C. All PCR reactions were terminated with a 5 min elongation at 72 °C. To amplify the 700-800 bp segment encoding the NRPS, we used the primers A3F(5'-CSTACSYSATSTACACSTCSGG-3') and A7R (5'-SASGTCVCCSGTSCGGTAS-3') (Ayuso-Sacido, 2005). After a 5 min incubation at 94 °C, 30 cycles (each of 1 min at 94 °C, 1min at 58 °C and 1 min at 72 °C) All PCR reactions were terminated with a 5 min elongation at 72 °C.

ii. PKS gene region screening

K1F/M6R primers (Table 1) were used for PCR reactions. PCR reactions were performed 50 µl total volume and PCR mixture was contained 10 µl 10X PCR buffer, 2 µl each primer (10 pM), 2 µl dNTPs (10 mM), 3 µl $MgCl_2$, 0.25 µl Taq DNA polymerase (5 U/µl; GoTaq Hot Start DNA polymerase), 1 µl genomic DNA, and 5 µl DMSO. To amplify the 1200-1400 bp segment encoding the PKS, we used the primers K1F (5'-TSAAGTCSAACATCGGBCA-3') and M6R (5'-CGCAGGTTSCSGTACCAGTA-3') (Ayuso-Sacido, 2005). After a 5 min incubation at 94 °C, 30 cycles (each of 1 min at 94 °C, 2 min at 58 °C and 1.5 min at 72 °C) All PCR reactions were terminated with a 5 min elongation at 72 °C.

Table 1: Primers and their feature

primers	sequences	target gene	amplicon lenght (bp)	literature
K1F	5'-TSAAGTCSAACATCGGBCA-3'	PKS	1200-1400	Ayuso-Sacido, 2005
M6R	5'-CGCAGGTTSCSGTACCAGTA-3'			
A3F	5'-CSTACSYSATSTACACSTCSGG-3'	NRPS	700-800	Ayuso-Sacido, 2005
A7R	5'-SASGTCVCCSGTSCGGTAS-3'			
ADEdom5	5'-ACSGGCNNNCCSAAGGGCGT-3'	NRPS	450	Busti, 2006
ADEdom3	5'-CTCSGTSGGSCCGTA-3'			

Results and Discussion

PKS and NRPS screening are used as a collateral strategy for discovering bacterial natural product diversity (Pathom-Aree, 2006). Because natural product diversity are a reflection of bacterial genetic diversity. Prescreening of these target genes are beneficial approach for determine to new and useful secondary metabolites (Ketela et al., 2002). In this study eight strains were used for PCR based screening. Firsty, NRPS PCRs were done using A3F/A7R primers sets and appropriate conditions (Table 1). But PCRs were not run. For this reason other primer sets were tried for NRPS. ADEdom5/ ADEdom3 primers (Table 1) were used for NRPS PCR and 5 positive bands (≈450bp lenght) were detected on %1 agarose gel (Table 2). K1F/M6R primers (Table 1) were used for PKS PCR and 3 positive bands (≈1200-1400bp lenght) were were detected on %1 agarose gel (Table 2).

Table 2: PCR results of target genes

Actinobacteria strain	PKS PCR (K1F/M6R)	NRPS PCR (A3F/A7R)	NRPS PCR (ADEdom5/ ADEdom3)
S1	-	-	-
S2	-	-	-
S3	-	-	-
S4	+	-	+
S5	+	-	+
S6	-	-	+
S7	+	-	+
S8	-	-	+

According to results, many isolate were found positive for NRPS (62,5%) and PKS (37,5%) genes. Besides PKS and NRPS were found with together some samples (37,5%). Thus this marine derived actinobacteria have a great potantial for production of bioactive secondary metabolites.

Conclusion

PCR screening of PKS or NRPS gene regions were not functional strategy. On the contrary of fermentation based studies, active compounds were not isolated at the end of the PCR screening. But prescreening of these gene regions were found very effective approach for genetic research. Results of PCR screening can use for upper studies. Also these results might be guide similar studies

Acknowledgements

This study was financed by Giresun University Scientific Research Projects Coordination Unit (FEN-BAP-A-200515-87)

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THE EFFECT OF RESERVOIR LENGTH ON THE EARTHQUAKE BEHAVIOR OF ROLLER COMPACTED CONCRETE DAMS

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Abstract: Finite element analysis is an effective method for evaluating roller-compacted concrete (RCC) dams in the earthquake zone and investigating earthquake response of RCC dams. The primary aim of this research is to inspect the effect of various reservoir lengths on the earthquake response of a selected RCC dam under strong ground motion effect. This study presents two-dimensional earthquake response of Cine RCC dam considering geometrical and material non-linearity in time-history analyses. The Drucker-Prager material model is used in the materially non-linear analyses for concrete and also foundation rock. The reservoir length of RCC dam is modeled respectively as half, itself, two times, three times, five times and ten times of the dam height. The dam–reservoir-foundation interaction is modeled by the contact-target element couples. The hydrodynamic pressure of the reservoir water is modeled with two dimensional fluid finite elements based on the Lagrangian approach. 1999 Duzce Earthquake acceleration records are considered in all dynamic analysis. According to non-linear time history analyses, the horizontal displacements and principle stress components are compared and evaluated.

Keywords: Contact-target element, Hydrodynamic pressure, Lagrangian approach, Roller-compacted concrete dam.

Introduction

People have always tried to live around water resources from past to present Because water is very important to survive people and other lives. People have needed water for a lot of purpose until humanity. The settlers around water resources have used water for storing, drinking and irrigation in many eras. Furthermore, settlements away from water supplies have always many problems. They were not obtainable water every time and every place. Dams are the most important buildings for storing water, water protection and the buildings play very important role for obtaining of energy and continuing of people's daily lives. Dams can prevent uncontrolled water. Dams can reduce consumption of fossil fuels for electricity production. Roller compacted concrete (RCC) dams have been widely used by all world countries since the 1980s. DSI (state hydraulic works) which is responsible for realization of water resources development projects in Turkey is completed 204 large dams and 339 small dams until today. 111 large dams and 159 small dams are under construction in Turkey.

The investigators usually focused on the thermal analysis of RCC dams because thermal cracking may create a leakage path to the downstream face that is aesthetically undesirable. Noorzaei et al. (2006) performed thermal and structural analysis of Kinta RCC gravity dam, which is the first RCC dam in Malaysia, using the developed two-dimensional finite element code. Then the authors compared predicted temperatures obtained from the finite element code with actual temperatures measured in the field using thermocouples installed within the dam body and they found them to be in good agreement. Jaafar et al. (2007) developed a finite element based computer code to determine the temperatures within the dam body. According to performed thermal analysis of a RCC dam changing the placing schedule can optimize the locations of maximum temperature zones. Bayraktar et al. (2010) investigated the effect of reservoir length on seismic performance of gravity dams to near and far-fault ground motions. Abdulrazeg et al. (2010) performed three dimensional coupled thermal and structural analysis of roller compacted concrete dams. They assessed crack development within the dam body using the proposed crack index. This method remarkably reduces the total number of elements and nodes when the dam height was increased. Zhang et al. (2011) simulate and analyze the temperature field and thermal stress of certain RCC gravity dams in cold regions using the material properties of roller-compacted concrete by three-dimensional finite element relocating mesh method. As a result, the authors indicated that superficial insulation prevented surface cracks from

forming. Kartal et al. 2012 investigated three-dimensional earthquake analysis of roller-compacted concrete dams.

In this study, two-dimensional earthquake response of Cine RCC dam is investigated for six different cases. The reservoir length of RCC dam is modeled respectively as half, itself, two times, three times, five times and ten times of the dam height. The two dimensional fluid finite elements based on the Lagrangian approach is utilized to obtain the hydrodynamic pressure effect of the reservoir water. Contact-target elements are used in dam-foundation-reservoir interfaces. No separation friction case is considered between dam and foundation. Nonlinear time-history analyses are carried out to obtain earthquake response of the dam. Geometrically and materially nonlinear analysis were made for this purpose. Fixed boundary conditions are considered in the numerical solutions. Numerical solutions indicate that the horizontal displacements increased by increasing reservoir length and hydrodynamic pressure effect. In addition to this, principal tensile and compressive stresses increased by reservoir length. When reservoir length extended, greater displacements and stresses appeared in the upstream side of the dam.

Formulation of Dam-Foundation-Reservoir Interaction by the Lagrangian Approach

The formulation of the fluid system based on the Lagrangian approach is presented as following (Wilson and Khalvati, 1983; Calayır 1994). In this approach, fluid is assumed to be linearly compressible, inviscid and irrotational. For a general two-dimensional fluid, pressure-volumetric strain relationships can be written in matrix form as follows,

$$\begin{Bmatrix} P \\ P_z \end{Bmatrix} = \begin{bmatrix} C_{11} & 0 \\ 0 & C_{22} \end{bmatrix} \begin{Bmatrix} \varepsilon_v \\ w_z \end{Bmatrix} \tag{1}$$

Where P, C_{11}, and ε_v are the pressures which are equal to mean stresses, the bulk modulus and the volumetric strains of the fluid, respectively. Since irrotationality of the fluid is considered like penalty methods (Zienkiewicz and Taylor, 1989; Bathe, 1996), rotations and constraint parameters are included in the pressure-volumetric strain equation (Eq. (1)) of the fluid. In this equation P_z, is the rotational stress; C_{22} is the constraint parameter and w_z is the rotation about the cartesian axis y and z.

In this study, the equations of motion of the fluid system are obtained using energy principles. Using the finite element approximation, the total strain energy of the fluid system may be written as,

$$\Pi_e = \frac{1}{2}\mathbf{U}_f{}^T \mathbf{K}_f \mathbf{U}_f \tag{2}$$

where $\mathbf{U}_f$ and $\mathbf{K}_f$ are the nodal displacement vector and the stiffness matrix of the fluid system, respectively. K_f is obtained by the sum of the stiffness matrices of the fluid elements as follows,

$$\begin{aligned} \mathbf{K}_f &= \Sigma \mathbf{K}_f^e \\ \mathbf{K}_f^e &= \int_V \mathrm{B}_f^{e\,T} C_f \mathrm{B}_f^e dV^e \end{aligned} \tag{3}$$

where C_f is the elasticity matrix consisting of diagonal terms in Eq. (1). B_f is the strain-displacement matrix of the fluid element.

An important behavior of fluid systems is the ability to displace without a change in volume. For reservoir and storage tanks, this movement is known as sloshing waves in which the displacement is in the vertical direction. The increase in the potential energy of the system because of the free surface motion can be written as,

$$\Pi_s = \frac{1}{2}\mathbf{U}_{sf}^T \mathbf{S}_f \mathbf{U}_{sf} \tag{4}$$

where $\mathbf{U}_{sf}$ and $\mathbf{S}_f$ are the vertical nodal displacement vector and the stiffness matrix of the free surface of the fluid system, respectively. $\mathbf{S}_f$ is obtained by the sum of the stiffness matrices of the free surface fluid elements as follows,

$$\left.\begin{aligned} \mathbf{S}_f &= \Sigma \mathrm{S}_f^e \\ \mathbf{S}_f^e &= \rho_f g \int_A \mathrm{h}_s^T \mathrm{h}_s dA^e \end{aligned}\right\} \tag{5}$$

where h_s is the vector consisting of interpolation functions of the free surface fluid element. ρ_f and g are the mass density of the fluid and the acceleration due to gravity, respectively. Besides, kinetic energy of the system can be written as,

$$T = \frac{1}{2}\dot{\mathbf{U}}_f^T \mathbf{M}_f \dot{\mathbf{U}}_f \tag{6}$$

Where $\dot{\mathbf{U}}_f$ and $\mathbf{M}_f$ are the nodal velocity vector and the mass matrix of the fluid system, respectively. $\mathbf{M}_f$ is also obtained by the sum of the mass matrices of the fluid elements as follows,

$$\left.\begin{aligned} \mathbf{M}_f &= \Sigma M_f^e \\ \mathbf{M}_f^e &= \rho_f \int_V H^T H dV^e \end{aligned}\right\} \tag{7}$$

where H is the matrix consisting of interpolation functions of the fluid element. If (Eq. (2), (4) and (6)) are combined using the Lagrange's equation (Clough and Penzien, 1993); the following set of equations is obtained,

$$\mathbf{M}_f \ddot{\mathbf{U}}_f + \mathbf{K}_f^* \mathbf{U}_f = \mathbf{R}_f \tag{8}$$

where, $\ddot{\mathbf{U}}_f$, $\mathbf{U}_f$ and $\mathbf{R}_f$ are the system stiffness matrix including the free surface stiffness, the nodal acceleration and displacement vectors and time-varying nodal force vector for the fluid system, respectively. In the formation of the fluid element matrices, reduced integration orders are used (Wilson and Khalvati, 1983).

