

## **DR ARIFAH BAHAR**

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### *Associate Professor*

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### **Field of Expertise:**

**Stochastic Dynamics, Applied Probability and Stochastic Process**

### **Research Fields:**

**Stochastic Modelling, Statistical Data Analysis, Statistical Modelling, Environmental Science, Uncertainty Quantification**

## **ACADEMIC QUALIFICATIONS**

July 2005	Ph.D. (Stochastic Dynamics) University of Strathclyde, UK
April 1999	M.Sc. (Statistics) Universiti Kebangsaan Malaysia, Bangi
July 1996	B. Sc. (Mathematics, Statistics & Operational Research) UMIST, UK

## **PROFESSIONAL MEMBERSHIP / QUALIFICATIONS / RECOGNITION**

- Life member of Persatuan Sains Matematik Malaysia (PERSAMA) (AS2005-2 )
- Life member of Malaysia Institute of Statistics (874)
- Member of Society of Industrial & Applied Mathematics (020860353) with Special Interest & Activity Group – Uncertainty Quantification

## **ADMINISTRATIVE EXPERIENCE**

**Director** (August 2018 – now)  
UTM-Centre for Industrial & Applied Mathematics (UTM-CIAM)  
Ibnu Sina Institute for Industrial & Scientific Research  
Universiti Teknologi Malaysia

## OTHER EXPERIENCE

1. **Total Quality Control Coordinator**  
Production Department, Applied Magnetics (M) Sdn Bhd September – December 1996.
2. **SAP Officer**  
Production Control Department, Sharp Manufacturing (M) Sdn Bhd Mac 1997 – July 1997.
3. **Tutor**  
Mathematics Department Faculty of Science, UTM July 1997 – May 1998
4. **Lecturer**  
Mathematics Department  
Faculty of Science, UTM  
May 1999 – May 2007
5. **Senior Lecturer**  
Department of Mathematical Sciences, Faculty of Science, UTM  
May 2007 – August 2019
6. **Associate Professor**  
Department of Mathematical Sciences, Faculty of Science, UTM  
August 2019 – present
7. **Research Fellow**  
UTM-Centre for Industrial & Applied Mathematics (UTM-CIAM)  
March 2013 – January 2016, August 2018 – present
8. **Associate Research Fellow**  
UTM-Centre for Industrial & Applied Mathematics (UTM-CIAM)  
Feb 2016 – August 2018

## RESEARCH ACTIVITIES

### RESEARCH PROJECT UNDERTAKEN

#### Principal Investigators

1. **UTM-FR** – New Estimation Method of Hydraulic Conductivity Incorporating Uncertainty In Heterogeneous Aquifer Vote: **21H21**
2. **PDRU** - Mathematical Modelling of the Hydraulic Conductivity Effect on Contaminant Transport in Riverbank Filtration Systems Vote: **04E62**
3. **UTM-CoE** – Airport Delays Prediction Using Weather Impact Index Vote: **03G96**
4. **GUP** - Improvement Of Attendance System By Incorporating Mathematical Logic, 1 July 2017- 30 June 2019 Vote: **16H11**
5. **Flagship** – Statistical Literacy for SME in Malaysia, 1 May 2016 – 30 April 2017 Vote: **03G54**
6. **PPRN** – Detection of Volatile Organic Compound From *Ganoderma Boninense*, 15 Februari 2015 – 14 Januari 2016 Vote: **4L160**
7. **GUP** - Estimation of Stochastic Volatility with Long Memory, 1 December 2012 – 30 November 2013 Vote: **07J62**
8. **Flagship** – Stochastic Model for Groundwater Flow in Peninsular Malaysia, 1 April 2013 – 31 Mac 2015 Vote: **01G22**
9. **Matching Grant** – Stochastic Logistic Model with Time Delay of Solvent Production by *C.Acetobutylicum P262* Vote: **00M08**

## FUNDAMENTAL RESEARCH GRANT SCHEME (FRGS FUND)

### Principal Investigators

1. Modelling of *C. acetobutylicum* and Solvent Production in Fermentation using Stochastic Power Law Logistic Model, 1 September 2007-30 November 2009, Vote:(78221)
2. Numerical Solution of Stochastic Delay Differential Equations, 1 April 2010 – 30 September 2012, Vote:78526 (3F459)
3. Long Memory Stochastic Volatility Estimation Method for Fractional Ornstein-Uhlenbeck Process, 1 July 2014 – 30 June 2016 Vote: (4F440)

## SUPERVISION

### MSc. Student

No	Year	Name	Status	Title	Roles of Supervision
1	2020	Umi Haryantie Mohd Hisham	On Going	Geostatistical Method Estimation for Hydrogeological Properties of Groundwater	Main Supervisor
2	2017	Saiful Haqiqi bin Hassan	On Going	Improved Chebyshev Polinomial in Ridge Orientation Modelling	Main Supervisor
3	2017	Nur Hashida Md Lazim	Graduated	Modified Two-Step Method for SDE's Parameter Estimation	Co-Supervision with Dr Haliza Abdul Rahman
4	2016	Siti Aryati Minhat	Graduated	Temporal Analysis of Ganoderma Boninense Infection in Oil Palm Seedling Using Logistic Growth Model	Main Supervisor
5	2016	Siti Fatimah Anas	Graduated	Modelling of Oil Price Fluctuation with Brownian Motion	Main Supervisor
6	2014	Wong Chai Yun	Graduated	Stochastic groundwater transport flow model in Pontian Johor	Main Supervisor
7	2014	Nur Amirah Jumaat	Graduated	Stochastic groundwater flow a case study in Pontian	Main Supervisor

8	2013	Tey Seah Ying	Graduated	Probability distribution of returns in Heston model for index prices of FTSE Bursa Malaysia KLCI	Main Supervisor
9	2013	Nurul Nabihah Rahman	Graduated	Quantificational Analysis on the Progress of River Water Quality in Johor	Co-Supervision with Assoc Prof Dr Fadhilah Yusof
10	2012	Mohd Fariduddin Mukhtar	Graduated	Parameter estimation using sequential monte carlo	Main Supervisor
11	2010	Norlianna Mohd Lip	Graduated	Stochastic Modelling of the Growth <i>C.Acetobutylicum</i> with Missing Data	Main Supervisor
12	2009	Mohd Khairul Bazli Mohd. Aziz	Graduated	Stochastic Modelling of <i>C.Acetobutylicum</i> and Solvent Production in Fermentation	Main Supervisor
13	2007	Nor Hasliza Mohd Desa	Graduated	Stochastic Modelling of the Fermentation of Sago Starch by a Microb ( <i>Clostridium Acetobutylicum</i> P262)	Main Supervisor

**PhD. Student**

No	Year	Name	Status	Title	Roles of Supervision
1	2012	Norhayati Rosli	Graduated	Stochastic Runge-Kutta method for stochastic delay differential equations	Main Supervisor
2	2012	Ting Chee Ming	Graduated	Continuous-time non-linear non-gaussian state-space modeling of electroencephalography with sequential Monte Carlo based estimation	Co-supervision with Dr Zaitul Marlizawati
3	2014	Haliza Abd Rahman	Graduated	An improved two-step method in stochastic differential equation's structural parameter estimation	Main Supervisor

4	2014	Leyla Ranjbari	Graduated	Stochastic Integro Differential Equation in Finance	Co-Supervision with Prof Zainal
5	2017	Shayma Mustafa	Graduated	Mathematical Modelling of Contaminant Transport in Riverbank Filtration System	Co-Supervision with Prof Zainal
6	2017	Khoo Chia Chen	Graduated	Long Memory Estimation of Stochastic Volatility for Index Prices	Main Supervisor
7	2018	Granita	Graduated	Stochastic Differential Equation for Two-Phase Growth Model	Main Supervisor
8	2019	Siti Rohani Mohd Nor	Graduated	Multi-population Model	Co-supervision with Assoc Prof Dr Fadhilah
9	2020	Teng Li Siang	Graduated	Mathematical Modelling and Parameter Studies of Torsional Surface Wave	Co-Supervision with Prof Zainal
10	2015	Norshela Mohd Noh	Ongoing	Optimising Oil Refinery Profit Margin	Main Supervisor
11	2019	Abdul Shukur Hassan	Ongoing	Stochastic Game for Crude Palm Oil Pricing	Co-supervision with Assoc Prof Dr Zaitul Marlizawati
12	2018	Fawzia Mansour Elniel Dalam	Ongoing	Characterization of The Flow for Some Non-Newtonian Fluids Models Flowing Through A Porous Medium	Main supervisor