The equations of motion of the fluid system, (Eq. (8)), have a similar form with those of the structure system. To obtain the coupled equations of the fluid-structure system, the determination of the interface condition is required. Since the fluid is assumed to be inviscid, only the displacement in the normal direction to the interface is continuous at the interface of the system. Assuming that the structure has the positive face and the fluid has the negative face, the boundary condition at the fluid-structure interface is,

$$U_n^- = U_n^+ \tag{9}$$

where U_n is the normal component of the interface displacement (Akkas et al., 1979). Using the interface condition, the equation of motion of the coupled system to ground motion including damping effects are given by,

$$\mathbf{M}_c \ddot{\mathbf{U}}_c + \mathbf{C}_c \dot{\mathbf{U}}_c + \mathbf{K}_c \mathbf{U}_c = \mathbf{R}_c \tag{10}$$

in which Mc, Cc, and Kc are the mass, damping and stiffness matrices for the coupled system, respectively. $\mathbf{U}_c, \dot{\mathbf{U}}_c, \ddot{\mathbf{U}}_c$ and $\mathbf{R}_c$ are the vectors of the displacements, velocities, accelerations and external loads of the coupled system, respectively.

Numerical Model of Cine Rcc Dam

The Model of Cine RCC Dam

Cine dam, located approximately 16km southeast of Cine, Aydın, was constructed in 2010 by General Directorate of State Hydraulic Works (Fig. 1) (DSI, 2015). It was established on Cine River. This dam was projected as a roller compacted concrete dam. The reservoir is used for irrigation and energy purposes. The dam crest is 372.5m in length and 9m wide. The maximum height and base width of the dam are 136.5 m and 142.5 m, respectively. The maximum height of the reservoir water is considered as 98.77 m. The annual total power generation capacity is 118 GW.

Fig. 1. Cine Roller Compacted Concree Dam

Material Properties of Cine Dam

The two-dimensional finite element model of Cine dam is modeled considering two layered foundation rock. One of this begins from crest level to base of the dam body. The other begins from the base of the dam body to bottom of the foundation. The material properties of Cine roller compacted concrete dam body and foundation are given in Table 1.

Table 1. Material Properties of Cine RCC dam

	Material Properties		
	Modulus of Elasticity (GPa)	Poisson's Ratio	Mass Density (kg/m³)
Concrete (Dam)	30	0.20	2530
Rock (Lower Foundation Soil)	25	0.18	2800

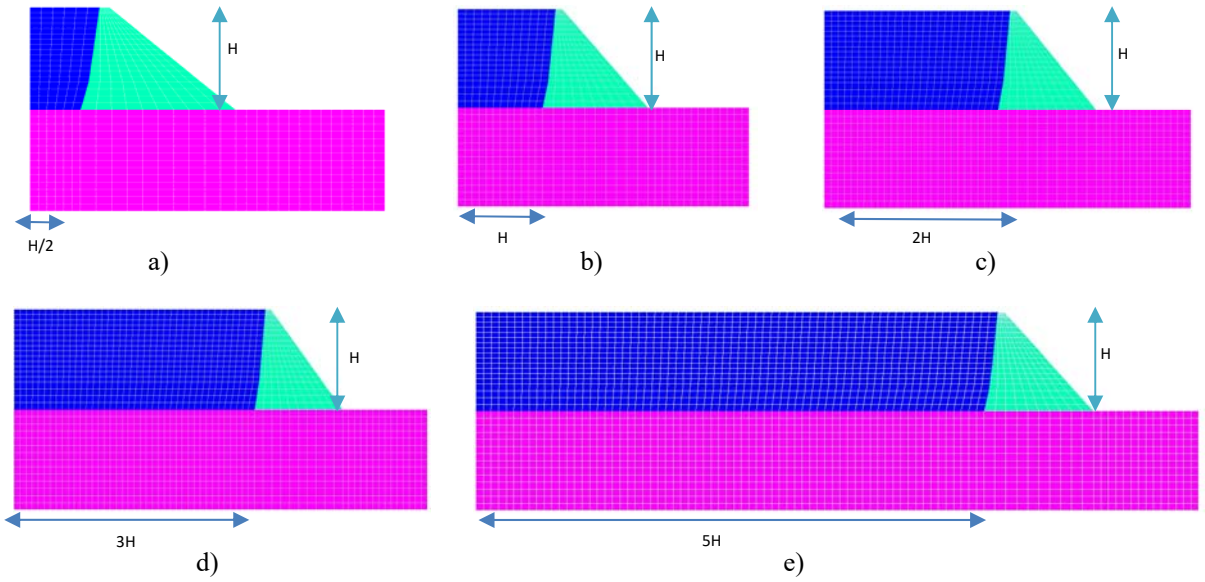
Finite Element Models of Cine Dam

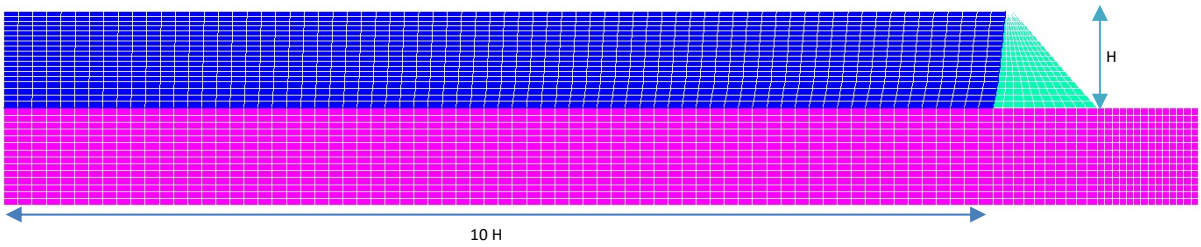
This study considers two-dimensional finite element models of Cine RCC dam (Fig. 2). In this model, if the height of the dam is indicated as 'H', the foundation soil is extended as 'H' in the transverse river direction, downstream direction and gravity direction. Besides, reservoir water model is extended as following Table 2. Numerical analysis were performed for these six cases.

Table 2. Numerical analysis

Cases	*Reservoir length*
Case 1	H/2
Case 2	H
Case 3	2H
Case 4	3H
Case 5	5H
Case 6	10H

Fluid and solid element matrices are computed using the Gauss numerical integration technique (Wilson and Khalvati, 1983).



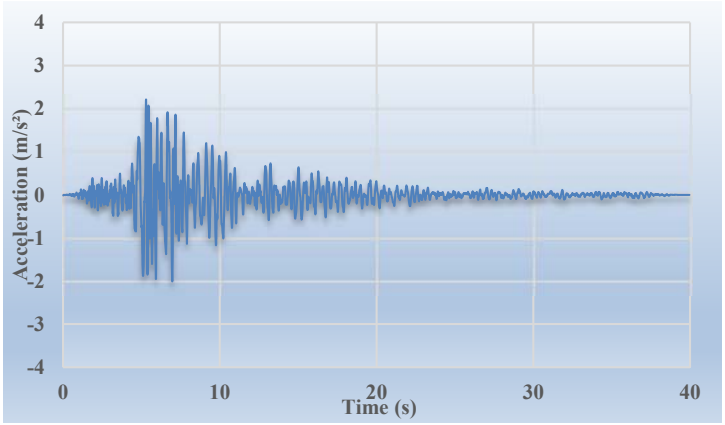


f)

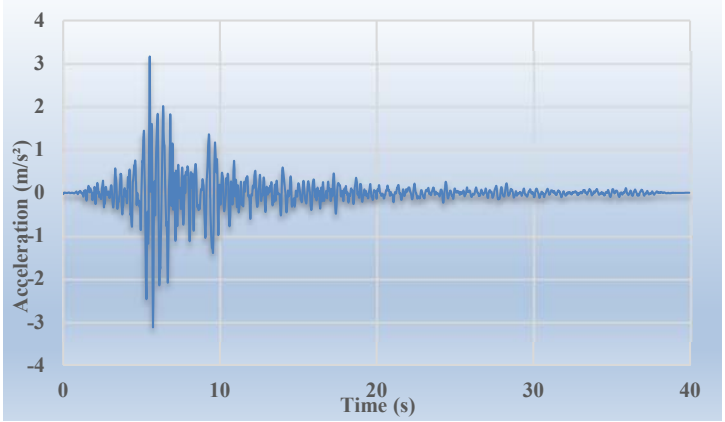
Fig. 2. Finite Element Models of Cine RCC dam

Strong Ground Motion Effects

This study investigates the earthquake response of Cine RCC Dam subjected to strong ground motion. Different reservoir length cases are taken into account in the numerical solutions. The north-south and vertical components of the 1989 Loma Prieta earthquake (Fig. 3) are utilized in analyses. Earthquake analyses are performed during 39.96 second. Nonlinear time-history analyses were performed using Ansys (2016). In the non-linear time history analyses, the time interval is used as 0.01 in different water level case. Rayleigh damping is used in time-history analysis. Therefore, first six vibration frequencies are considered to calculate Rayleigh damping constants using initial boundary conditions (Rayleigh and Lindsay, 1945; Chopra, 1996). Besides, Newmark algorithm was employed in numerical solutions.



a) Vertical component



b) North-South component

Fig 3. 1989 Loma Prieta Accelerograms

Numerical Analysis and Results

This study presents earthquake behavior of Cine RCC dam considering north-south and vertical components of 1989 Loma Prieta earthquake. Earthquake analyses are performed during 39.96 second. Numerical analysis was investigated for six different cases. If dam body height supposes as H, reservoir length is modelled as the following (Table 2). Numerical analysis is performed for each cases.
Solutions are shown in Fig. 4-6. According to these solutions, the smallest displacement is approximately 4.7 cm at dam crest for Case 1. However, the maximum displacement is 7.4 cm at dam crest for Case 6 (Fig. 4). So this solution is clearly shown that when reservoir length extends, higher displacements are obtained.

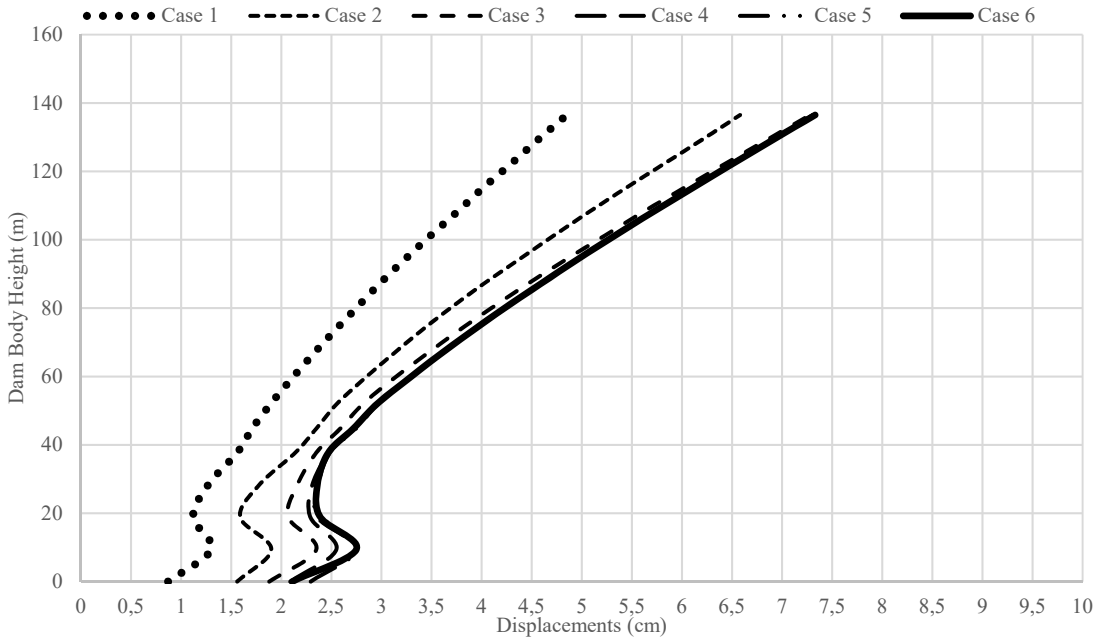


Fig. 4. Horizontal Displacements

The principal tensile and compression stresses are shown in Fig. 5-6. The maximum principal compression stress is approximately 9900 kN/m^2 at bottom of dam for Case 6. The minimum principal compression stress is 7350 kN/m^2 for Case 1 (Fig. 5.). The effect of reservoir length clearly appeared from these solutions.

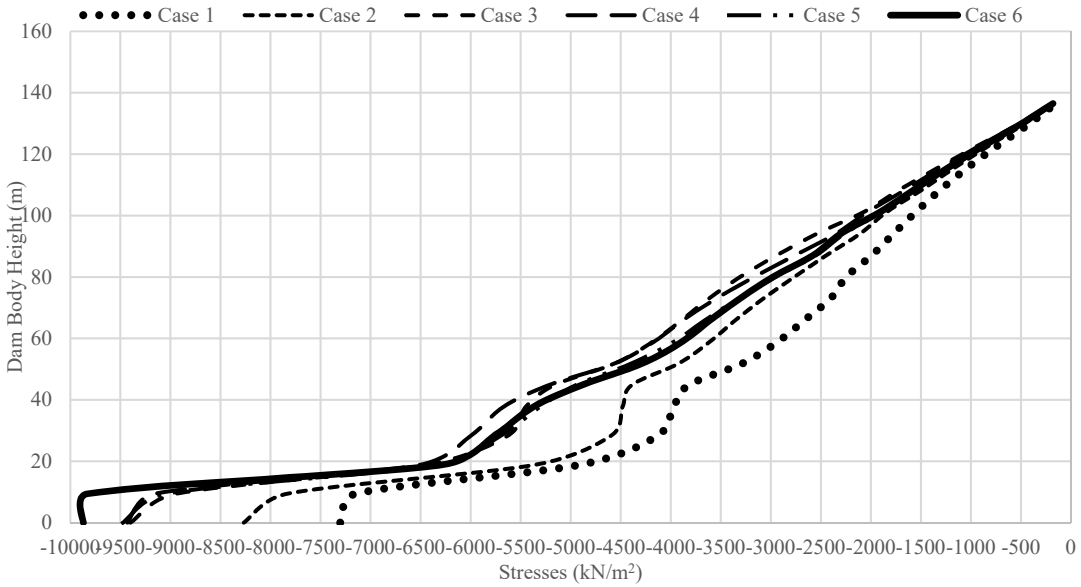


Fig. 5. Principal Compression Stresses

The maximum principal tensile stress is approximately 1950 kN/m^2 for Case 6 and the minimum principal compression stress is 7350 kN/m^2 for Case 1 at bottom of dam body (Fig. 6.). It clearly appears from Fig. 6 that if reservoir length extends, the principal tensile stresses increase by dam height.

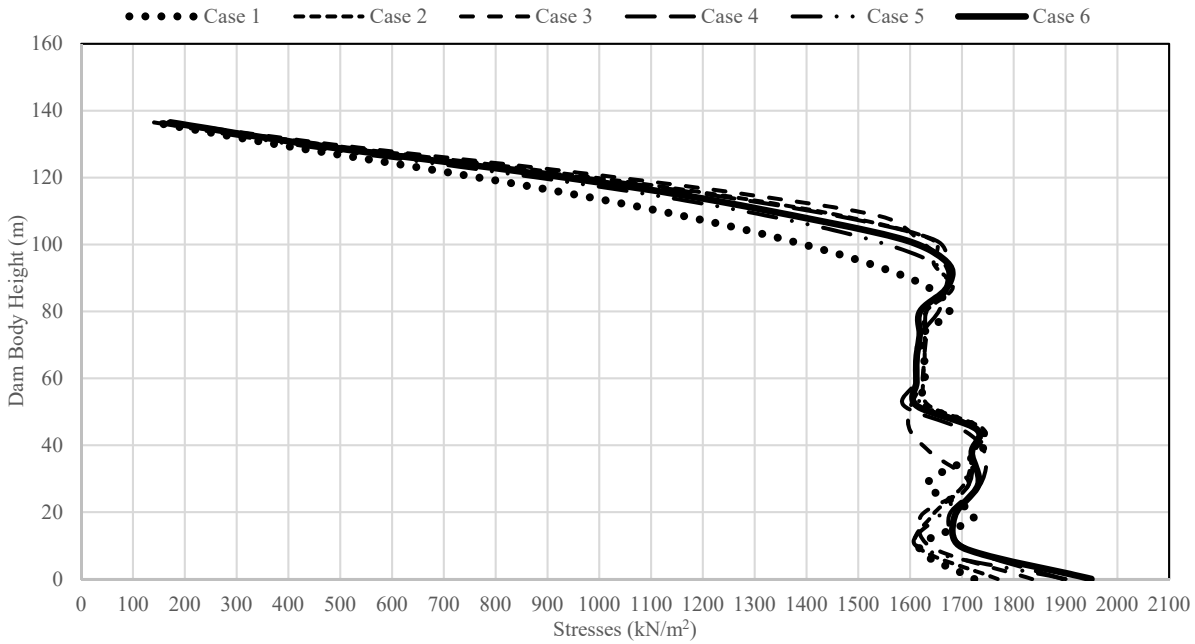


Fig. 6. Principal Tensile Stresses

Conclusion

Investigation of the effect of different reservoir length on the earthquake behavior of RCC dams is very important to observe the response of the dam. According to performed numerical solutions, if reservoir length extends, horizontal displacements increase. In additional this, nonlinear analyses clearly refer that the principle tensile and compressive stresses decrease the upper side of the dam body compared to bottom of the dam body. When reservoir length extended, principal stresses and compression stresses increase. This solution shows that effect of reservoir length on behavior of dam.

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THE IMPORTANCE OF ONTOLOGY IN SOFTWARE ENGINEERING EDUCATION PROGRAMS

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Abstract: Since late 1970s (Yordon Structured Design, DeMarco Structured Analysis) and early 1980s (Structured System Analysis and Design Method -SSADM) to early 1990s (Booch Method), software developing methodologies have planned to model system building. As the real world problems became more complex and software industry became more complicated, software engineering education has been a necessity as a separate discipline. The Guide to the Software Engineering Body of Knowledge (SWEBOK) was published in 2004 after the description of a sequence of software engineering standards. These standards began to be specified in 1976 by IEEE Computer Society. On the other hand, the radical changes on the context of software problems arose object technology. The revolution of object technology took many years. As the consequence of different practices, a new software development approach Model-Driven Engineering (MDE) developed by Object Management Group (OMG) focused on models as the primary artifacts for development process. The processes have been implemented with transformations mapping information from one model to another. The integration of knowledge in different models depends on the existence of explicit declarative semantic models. Therefore, increasing diversity and complexity of information gave rise to increasing interests on ontologies. These formal domain models have been linked to each other on the Web. The linked ontologies provide shared terminologies for different applications. In 2013, the Knowledge Areas (KAs) in SWEBOK 3.0 have also been rearranged according to these complications of the real world problems. Formal and informal solution techniques, latest development methods and new technologies have been included to guide the software engineering education programs.

Keywords: Ontology, Semantic Web, Model Driven Engineering SWEBOK, Knowledge Area

Introduction

In 2009, Tim Berners Lee at TED conference explained the importance of Linked Data as follows[1]: "At the present day, the huge amount of data, in other words open data, must be combined each other as a different system or technology. It is required to give meaning to everything to obtain the required solution. This is the semantic web movement and Wikipedia is the first project of that movement". Knowledge based applications on MDE uses ontologies to share the information (Gruber, 1993; Uschold &Gruninger,1996; Parreiras& Gröner& Walter et.al. ,2013). Although the primary applications on ontology have been accepted as the research area of the artificial intelligence experts, it came into a part of industrial software engineering applications on the solution today's software problems. One of the knowledge areas of the Software Engineering education program on SWEBOK taxonomy (Bourgue & Fairley, 2014) is Mathematical Foundations KA and it supplies well understood solutions to the real world problems with an unambiguous logic. The search of the formal systems related with the completeness, in other words preciseness is the basis of discrete mathematics. Since the software problems for different applications requires distinct abstraction, Mathematical Foundations is a separate KA of the software engineering undergraduate programs. Software Engineering Models and Methods as another KA of the SWEBOK taxonomy defines the modelling as an abstraction of any software component, and this component has more than one abstractions. The aggregation of these abstractions compose the software model. When the developed model has been reused, coherence with the new context will be verified by the inferences constituted from simplifications (abstractions).

Ontology is a conceptualization corresponding to any domain as machine readable entities, attributes, and well understood rules, in other words axioms (Gruber, 2008; Tobias, 2011; Aßmann &Andreas&Christian, 2010). Various ontologies that have aimed at modelling the concepts support to reuse and to extend these independently developed ontologies. Information modelling as one of the modelling types of Software Engineering Models and Methods KA is an abstraction as semantical, in other words conceptual knowledge model and it includes the senses,

[1] https://www.ted.com/talks/tim_berners_lee_on_the_next_web?language=en

properties and constraints that formalize the real world outlook of knowledge. Finally, standard knowledge representation for semantic web can be determined by intelligent access to the heterogeneous and distributed information with better interaction of human-computer on the web. It is not possible to implement this using UML diagram that is one of the structural modelling types of the same KA (Software Engineering Models and Methods). Logic based knowledge representation used widely for ontology languages is represented by Description Logic (DL). (Sowa, 2008; Krötzsch&Simancík&Horrocks, 2014), and it belongs to the same KA of SWEBOK taxonomy. First order predicate logic supplies the modeling of all relationships among the objects as set elements. For example, World Wide Web Consortium (W3C) has been defined by DL syntax with the class/concept constructors of OWL2 (Web Ontology Language)[2]. Disambiguation of the ontological studies can also be obtained by semantic definitions which the complexity has been reduced. This is possible with theoretically well-defined reasoning algorithms and well explained formal properties. eScience, geographical investigations, engineering, medicine, biology, defense industry projects are some of the application domains that the ontologies have extensively been used. Software engineering education programs must be a separate discipline since the concepts summarized above. In this study, the reasons of teaching ontology in undergraduate software engineering programs due to the need to huge data for present day software products have briefly been explained.

Software Engineering Undergraduate Programs

The number of software engineering department in Turkey has been 16 in the 2015-2016 academic year. Three of them with the inclusion of Technology Faculty Departments are at Karadeniz Technical, Fırat and Celal Bayar Universities. Three of the foundation universities are held in North Cyprus (Doğu Akdeniz, Lefke and Yakın Doğu Universities), one is in Ankara (Atılım University), two are in Izmir (Izmir Ekonomi and Yaşar Universities) and one is in Mersin (Toros University). In Istanbul there are six Software Engineering Departments at the Universities Bahçeşehir, Beykent, Maltepe, Aydın, Işık and Sabahattin Zaim. Since the number of software engineering departments have rapidly increased in the last 10 years, it is important to prepare and to update the education programs of software engineering departments. The first study about the organization of software engineering undergraduate programs began in 1987 with the conference "The Conference on Software Engineering Education and Training - CSEET". These conferences devised by SEI (Software Engineering Institute) repeated with different periods, until they were completely complemented. Another important study to prepare the education programs is the project SWEBOK started in 1998. This project aims to the software engineering standards supported by IEEE (Altan, 2010). SWEBOK Guide released in 2004 was composed of 10 KAs. This guide has been expanded in parallel with the raise of problem sizes to appraise the software engineering on the world measurement. Table 1 shows all KAs with the reorganized 5 KAs. The undergraduate programs at software engineering departments must be updated in accordance with the new requirements since the comprehensive complexity of the software problems (Altan, 2015). Moreover, to distinguish software engineering undergraduate programs from computer engineering undergraduate programs, it is important to realize the KAs in SWEBOK guide.

Table 1 : SWEBOK 3.0 Knowledge Areas (KAs)

1	Software Requirements (2004)
2	Software Design (2004)
3	Software Construction (2004)
4	Software Testing (2004)
5	Software Maintenance (2004)
6	Software Configuration Management (2004)
7	Software Engineering Management (2004)
8	Software Engineering Process (2004)
9	Software Engineering Models and Methods (2004)
10	Software Quality (2004)
11	Software Engineering Professional Practice (2013)
12	Software Engineering Economics (2013)
13	Computing Foundations (2013)
14	Mathematical Foundations (2013)
15	Engineering Foundations (2013)

Since a special emphasis is put on the information sector both in our country and in European countries in accordance with Europe 2020 Targets, software engineers will increasingly be demanded persons. Moreover researches show that the software sector gets possession the most labor force when compared with other sectors. We also know that information and telecommunication technologies contributes the maximal productivity on all over the world. In this context, young graduates can employ at all domains from social media, business, and

[2] http://www.w3.org/TR/owl2-profiles

economics to education and production sectors to apply present-day technologies; besides they can develop new software products and new application domains. On the other hand, it is a fact that well-qualified labor supply is insufficient in Information Technology (IT) industry in Turkey. Although the sector employs 160,000 persons, more than half of them are the labor force with poor quality (Türkiye Bilişim Derneği, 2016). Furthermore, digital data will get around to 40 billion terabyte since the considerably growing data annually obtained from device, sensor, geographic applications, web and social media. Big data as a new concept arose from this huge increment beside the usual data sources, and the IT sector made an investment to the new technological developments to obtain consequences semantically. The fundamental reason of this research comes from the management of big data.

The Challenges on Software Engineering

The main problem of the software engineers is to produce working software artifacts according to the customer needs, in time and within the budget. This is the fundamental software quality criteria on the evolution of software engineering discipline. Software crisis gradually have been increasing since the first software products developed. In 1995, the Standish Group[3], a small IT Research Company, published "The CHAOS Report" about over 8,000 software projects. Each project was accepted to be successful if it met all the software product quality criteria. While only 16.2% of the projects were successful and 31.1% of projects were cancelled. 52.7% of them were challenged. Any project has usually been confirmed as canceled before delivered anything; in other words, before completion or never implemented. The challenged projects were either completed or operational with over-budget, over-schedule and/or estimate fewer featured. Standish Group 2015 CHAOS Report gives us 29%, 19%, 52% results for successful, cancelled and challenged projects sequentially. More than 50,000 projects around the world ranged all project sizes including re-engineering implementations give the similar results with the first CHAOS Report. During the 21 years software developing methodologies have changed to cope with the complex real world problems. Cancelled and challenged IT Projects are higher in Standish Group Reports than in other reports since the detailed evaluation criteria reflects the critical quality problems with software.

At the present time, the customers demand the products with more functionality delivering in shorter time. Moreover traditional software development processes starting with waterfall projects and the evolution of waterfall by time as prototyping, incremental, spiral and unified processes became a challenging issue for software engineering discipline. Too many requirements and scope changes, lack of management skills, much development costs than planned, lack of technical skills, unessential system anymore are other causes of unsuccessful software projects. By time three measurements on time, on budget, on satisfaction to succeed a project increased to six adding the measurements on target, on goal and on value. This is the success criteria of the Project Management Institute (PMI) that most of the project management processes have been doing from the PMBOK Guide (4. Edition)[4] since 2012. Team working and skill level of the team members are important issues for a software project. However, most organizations don't emphasize enough in increasing the skills of their people. The collection of basic behaviors about how people work together is another success factor nowadays software projects. On the other hand, the users must be involved in the project starting from the requirements elicitation at the all developing phases of the product[5]. Optimization and organization of the projects reduce project overhead and business capability increases[6].

Software development is the process of generating software through successive phases. This process includes not only the actual writing of code, but also the preparation of requirements, the design of what is to be coded, and the confirmation of what is developed to meet the objectives (Presman, 2014; Sommerville, 2011). Before system development methods came into being, the development of a new system or any product was often carried out by using the experiences and intuitions of the management and technical personnel. As the complexity of software products long ago made the need clear for some kind of development process, the waterfall model recorded in 1970 as the first public life cycle model. Since then, waterfall model describing linear and sequential development method has been a popular version of the software development life cycle for software engineering. Figure 1 shows the distinct goals of the waterfall for each development phases. Agile solutions have emerged as a perfect approach for the software development. These projects have firmly been shared with users and delivered continuously (Braude &Bernstein, 2010). Furthermore, the solutions of some software problems can be achieved by model based engineering frameworks, and the usage of frameworks supply the abstractions in a lower level than others.

[3] www.standisshgroup.com
[4] http://www.pmi.org/
[5] http://agilemanifesto.org
[6] www.chaostuesday.com

The basics of the software development processes must be given as individual courses in the software engineering undergraduate programs. The lectures can be carried out both in department electives and in core courses of the curriculum structure. This property distinguishes the computer engineering undergraduate program from software engineering education programs.

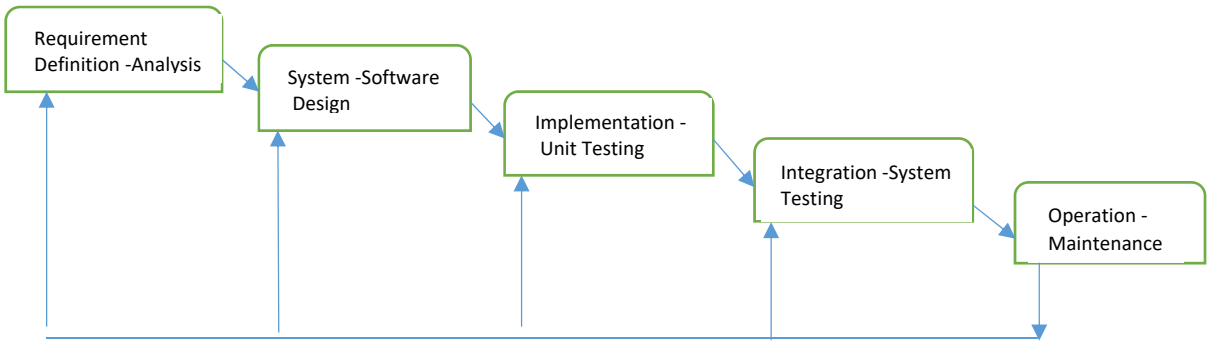
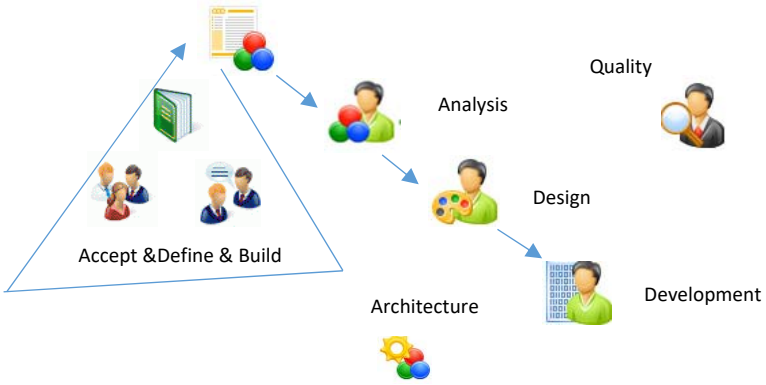


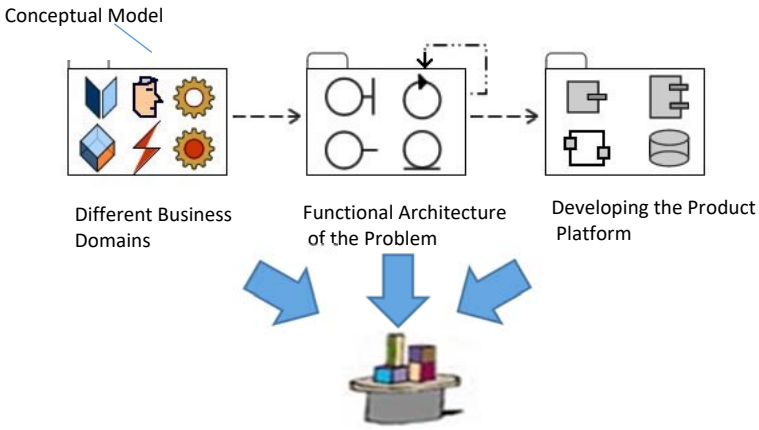
Figure 1: General overview of waterfall model

Model-Driven Software Development as a Software Engineering Paradigm

Model-Driven Software Development is a branch of software development approach based on the idea of developing software from domain-specific models (Perisic, 2014; Küster,2011). The primary aim of this development technique is to increase the productivity and maintainability of software. These can be achieved by raising the abstraction levels of physical system represented in a general purpose language. Such development processes are called as domain-specific models written in high level. Therefore developers can concentrate on application logic rather than the complexity of low-level implementation details. This is contrast to traditional software development practices where modelling is commonly used for documentation. Moreover, communication purposes and the final product broadly differs from the models representing the problem. We can not only distinguish the differences between procedural and declarative software engineering processes, we can also see the abstraction levels and the platforms to be integrated in Figure 2. The abstract syntax has been used at each abstraction level in Figure 2-b. The developers describe the problem and its solution at different abstraction levels using model based engineering.



a) General Overview to Agile and Phase Software Development Models



b) Model Driven Engineering Processes as Bottom-Up with work-units defined by their role on targeted artifact

Figure 2: Phase Based Modern Software Models and Model Driven Software Engineering

Model Driven Engineering (MDE) describes tasks directly from development flows. Therefore, a declarative and bottom-up approach is implied contrary to the activity based top down development processes. The effects are built-in and derived processes instead of textual and graphical developing phases of the activity based models. In Figure 3, we can clearly see the transition from conventional development processes to more effective processes. Domain-specific models constitute requirements-driven and architecture centric development approach (Figure 2-b) instead of document-based and code-centric problem solutions (Figure 2-a)

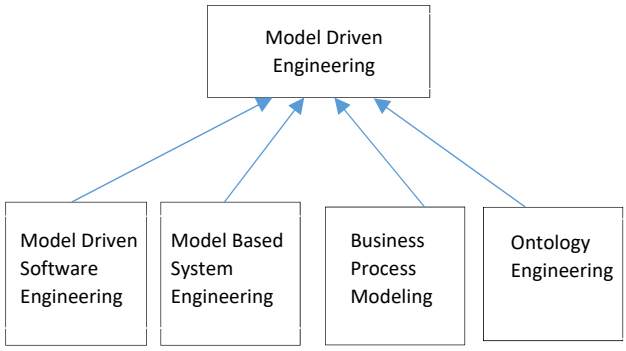


Figure 3: Models Relationships of Model Based Engineering

Model Driven Architecture (MDA)[7] developed by Object Management Group (OMG) is the special case of Model Based Software Engineering, and it is divided into three models as Computation Independent Model (CIM), Platform Independent Model (PIM), and Platform Specific Model (PSM) (Figure 4). CIM has to be used to clarify

[7] http://www.omg.org/mda/presentations.htm

the problem domain focusing on the environment and the specific requirements of the system. Briefly, the structural details of the product are hidden at this layer. Fine grained artifacts of this layer can be descripted as events and communications, objects and features, processes and activities and objects and agents. These are defined independently and followed as PIM. PIM is input to model the problem. At this phase, the developers define functional architecture of the system by specific technologies. All the information needed is symbolized with boundaries, controls, entities and services to describe the behavior of the system in a platform independent way by different platforms. The solution results as PSM. To constitute specific components of the developing system, PSM is applied to the convenient technologies. PSM combines the specifications in the PIM with the details that specify how the system uses a particular type of platform. Fine-grained artifacts of this layer is middleware, clients, servers, databases as specific platform characteristics. To get the well-defined software product, it is important not to confuse these three layers (Stahl & Völter, 2006).

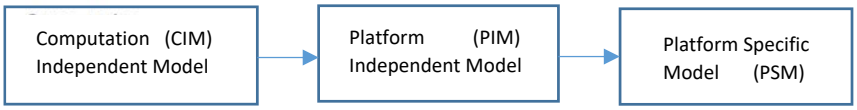


Figure 4: Architectural Layers of MDA with respect to abstractions

INCOSE (International Council on Systems Engineering) defined its 2020 vision as Model Based Systems Engineering, thereby announcing systems engineering as an independent discipline which works in conjunction with software engineering. This view approves the existence of formal description languages in domain-specific conceptual modelling in software engineering. Any description language as a text-based language, which acquires from discrete mathematics and first order propositional calculus, constitutes the conceptual modelling as an intermediate phase prior moving from the visual solution towards programming language solution (Altan, 2015).

Semantic Extraction of Ontologies

In his PhD theses Parreiras (2011) predicts that the software engineering domain will depend on the dependency between MDE and ontology technologies. In fact, real-world elements form the structure of models and language semantics comprise metamodels as a step of MDE. The second step is transformations between languages. UML (Unified Modelling Language) and OWL are two examples of the transformation languages. Ontology as an explicit, formal and declarative semantic model gives the integration of knowledge and services (Bunge, 1977). While UML has extendibility and modularity properties, these attributes has not been presented in most OWL languages. Ontology is also an urgency to develop contemporary software systems since the inclusion of huge knowledge. Basic introduction to knowledge and ontology is given in Sowa's book (2000). Logical languages, frame based languages and graph based languages are three different representation style of knowledge (Baclawski& Kokar& Kogut et.al, 2002). The first language expresses knowledge in terms of logical statements. An example of such knowledge representation is Knowledge Interchange Format (KIF). The second classification is similar to object oriented database languages. The last one includes semantic networks and conceptual graphs. Sowa as one of the pioneers of conceptual graph theory proposed to create a logical system to represent natural language semantics, and defined it being a graph representation for logic based semantic networks. It is also a compromise between a formal language and a graphical language. First order logic semantics has been used to translate the graphs. The modern frame-based systems denote the implementation of knowledge base (KB) systems and DL that can be applied in several areas cover the theoretical aspects (Baader et.al., 2003). We can integrate model driven development and semantic web using OWL ontologies, for example Protage[8]. Therefore, the resulted object design patterns will reduce the complexity and will increase the productivity. The templates which are the form of knowledge base also supply the reliability. A standard DL knowledge base consists of ABox and TBox components. The ABox contains extensional knowledge about the domain of interest. In other words, it is possible to assert the individuals with ABox axioms. TBox is a concept definition, that is, the definition of a new concept in terms of other previously defined concepts. In other words it is possible to determine the relationships between objects with TBox axioms. The following example describes a simple domain ontology about online library records in terms of DL[9].

[8] http://protegewiki.stanford.edu/wiki/Protege_Ontology_Library#OWL_ontologies

[9] It has been accepted the class hierarchy of the ontology has previously been constituted.

Lecturer ⊑ ∃isMemberOf.University ⨅ ∃writes.Article ⨅ ∃teaches.Course	[TBox Axiom]
Course⊑ ∃ isArrangedby.Department	[TBox Axiom]
University ⊑ ∃isLocatedIn.City	[TBox Axiom]
University(Beykent,KavramVacationSchool,Sakarya),Department (computerEngineering)	[ABox axiom]
Article(computer science)	[ABox axiom]
Lecturer (Zeynep Altan), University (Beykent), City (Istanbul)	[ABox axiom]
isLocatedIn (Beykent,Istanbul), teaches(ZeynepAltan, computerEngineering)	[ABox axiom]
isMemberof (ZeynepAltan, Beykent)	[ABox axiom]
writes(ZeynepAltan, computerScience), Lecturer(Ali A.)	[ABox axiom]
isLocatedIn (Ali A., ¬Kavram), isLocatedin(Ali A., ¬Sakarya)	[ABox axiom]

Based on the KB above, any user may search all lecturers at Beykent University with the following DL query:

∃isMemberOf.{Beykent}

The answer of this request is *Zeynep Altan* in case of short KB. The conclusion also includes the lecturer *Ali A.* for the complete KB. We have to close the domain of a class with an example. We accepted that the class University is equivalent to the set of other defined individuals. Moreover, we can assert that university of the article is the same as university of the lecturer as the following:

course(?x) ∧university(?y)∧article(?z)∧ isMemberOf(?x,?y) →isArrangedby(?x,?z) →isLocatedin(?y,?z)

It is possible to reuse and extend these templates. When we define the super class, for example University class, it includes all universities in all cities of the studied countries. In other words, it includes a list of existing individuals of this type. This superclass and its rule is*MemberOf* is usable for other types of university domain. For example, for student relationships, Erasmus programs etc. Finally, the templates can be reused in other ontologies

Conclusion

Complex software systems play an important role in business and everyday life. Since the technologies and practices in the informatics area are increasingly developing, the education programs on software engineering need to include both technical and non-technical abilities with details for the industrial software engineering. Therefore an essential task in teaching software engineering is the incremental improvement and enhancement of courses. The complexity and evolution of software engineering education is an indisputable reality; therefore more transparent and traceable problem solving methods are valuable than traditional ones. MDE is one of the contemporary approximation to develop software products unlike traditional development techniques which tend to be code-centric. As a present day example, the usage of models at all levels of the software development life-cycle can be emphasized by MDA standard. This change in software engineering has impacted both the construction way of the software products and the teaching way the software engineering education. Moreover software engineering standards have a significant emphasis on body of knowledge that should be integrated in a software engineering curriculum. Besides, KAs in SWEBOK plays the most important role in updating education programs. In this paper, the impact of the MDE approach has been explained on software education. As a constituent of MDE, semantic web techniques enable new software engineering capabilities. It is possible to identify various ontologies based on all phases of software life cycle and their application scope. Because of the attractively of OMG's MDA software development approach, new KAs in SWEBOK must definitely be added to the software engineering undergraduate programs without delaying.

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THE ROLE OF COOKERY VOCATION IN THE TOURISM SECTOR ON WOMEN EMPLOYMENT

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Abstract: Tourism sector makes many contributions to country economies from creating an important share with regard to national income to providing employment opportunities as a dynamic sector. Thanks to this position, tourism sector has become an important sector for developing countries such as Turkey where unemployment problems are experienced. Satisfaction from the service provided in the tourism sector is among the most important conditions for the sustainability of the success of this sector. The food and beverage departments of the accommodation establishments which are part of this sector have a critical importance for both customer satisfaction as well as the economic contributions provided to the accommodation facility. The success of the food and beverage department has direct effects on the success of the accommodation establishment. Male employment has been more dominant in this sector due to the long working hours, intensive weekend schedules as well as tasks that require physical strength. Marriage is also an important factor that has negative impact on the participation of women in this sector. When it is taken into account that the food and beverage services play an important role in customer satisfaction related with accommodation establishments, the importance of trained personnel in this field becomes even more important. Recently, female students who graduated from the Culinary Arts and Gastronomy departments of universities that have started to increase in number started to take place in the food and beverage departments thus contributing to the presentation of a more quality service.

Keywords: Tourism, Food and beverage, Accommodation establishment, Female employment

Introduction

Today, millions of people leave their locations of continuous residence to go to other countries or regions thus meeting their psychological, social and cultural requirements such as travelling, resting, entertainment and education. This event named as tourism makes significant effects both economically and socially and forms a fundamental property of today's civilization.

It is inevitable that the rapidly developing technology of our age will affect the tourism sector. The tourism sector that has grown and developed rapidly all over the world as a result of technological advancements continues to grow and develop in Turkey while also contributing to the development of other sectors as well. When the historical development of tourism activities are examined, whereas the total number of people who participated in international trips during the 1950's was around 25 million people, this number has reached about 1.08 billion people in 2013. In addition, it is expected that the number of people who participate in international tourism activities in the year 2020 will reach 1.6 billion people in the world with international tourism income reaching 2 trillion dollars. The concept of globalization has enabled tourism to become one of the most rapidly growing sectors in the world.

Whereas in our country, tourism sector has developed and changed rapidly starting from the 2000's thus becoming one of the sectors with the highest international competition strength. According to TUİK (Turkish Statistical Institute) data,the number of tourists who visited Turkey in 2014 was 41 million 415 thousand 70 and the tourism income was 34 billion 305 million 904 thousand dollars. Tourism plays a key role in decreasing foreign trade deficits and unemployment in times of economic distress by providing a significant amount of foreign currency inflow. At the same time, it acts as a savior for preventing unemployment due to its labor-intensive property and by increasing employment. All income to the tourism sector has direct effects on employment in the tourism sector and indirect effects on employment in other sectors. It is important for the development of national tourism that

people are employed in the field of tourism and have the necessary knowledge and skills to be employed. Tourism sector and especially accommodation establishments have a significant employment capacity in our country. The most distinctive structural property of this sector is that it is a service sector and that employees are working at jobs where their labor is primary.

Accommodation establishments; are establishments which meet the demands of tourists for temporary accommodation, food and beverage, entertainment and various other social needs. In other words; accommodation establishments are facilities that meet the demands of tourists for accommodation at different places. The fact that the reasons for travel of tourists, their expectations from their travels, the invome levels, age groups and tastes are different requies different accommodation establishments as well. Accommodation establishments in Turkey are classified as hotel, holiday village, guest houses and health facilities according to different criteria. When the economic contribution of accommodation establishments are considered, the importance of food-beverage services provided at these establishments become apparent by their own accord. Because food-beverage department provides the highest income for accommodation establishments after the rooms department. Establishments make significant expenses to foods and beverages in order to acquire this income. Kitchens also have significant importance for accommodation establishments as the division where food production is made. This department generates an important field of employment. When the profile of the employees in this department are examined, it is observed that the number of women employees is low in comparison with men and that even though kitchens are considered as one of the fundamental areas for women, this has not been the case in the sector.

Employment Status In Tourism

It is possible to define the concept of employment in various ways. Employment can be defined in general as, “having people who have the will and desire to work and earn an income work for the production of goods or services”.

Contribution of tourism in generating employment increases due to the fact that tourism is in general a labor-intensive sector since majority of the activities in the tourism sector are service related, in addition to the fact that the required labor force is either skilled or unskilled and that such kind of labor force is readily available in many developing countries or regions with collapsing economies. There are many different sectors such as accommodation, transportation, entertainment, travel agencies, management, finance and health which are directly affected by the tourism sector. In addition, various other sectors such as agriculture and production are indirectly affected. Hence, it is quite difficult to clearly determine the effects of tourism sector on employment. The employment effect that increases parallel to the development of tourism results in three different employment types which are direct, indirect and induced employment.

These are:

- Direct Employment: Tourism establishments such as accommodation, food-drink, transportation establishments, travel agencies and tour operators encompass direct employment.
- Indirect Employment: jobs in sectors that provide goods and services that the tourism sector needs and that benefit from the expenses by tourists are within the scope of indirect employment. Sectors such as agriculture, fishing, construction, handcrafts, banks and production sectors are sectors that provide new employment opportunities with the development of tourism.
- Induced Employment: type of employment that encompasses the additional employment opportunities generated in the economy as a result of the income provided by direct and indirect employment.

Employment opportunities that are generated by the tourism sector in this manner are very important for countries such as Turkey that face unemployment problems.

In addition, the fact that mechanication and automation options are limited in the tourism sector increases the employment intensity more for the tourism sector in comparison with other sectors. Touristic expenses generate a high amount of direct employment effect due to the fact that labor-intensive activities are more frequent in the sector. In addition, it also generates an induced employment effect by providing new business opportunities to secondary sectors that provide goods and services to the tourism sector. It is accepted that the investments and expenses made for the tourism sector provide employment at higher ratios in comparison with other sectors. According to İçöz and Kozak (1998:225), the factors that increase the number of people employed in the tourism sector are as follows:

- Labor intensiveness
- The fact that there are many low income business areas
- The high number of part-time and temporary jobs
- Seasonal intensity and periodicity

Tourism sector cannot enable the development of a country by itself; however it is an undeniable fact that it will have positive impacts on providing development.Even though there is no single data related with the employment generated by the tourism sector in the Turkish economy, it can be seen that the total number of people working in this field is slightly above 1 million people according to information compiled from various different resources.

Table 1: Employment at Accommodation Establishments (2000-2010)

Years	Hotel + Restaurant (Thousand People)	Hotel, Entertainment Venues (Thousand People)
2000	776	211.4
2001	796	243.5
2002	826	255.6
2003	847	280.1
2004	872	297.6
2005	949	309.2
2006	1.001	318.4
2007	1.067	328.7
2008	1.058	341.5
2009	1.131	342.4
2010	1.066	351.4

Source:http://www.tuyed.org.tr (18.05.2011)

When the table given above is examined, it can be observed that the employment numbers of hotels, restaurants and entertainment venues are continually on the rise with only a decrease in hotel restaurant employment during 2008 and 2010.
When the status of female-male employees in the tourism sector is examinbed;
The fact that females can address humane emotions better, their status in society and family in addition to their personal attributes comes to the forefront as a reason for their preference. This is understood from the increasing number of female employees in the tourism sector. According to EUROSTAT data, whereas the ratio of males employed in the tourism sector in our country in 2013 was 70%, the ratio for females was around 30. However, whereas the ratio of males employed in the tourism sector was 74.3% in 2006, it decreased to 70.1% in 2013 while the ratio of females increased from 25.7% to 29.9%. When the occupation and positions of the females in this sector are examined, certain distinct horizontal and vertical gender discriminations can be observed.

- Horizontally, females and males are placed in different occupations. Whereas females are employed as waitresses, cleaners, travel agency sales representatives; males are employed as barmen, gardeners, construction workers, drivers and technical personnel.
- Vertically, a typical “social gender” pyramid is also common in the tourism sector. Lower positions and occupations with less career development options are filled with women. On the contrary, significant managerial positions are populated by men.

In this case, even though females comprising half the world’s population have significant impact on contribution to economic life, generating economic value and thus ensuring development, the share they receive from economic development is way behind that of men. The main reason that causes women to remain in the secondary position both economically and socially is gender discrimination that stems from male-dominant culture. This mentality limits the roles of women with the household thereby putting forth that the tasks of the women outside of their household are all secondary even if they have other occupations. Even though female employment increases as a result of the search for flexible and cheap labor brought about by globalization, female labor is still gathered mostly around jobs with no regular income including unpaid family worker.

Female Employment In Cookery Occupation

Women in Turkey have started to take place within the labor market in the real sense following the 1950’s as a result of the urbanization brought about by the migration to the cities from rural areas. The positions of women in the labor market in addition to their working types have changed over time. It is important how this change came about from a sectoral perspective. Because the sectoral distribution of employment in a country is an important indication of the development level of that country. Whereas employment decreases in the agriculture sector together with development, it increases in non-agriculture sectors. This is exactly the case for female employment as well. Female labor is gathered around the agriculture sector in developind countries and regions, whereas females in developed countries work mostly in the service sector. The ratio of females employed in the services

sector in 2000 was 27.3% increasing to 33.3% in 2005. The number of females employed in the tourism sector which is part of the service sector continues to increase. On the other hand, it is a known problem that the personnel circulation rate employed at the accommodation establishments in the tourism sector is quite high. The kitchen dearptment is among the primary departments where personnel circulation rate is high. It is possible to state that working conditions is among the factors resulting in high personnel circulation rates. Because, elements related with the physical environments in kitchens have significant impact on the motivation and efficiency of the personnel. It is not possible to cook without steam or odor in the kitchens and it has been observed that the air pollution generated has significant adverse effects on human health. In addition, it has also been determined that the improer thermal stress at the working environment causes discomfort and health problems while also making negative impact on the work performance. In addition, accidents such as slipping, falling and injury occur frequently in kitchens. Thus, the physical environment should be arranged so as to address the employees. Problems such as seasonal employment, part-time employment, long working hours, undeclared employment and low wages are observed frequently. In addition, employees generally try to cope with negativities due to the physical environment conditions such as closed space, high temperature, insufficient equipment and tools. That is why; there is a need for self-sacrificing employees in the kitchens. A significant portion of this personnel is comprised of those who carry out the cookery vocation. A cook is defined in the national occupational standards prepared by the Vocational Qualification Institute (2010) as; "*a person with the necessary knowledge and skills to prepare standard recipes and menus, soups and consommé from local and world cuisines, hot and cold sauces, pastry dishes, meat and fishery dishes, vegetable and legume dishes, olive oil dishes, rice and pastas, hot-cold starters, salads, side dishes and desserts in accordance with both the requirements of the establishment and department as well as rules of hygiene*". Cookery is an occupation that requires high level of skills and planning.

The number of females employed in the kitchen department is generally quite low. Females are employed in the sector in occupations that generally require less education and accordingly they earn less financially. Even though the society considers kitchens as one of the fundamental areas for women, this has not been the case in the sector. In addition, there is discrimination as female and male occupation. Burrell et.al. (1997) carried out a study on women working in the accommodation sector in France, Spain, Italy and England as a result of which it was determined that there are differences with regard to the jobs carried out despite the fact that there is not much difference in female and male distribution in the kitchen. Whereas men cook more in the kitchens, women take care of cleaning and dish washing tasks. Mok and Finley (1986) examined the job satisfaction levels of hotel food-service personnel in Hong-Kong according to demographic variables and examined the relationship between job satisfaction and personnel circulation. It was determined as a result of the study that the job satisfaction levels of women are lower in comparison with men and that the the job satisfaction levels of young personnel are lower in comparison with the elderly.

It is thought that the responsibilities of women will affect their performance. The fact that working hours are not standard especially for tourism establishments based on uninterrupted service principle in addition to the possibility of being called to work at any time emerges as an irregularity which poses significant problems especially for married women in the sector. The facts that work loads are generally high in the kitchen department where services are mostly based on human labor in addition to the tendency of women not to be able to tolerate the work load due to their physical properties emerge as a different problem. Insufficient resting due to long working hours may result in accidents in the kitchen since it has adverse effects on the physical strengths of the employees and thus their resistance, power and attention. Kitchen equipment that is not arranged ergonomically cause occupational diseases in the musculoskeletal system. The large and heavy equipment used in the kitchen create difficulties for women. Because lifting these cookers, stirring the large amounts of food prepared in large pots using large ladles, peeling potatoes alone perhaps for a thousand people or carrying a ten kilogram jar of mayonnaise are all tasks that require labor and strength. That is why, injuries such as waist slips, injury in the back muscles and stiffness of the neck occur frequently. Hence, it becomes difficult to employ female personnel for long periods of time in the kitchens of tourism establishments. However, kitchen equipment has also become more modern due to technological advancements in recent years. These devices that make use of new technology have eased the tasks with their different designs, colors, control elements, digital indicators and their programmable features. Women can now carry out tasks in modern kitchens which were deemed impossible in the past. Hence, technology has supported women completely thus creating an environment in the tourism sector where they can work equally with men. There is now a demand for qualified labor that can adopt to the technological advancements in kitchens as a result of this positive impact of technology. In order to accomplish this, employability should be increased by using formal and informal education possibilities for increasing the education level of the female work force in addition to the male employees. It can be stated that there is an increase in the cookery vocation in recent years. Associate degree cookery programs along with undergraduate level gastronomi departments have been opened in many universities. The number of cookery programs was 43 in 2011 which increased up to 91 in 2014. Thus, the increasing demand for qualified female cooks will be met by the employment

of the students graduating from these departments in the food-beverage sector kitchens. Establishments should also enable the graduates to advance in their careers. In addition, they should also provide positive impressions towards the vocation while also providing various opportunities so that students who have received cookery education can develop themselves.

Conclusion

Tourism sector makes many contributions to country economies from creating an important share with regard to national income to providing employment opportunities as a dynamic sector. Thanks to this position, tourism sector has become an important sector for developing countries such as Turkey where unemployment problems are experienced. The food-beverage sector which is part of the tourism sector is also developing at the same rate. However, when the employment status is examined, it is observed that female employees have not reached a sufficient majority even though the number of female employees in the tourism sector in general is high. High work load and long working hours in the kitchens are among the primary problems for both male and female employees and in addition, the physical properties as well as the roles they play in their families should be taken into consideration when making the work-task distribution. Establishments generally consider the employment of quality personnel only as a cost and neglect the benefits that will be provided by qualified employees. In this regard, the employment rates of those who have received an occupational education is quite low in the sector. However, it is an undeniable fact that service quality is among the most important factors for establishment quality and the reasons for preference of an establishment. The required service quality may be attained only through educated and successful employees who are experts at one-to-one communication with the customers. Hence, tourism establishments should determine new personnel policies. Arrangements for equal evaluation during the hiring process, opportunities for equal pay, equality with regard to social rights, equality with regard to working hours, provision of equal opportunities for career development, equal evaluation free from all prejudices during career evaluation in addition to the employment of personnel with the required education and vocational skills should be made with these policies that will be put forth by the establishments. A significant increase in female employment for cookery vocation in kitchens can thus be increased as a result of these regulations.

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TUMOR DETECTION ON CT LUNG IMAGES USING IMAGE ENHANCEMENT

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Abstract: Last three decades, early cancer detection and researches on early detection solutions play vital role for human health. Computed tomography images (CT) are widely used in radiotherapy planning because they provide electronic densities of tissues of interest which are mandatory to a correct dose computation. Furthermore, the good spatial resolution and soft/hard tissues contrast allow precise target delineation. Also, CT techniques are preferred compared to X-Ray and MRI images. Image processing techniques have started to become popular in use of CT images. In this study, image pre-processing, image erosion, median filtering, thresholding and feature extraction of image processing techniques are applied on CT images in detail. The aim of this study is to develop an image processing algorithm for lung cancer detection on CT Images.

Keywords: CT Lung Cancer Images, Thresholding, Feature Extraction

Introduction

As WHO reported (WHO 2012), all around the world 8.2 million people died because of cancer. According to American Cancer Society (ACS 2012) researches showed that lung cancer mortality rates in men has dropped nearly 30 percent whereas, this rate in women has started to regress in last 10 years.

According to ACS (ACS 2012), the second most common cancer in both men and women is lung cancer, where prostate cancer is more common for men and breast cancer is for women. Lung cancer has very low survival rate after late diagnosis, where it is directly proportional with its growth at its detection time. However, if it can be detected at early stages, people have a higher possibility of survival.

Carcinoma, another name given to lung cancer, is growing of abnormal cells. Lung cancers are broadly classified into two types: small cell lung cancers and non-small cell lung cancers which are abbreviated as SCLC and NSCLC respectively (Rath 2001). As for the stages, there are four stages of carcinoma; I, II, III and IV, where staging is relying on tumor size, tumor and lymph node location (Rath 2001).

In today's world there are different techniques such as Chest Radiography (x-ray), Computed Tomography (CT), Magnetic Resonance Imaging (MRI) scan and Sputum Cytology, for diagnosing lung cancer (Al-Tarawneh 2012), (Chaudhary and Singh 2012). As stated earlier, early diagnoses are important for interfering the cancer, so that new technologies are greatly needed. Researches showed that, with early detection, survival rate of lung cancer patients has been increased from 14% to 49% within last five years (Chaudhary and Singh 2012). Image processing techniques are widely used in different medical fields to guide medical staff for detection of cancer in earlier stages (Al-Tarawneh 2012).

Nowadays multi-disciplinary actions are carried out for effective and efficient solutions for human health and survival. One of the most popular multi-disciplinary work is on image processing techniques that have been used in various medical fields (Ada and Kaur 2013), (Dimililer 2012), (Dimililer 2013). The aim of this paper is to perform image processing techniques and their interrelated methods to Health care, especially to the carcinoma patients. Ultimate research relay on quantitative information for instance, the shape, size and the ratio of the affected cells (Pathan and Sptalkar 2012).

Proposed Lung Tumor Detection System

In this section, detection of tumors within the lung using Image processing techniques will be proposed. The suggested system will be explained in detail.

Image Acquisition

Computed tomography (CT) scan images are preferred to be used in this research, due to low noise and better clarity compared to X-Ray and MRI images. The lung image database has been chosen from NIH/NCI Lung Image Database Consortium (LIDC) which is an on-line CT image dataset available for the researchers in the field of digital image processing. The images used within this research are in .raw format. Figure 1 shows samples of original CT images.

Figure 1. Original CT lung images.

Image Enhancement on Lung Tumor Detection

Following image acquisition, all the images have gone a few image processing steps; grayscale conversion, thresholding, erosion, median filtering and noise removal, and image subtraction.

Gray Scale Conversion

This step involves conversion of original DICOM images which are in RGB format to grey color. It converts RGB images to grayscale by removing the tint and saturation information while maintaining the luminance.

Normalization

The size of the images has been reduced from `512 x 512` to `256 x 256` pixel values, in order to provide sufficient information while the processing time is low.

Image Thresholding

Threshold value is a specific value that turns a grayscale image into a binary image due to thresholding method. The main idea of this method is when multiple levels are selected, determine the threshold value or values (Dimililer, Kirsal-Ever and Ugur 2016). The easiest method for image segmentation is thresholding method, and it is the most common method used in CT images. The images in the proposed system are divided into five, namely `low brightness, LB (T1)`, `medium-low brightness, MLB (T2)`, `medium brightness, MB (T3)`, `high-medium brightness, HMB (T4)`, and `high brightness, HB (T5)` where ranges are defined as 0-51, 52-103, 104-155, 156-207, 208-255 respectively. These defined threshold values for brightness are classified according to field of applications, as stated in (Khashman and Dimililer 2005).

Figure 2 shows a median filter applied image, whereas figure 2b represents threshold segmentation is applied. This is the area with the consistency values higher than the defined threshold. High consistency areas mostly involve of cancerous tissue. Through the threshold segmentation, the location of cancerous tissue is determined.

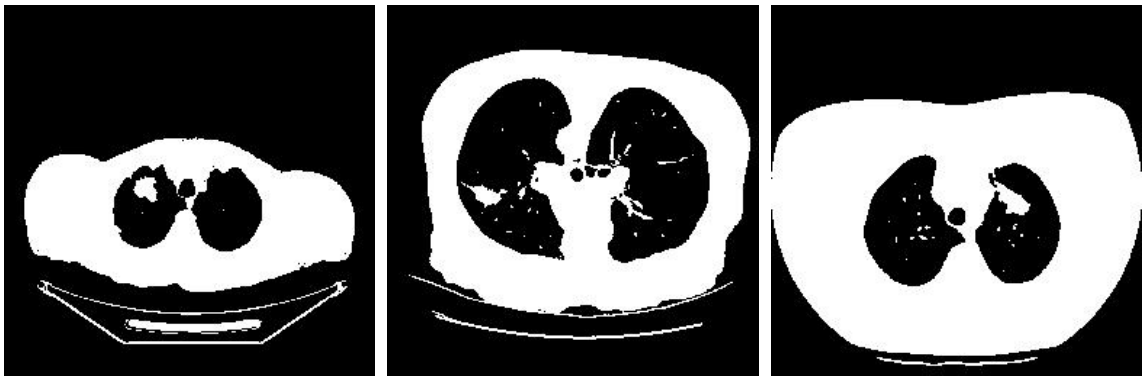

Figure 2. Threshold applied to Median filtered image.

Noise Removal

For removing the noise, erosion and 5 x 5 median filter (Dimililer, Kirsal-Ever and Ugur 2016) are applied to the system respectively. Erosion is one of the basic operators in the morphological image processing. The main effect of the operator on a binary image is to erode away the confines of sites of foreground pixels such as white pixels. Median filtering is applied to reduce the noise within CT images preserving the details and smooth non-impulsive noise. If the aim is to simultaneously minimize noise and conserve edges, a median filter is more impressive (Badrul Alam Miah and Abu Yousuf 2015). Figure 3 represents original CT lung image that erosion applied, where figure 4 shows median filter applied to eroded image.

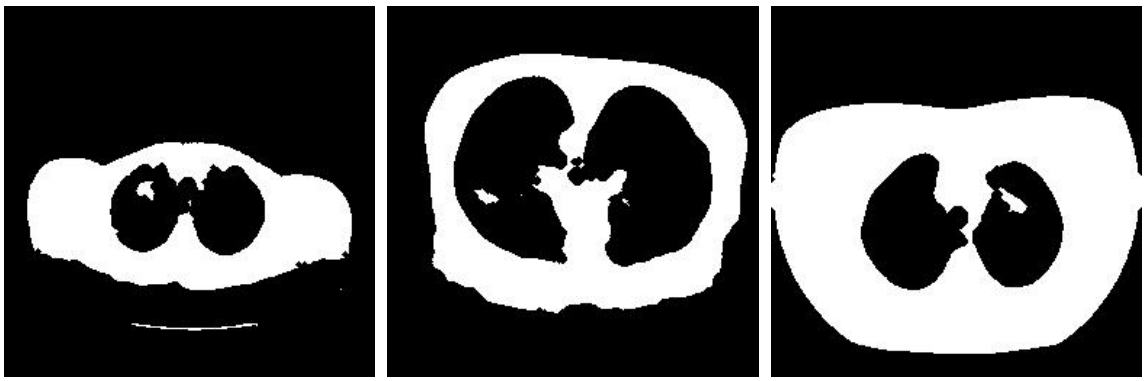

Figure 3. Original CT image with Erosion.

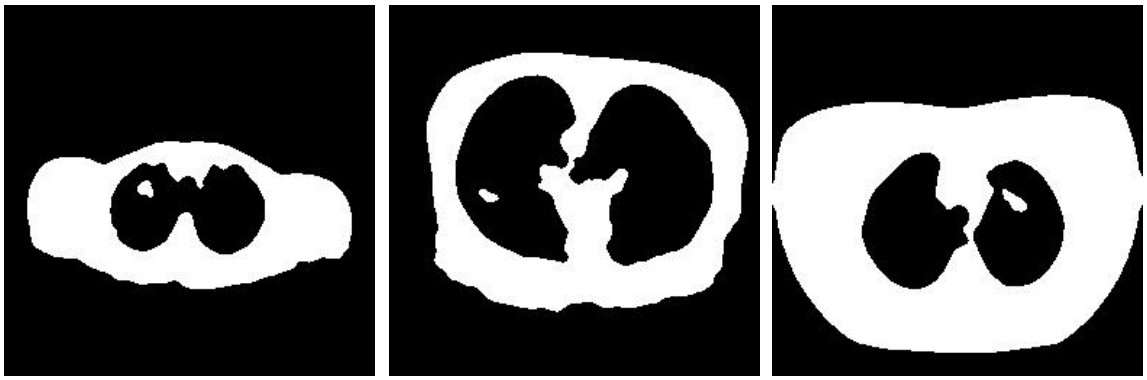

Figure 4. Median filtered applied to eroded image.

Feature Extraction

Image feature extraction stage plays an important role in this project. Image processing techniques are applied to localize and eliminate various desired portions or shapes (features) of an image.

The objects within the lung images having a total pixel numbers less than 1000, has been considered as 0 (black). The number of pixels has been decided upon several experiments for this type of tumors on lung images.

This whole process has been known as segmentation and after performing segmentation on lung images, the features can be achieved and the diagnosis rule can be designed to detect the cancer nodules in the lungs (Sharma and Jindal 2011). Figure 5 represent this information.

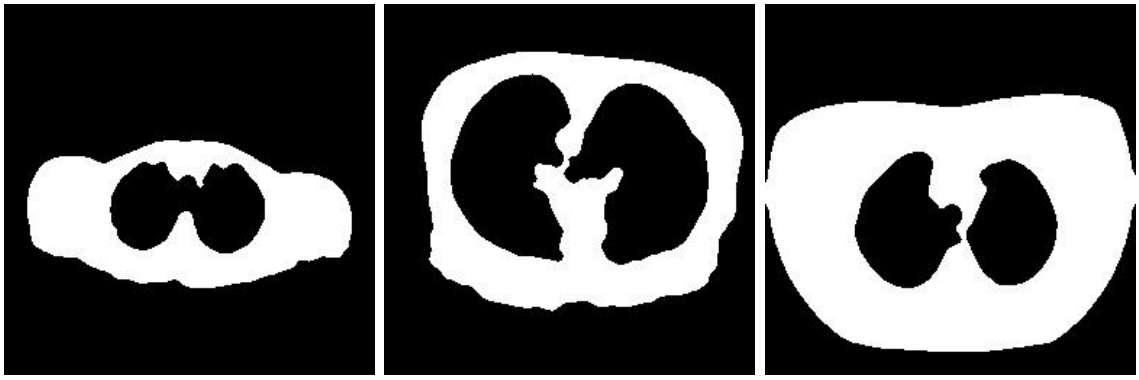

Figure 5. Feature Extraction.

Image Subtraction

In this step, images that have tumor cells are clarified by using filtering and elimination of small objects. Then tumor cells are removed from images. For removing tumor cells from images, objects are eliminated under specific pixel values.

In last step, in order to create tumor cells alone, difference between filtered image and small objects removed from the images are taken into account.

These two approaches are combined and applied successfully. Figure 6 shows the original image with the subtracted image.

Conclusion

In this paper, a tumor detection system using image enhancement is presented. In order to reduce the amount of data with computational and time costs, image processing techniques are used for providing meaningful representations of lung patterns. Relationship between input and output patterns has been created in order to detect the tumors within the images. Input images are obtained in 256x256 raw format, which thresholding are applied in order to clear black and white pixels. Afterwards, erosion and median filtering are used to remove noise. Afterwards, small objects within the image are removed. Last but not the least, small objects removed image is subtracted from median filtered image in order to find the location of the tumor.

Future work will include the modification of the system to recognize images that have scattered tumor on the lung cells.

Figure 6. Image Subtraction.

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VACATIONING AT A DESTINATION UNDER TERORISM RISK: TOURISTS' DESTINATION IMAGE PERCEPTIONS ABOUT ISTANBUL

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Abstract: The main purpose of this study is to analyze the consequences of terror related risks on destination image perceptions of tourists who are vacationing at a destination under terrorism risks. The survey was conducted with tourists, who were visiting Istanbul during a risky period. Before surveying with tourists, several terrorism attacks had took place in Istanbul. This study investigates the impact of terrorism activities on tourists' destination image perceptions of Istanbul as a travel destination, and also its impact on destination satisfaction, which in turn influence tourists revisit intentions and word of mouth behavior. The survey was conducted with 156 respondents at the Sultan Ahmet Square. Destination image of Istanbul is assessed with the destination atmosphere, travel environment, attraction & events, shopping, accommodation, and dining dimensions. Although tourists are vacationing at a destination under terrorism risk, results of this study indicate that the destination image of Istanbul is positive in the mind of tourists. Visiting Istanbul is quite valuable in terms of emotional, functional and overall values. Overall, respondents are highly satisfied with their decision to travel to Istanbul and strongly agree that it is right choice to visiting Istanbul. Majority of the respondents indicated that they are satisfied or extremely satisfied with their visit to Istanbul. Lastly, the findings showed that tourists, who visited Istanbul under terrorism risks, are highly satisfied with their travel experience and expressed that they will recommend Istanbul to others, say positive things about Istanbul, and they stated that they are willing to revisit Istanbul.

Keywords: Destination Image, Perceived Value, Destination Loyalty, Terrorism

Introduction

There has been substantial growth in the tourism industry and it has become one of the most rapid growing economic sectors in the world for last decades. According to World Tourism Organization 2015 Annual Report international tourist arrivals grew by 4.4% in 2015 with an additional 49 million more than in 2014, to reach a total of 1,184 million in 2015 (World Tourism Organization, 2015). Kim, Holland, and Han (2013) state that since tourism has been playing important role for regional development, there are strong competition among destinations to attract more tourists and make them become loyal to destination. Therefore, tourism professionals and destination marketers should re-consider their tourism marketing strategies to increase customer loyalty and build long-term relationships with their customers.

It is commonly recognized that destination image, that is "the sum of beliefs, ideas, and impressions that a person has of a destination", is a key factor in destination marketing (Taşcı & Gertner, 2007). Liu (2014) argues that in order to survive at the global competitive marketplace, it is crucial to create a unique destination image that differentiates a destination from the other destinations to get a positive positioning in the minds of customers. Baloglu and McCleary (1999) state that brand image is mainly shaped by two major forces: stimulus factors (e.g. information sources and previous experiences), and personal factors (e.g. psychological and social factors).

It is argued that favorable destination image leads to higher perceived value. Perceived value is one of the most important key determinant of customer satisfaction and loyalty (Kim, Holland, & Han, 2013) as well as repurchase intentions (Demirgüneş, 2015). Favorable destination image positively influence tourists' satisfaction (Prayag et al., 2015). In other words, it is stated that perceived value has positive effect on future behavioral intentions (e.g. intention to revisit) (Kim, Holland, & Han, 2013). Demirgüneş (2015) argued that customer's perceived value can be determined by money, quality, benefit, and social psychology; while Peng and Liang (2013) identified perceived values as functional, emotional and price values. Lee, Yoon, and Lee (2007) argued that perceived value is

identified in the form of emotional, functional and overall value, which can be used to measure tourists' perceived value for a destination.

Buyong and Rajani (2011) state that destination loyalty can be expressed as: behavioral loyalty, attitudinal loyalty, and composite loyalty. While behavioral loyalty can be defined as repeat visits, attitudinal loyalty refers to tourists' psychological expression such as intention to revisit a destination or recommend it to others, and finally composite loyalty is an integration of both attitude and behavior loyalty (Buyong & Rajani, 2011). Kim, Holland, and Han (2013) argue that repeat visits have often been regarded as desirable behaviors in terms of destination loyalty. In the literature it is argued that satisfied the customers are more likely to revisit the same destination, and are more willing to share their positive travel experience with their friends and relatives (Yoon & Uysal, 2005; Chia & Qub, 2008).

The main purpose of this study is to analyze the consequences of terror related risks on destination image perceptions of tourists who are vacationing at a destination under terrorism risks. The survey was conducted with tourists, who were visiting Istanbul during a risky period. Before surveying with tourists, several terrorism attacks had took place in Istanbul. This study investigates the impact of terrorism activities on tourists' destination image perceptions of Istanbul as a travel destination, and also its impact on destination satisfaction, which in turn influence tourists revisit intentions and word of mouth behavior

Research Methodology

The survey was conducted with tourists at the Sultan Ahmet Square. The data for this research were collected by using a self-administrated questionnaire. Destination image scale of this study includes 33 items that is adapted from several studies (Baloglu & McCleary, 1999; Qu, Kim, & Im, 2011; Kim, Holland, & Han, 2013). Perceived value scale embraces 8 items and it is adapted from the study of Kim, Holland, and Han (2013). Lastly, 3- item scale which is also adapted from the study of Kim, Holland, and Han (2013) is used to assess tourist destination loyalty. Destination image, perceived value, and destination loyalty scales are measured with seven-point Likert-type scale (1= "strongly disagree" to 7= "strongly agree"). To measure overall satisfaction, a single-item scale was used and respondents were asked to rate satisfaction level with the visiting experience of Istanbul on a 7-point Likert scale, ranging from 1= "extremely unsatisfied" to 7= "extremely satisfied".

Cronbach's Alpha value for the destination image, perceived value, and destination loyalty scale are 0.95, 0.92, and 0.84, respectively. Since Cronbach's Alpha of 0.70 or above is considered acceptable as a good indication of reliability, it is clear that scales of this study is reliable.

Table 1 Reliability of the scales

	Cronbach's Alpha	Mean	N of Items
Destination Image (DI)	.945	5.41	33
Perceived Value (PV)	.916	5.85	8
Destination Loyalty (DL)	.837	6.07	3

Findings of the study

The survey was conducted with tourists at the Sultan Ahmet Square and the survey was conducted throughout May 2016. A total of 156 usable responses was gathered and demographic characteristics of the respondents are presented as frequencies and percentages in Table 2. The distribution of gender groups are quite fairly distributed. Among the 156 respondents, 84 were female; while 72 were male. Approximately 60% of the respondents were between the ages of 26-40, 24.4% of them between the ages of 18-24, 11.5% of them between the ages of 41-65, and finally 4.5% of them were above the age of 65. Most of the respondents were the first time visitors (69.9%), 22.8% of them visited Istanbul 2-4 times, and 8.3% of them visited Istanbul 5 and more times. Regarding their

country of origin, 12.9% of them were from United Kingdom, while 12.2% of them were from Germany and 7% of them from United States. The majority of the respondents (49%) had come from European countries.

Approximately 65% of tourists visited Istanbul for holiday purpose; while 20% of them had come Istanbul in order to visit their friends or relatives, and 6% of them visited Istanbul for business purposes. While surveying with tourists, 31.4% of tourists had been in Istanbul since 3 or 4 days, and 32.7% of them had been in Istanbul since 5 or 6 days. Since approximately 90% of tourists stayed in Istanbul at least 3 days, it is clear that respondents spent enough time to experience about the city and gain some ideas about Istanbul.

Table 2 Demographic profile of tourists

		N	%			N	%
Gender	Male	72	46.2	**Duration of Stay**	1-2 days	16	10.3
	Female	84	53.8		3-4 days	49	31.4
Age	18-25	38	24.4		5-6 days	51	32.7
	26-40	93	59.6		7-9 days	14	9.0
	41-65	18	11.5		10 and over days	26	16.6
	65 above	7	4.5				
Number of Visit	First time visitors	109	69.9	**Country of Origin**	United Kingdom	20	12.9
	2-4	34	21.8		Germany	19	12.2
	5 and more	13	8.3		U.S.	11	7.0

Table 3 indicates the descriptive analysis of the 33-item destination image scale. Since the mean value of the scale of destination image is (μ: 5.41); it can be said that the destination image of Istanbul are positive in the mind of tourists. Destination image of Istanbul is assessed with the destination atmosphere, travel environment, attraction & events, shopping, accommodation, and dining dimensions. Tourists have favorable perceptions about the destination atmosphere (μ: 5.78), attractions & events (μ: 5.69), and dining (μ: 5.49) in Istanbul. The mean value of these three dimensions are higher than the average mean value of the destination image scale (μ: 5.41). The perceptions of tourists with the other destination image dimensions of Istanbul are also mildly positive.

Tourists strongly agree that Istanbul has distinctive (μ: 6.47), interesting (μ: 6.43), and variety of (μ: 6.38) historic and cultural attractions. Tourists also considered Istanbul as an exciting (μ: 6.19), enjoyable (μ: 6.11), and pleasant destination (μ: 5.94). Moreover, tourists have favorable perceptions about local cuisine (μ: 5.84). Tourists also agree that Istanbul has a wide variety of shop facilities (μ: 5.55) and is a good place for shopping (μ: 5.43). With regard to accommodation, tourists agree that Istanbul has a wide variety of accommodation alternatives (μ: 5.56), accommodation facilities in Istanbul provide satisfactory customer service (μ: 5.33), and they are reasonable priced (μ: 5.32).

Table 3 Descriptive statistics for destination image

	N	Min	Max	Std. Deviation	Mean	Cronbach Alpha
Destination Atmosphere					**5.78**	**.809**
Istanbul is an exciting destination	156	1.00	7.00	.97792	6.1923	
Istanbul is an enjoyable destination	156	1.00	7.00	.94331	6.1154	
Istanbul is a pleasant destination	156	1.00	7.00	1.10012	5.9487	
Istanbul is relaxing and restful destination	156	1.00	7.00	1.49986	4.8782	
Travel Environment					**5.01**	**.799**
It is easy to access Istanbul	155	1.00	7.00	1.32084	5.5226	
Native people in Istanbul is friendly and helpful	156	1.00	7.00	1.46459	5.4423	
Using local transportation in Istanbul is easy and convenient	154	1.00	7.00	1.42957	5.0455	
Istanbul is clean and tidy environment	156	1.00	7.00	1.60070	4.7756	
Istanbul has secure and safe environment	154	1.00	7.00	1.40862	4.7662	
Information about local transportation is easily accessible in Istanbul	154	1.00	7.00	1.58066	4.5390	
Attraction and Events					**5.69**	**.864**
Istanbul has distinctive history and heritage	155	1.00	7.00	.88501	6.4710	
Istanbul has interesting historic and cultural attractions	156	1.00	7.00	.99144	6.4359	
Istanbul has variety of historic and cultural attractions	156	1.00	7.00	1.09816	6.3846	
Istanbul has variety of breathtaking scenery and natural attractions	155	1.00	7.00	1.20058	5.7871	
Istanbul has a colorful night life	148	1.00	7.00	1.20006	5.3108	
Istanbul has variety of cultural events and festivals	144	1.00	7.00	1.21918	5.1944	
Istanbul has tempting cultural events and festivals	147	1.00	7.00	1.31315	5.0408	
Istanbul has a wide variety of outdoor activities	148	1.00	7.00	1.43101	4.9189	
Shopping					**5.13**	**.871**
Istanbul has a wide variety of shop facilities	156	2.00	7.00	1.23519	5.5577	
Istanbul is a good place for shopping	155	1.00	7.00	1.27930	5.4323	

Shopping in Istanbul is convenient	156	1.00	7.00	1.31208	5.1987	
Prices are reasonable for shopping in Istanbul	156	2.00	7.00	1.29724	4.9679	
Shops in Istanbul provide satisfactory customer service	154	1.00	7.00	1.41733	4.9351	
Shops in Istanbul sell high quality of merchandise	154	2.00	7.00	1.31216	4.7143	
Accommodation					**5.33**	**.848**
Istanbul has a wide variety of accommodations	156	1.00	7.00	1.17633	5.5577	
Accommodation facilities in Istanbul provide satisfactory customer service	155	1.00	7.00	1.24895	5.3290	
Accommodation in Istanbul is reasonable priced	156	1.00	7.00	1.23386	5.3205	
Accommodations facilities in Istanbul are clean and of good quality	155	1.00	7.00	1.31148	5.1419	
Dining					**5.49**	**.771**
Istanbul has tempting local cuisine	156	3.00	7.00	1.10222	5.8462	
Istanbul has a wide variety of restaurants	156	1.00	7.00	1.26922	5.7692	
Restaurants in Istanbul provide satisfactory customer service	156	2.00	7.00	1.21017	5.5000	
Restaurants in Istanbul has standard hygiene and cleanliness	156	1.00	7.00	1.32187	5.1987	
Restaurants in Istanbul are reasonable priced	156	1.00	7.00	1.18780	5.1218	

Table 4 illustrates the descriptive analysis of the 8-item perceived value scale. Since the mean value of the scale of perceived value is (μ: 5.85); it can be said that perceived value of visiting Istanbul is considered as positive by tourists. Perceived value of visiting Istanbul is assessed with the functional (μ: 5.79), emotional (μ: 5.92), and overall value (μ: 5.85) dimensions. Although, perceived emotional value is higher than perceived functional value of visiting Istanbul, tourists strongly agree that visiting Istanbul is valuable and worth it (μ: 6.07) and good value for the given money (μ: 5.73). They also considered visiting Istanbul is reasonably priced (μ: 5.58). With regard to emotional value, tourists strongly agree that they got pleasant experiences during their visit Istanbul (μ: 6.05) and visiting Istanbul made them feel better (μ: 5.80). Overall, respondents are highly satisfied with their decision to travel to Istanbul and strongly agree that it is right choice to visiting Istanbul (μ: 6.36). Besides, they emphasize that Istanbul is a place where they want to travel always (μ: 5.95).

Table 4 Descriptive statistics for perceived value

	N	Min	Max	Std. Deviation	Mean	Cronbach Alpha
Functional Value					**5.79**	**.809**
Visiting Istanbul is valuable and worth it	155	1.00	7.00	1.12302	6.0710	
Compared to other tourism destination. Istanbul is a good value for the money	156	1.00	7.00	1.26668	5.7308	

Visiting Istanbul is reasonably priced	156	1.00	7.00	1.19655	5.5833	
Emotional Value					**5.92**	**.893**
I got pleasant experiences during my visit to Istanbul	155	1.00	7.00	1.06504	6.0452	
Visiting Istanbul made me feel better	156	1.00	7.00	1.18278	5.8013	
Overall Value					**5.85**	**.741**
The choice to visit Istanbul was the right decision	155	1.00	7.00	.98045	6.3677	
Istanbul is a place where I want to travel always	156	1.00	7.00	1.22523	5.9551	
After visiting Istanbul. my image of Istanbul was improved	156	1.00	7.00	1.51709	5.2436	

To measure overall satisfaction, a single-item scale was used and respondents were asked to rate their satisfaction level with their visiting experience of Istanbul on a 7-point Likert scale, ranging from 1= "extremely unsatisfied" to 7= "extremely satisfied". 25% of the tourists are extremely satisfied, 51% of them are satisfied, and 19% of them are somewhat satisfied with their visit to Istanbul. Therefore, it can be stated that respondents perceived a positive value and had good travel experiences.

Loyalty to Istanbul was measured with 3-item destination loyalty scale. The value for the scale of destination loyalty is high with a mean of μ: 6.07. As it can be seen from the Table 5, tourists are strongly willing to make positive word of mouth (μ: 6.28), encourage their friends to visit Istanbul (μ: 6.23), and revisit Istanbul (μ: 5.71). Therefore, the results shows that tourists, who visited Istanbul under terrorism risks, are highly satisfied with their travel experience and expressed that they will recommend Istanbul to others, say positive things about Istanbul and they stated that they are willing to revisit Istanbul.

Table 5 Descriptive statistics for destination loyalty

	N	**Min**	**Max**	**Mean**	**Std. Deviation**	**Cronbach Alpha**
Destination Loyalty				**6.07**		**.837**
I will say positive things about Istanbul to other people	155	1.00	7.00	6.2839	.99188	
I will encourage friends and relatives to visit Istanbul	156	1.00	7.00	6.2308	1.06466	
I will definitely revisit Istanbul	154	1.00	7.00	5.7143	1.3658	

Conclusion

Although several terrorism attacks had took place before and during the visit of tourists, it can be said that the destination image of Istanbul in the mind of tourists are positive. Tourists have highly favorable perceptions about the destination atmosphere as well as attractions & events of Istanbul. Tourists strongly agree that Istanbul has distinctive, interesting, and variety of historic and cultural attractions. They also considered Istanbul as an exciting, enjoyable, and pleasant destination. Moreover, tourists have favorable perceptions about local cuisine, as well as shopping and accommodation facilities. Overall, respondents are highly satisfied with their decision to travel to Istanbul and strongly agree that it is right decision to visiting Istanbul. They emphasized that visiting Istanbul is valuable and worth it. The majority of respondents' are highly satisfied with their overall travel experience, and they expressed that they will recommend their visits to others, say positive things about Istanbul, and they are willing to revisit Istanbul.

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