## POSTGRADUATE EXAMINATION/VIVA

### MSc INTERNAL EXAMINER

- Nur Amalina Mat Jan (2014)** Estimating distribution parameters of extreme event using TL-moment method
- Nurul Izzaty Mohd Yunus (2014)** Stochastic modelling for river pollution of Sungai Perlis
- Tengku Salbiah binti Tengku Mohamed (2020).** Binary Logistic Regression Modelling with Appropriate Sample Size In Determining Graduate Employability Factors For Public Universities In Malaysia
- Farhad Waseel (2021).** Statistical Analysis of ICT Skills in Afghanistan Using Cumulative Logit Models.

## PHD INTERNAL EXAMINER

1. **Shazirawati Mohd Puzi (2014)** Probabilistic approach in neighborhood discovery and sensors integration for wireless sensor networks.
2. **Chin Wan Yoke (2016)** Joint survival and longitudinal models with missing data.
3. **Norbaiti Tukiman (2018)**. B-Predit Scoring System For Classification Mixed Financial Data
4. **Yusrina Andu (2020)**. Nontransformed PCA and Penalized Linear Regression of Stock Market Price.
5. **Ibrahim Elabid (2020)**. General Distance Formula Estimation of Population Total For Unequal Probability Sampling Designs With Auxiliary Variables
6. **Babar Zaman (2021)**. Designing Mixed And Adaptive Memory Control Charts For Efficient Process Monitoring

## PUBLICATIONS

### JOURNAL

#### ISI Journal:

1. Mustafa, S., Bahar, A., Zainal Abidin, A.R., Abdul Aziz, Z., Darwish, M, (2021) Three dimensional model for solute transport induced by groundwater abstraction in river-aquifer systems, *Alexandria Engineering Journal*, 60(2), pp. 2573-2582
2. Shaymaa Mustafa, Arifah Bahar, Zainal Abdul Aziz, Mohamad Darwish, (2020), Solute transport modelling to manage groundwater pollution from surface water resources, *Journal of Contaminant Hydrology*, Vol 233, 103662
3. Daniel, Y. S., Aziz, Z. A., Ismail, Z., Bahar, A., & Salah, F. (2020). Slip Role For Unsteady MHD Mixed Convection Of Nanofluid Over Stretching Sheet With Thermal Radiation And Electric Field. *Indian Journal Of Physics*, 94(2), 195-207.
4. Daniel, Y.S., Aziz, Z.A., Ismail, Z., Bahar, A. (2020). Unsteady EMHD dual stratified flow of nanofluid with slips impacts. *Alexandria Engineering Journal* 59(1), 177-189
5. Mustafa, S., Darwish, M., Bahar, A., Aziz, Z.A. (2019). Analytical Modeling of Well Design in Riverbank Filtration Systems. *Groundwater*, 57(5), 756-763
6. Daniel, Y. S., Aziz, Z. A., Ismail, Z., Bahar, A., & Salah, F. (2019). Stratified electromagnetohydrodynamic flow of nanofluid supporting convective role. *Korean Journal of Chemical Engineering*, 36(7), 1021-1032.
7. Elniel, F.M., Aziz, Z.A., Bahar, A., Rasheed, F.S., Mustafa, S. (2019) Steady flow of Johnson-Segalman fluid through porous medium over an inclined plate. *Journal of Porous Media*, 22(5), 583-598
8. Siam, F.M., Grinfeld, M., Bahar, A., Rahman, H.A., Ahmad, H., Johar, F. (2018). A mechanistic model of high dose irradiation damage. *Mathematics and Computers in Simulation*, 151, 156-168
9. Chen, K. C., Bahar, A., Ting, C. M., & Rahman, H. A. (2017). Modeling and estimation on long memory stochastic volatility for index prices of FTSE Bursa Malaysia KLCI. *Malaysian Journal of Fundamental and Applied Sciences*, 13, 315-324.
10. Shayma Mustafa, Arifah Bahar, Zainal Abdul Aziz & Saim Suratman, (2016) "Modelling contaminant transport for pumping wells in riverbank filtration systems", *Journal of environmental management* 165, 159-166
11. Fuaada Mohd Siam, M Grinfeld, Arifah Bahar, Haliza Abdul Rahman, H Ahmad,

- Farhana Johar, (2018), "A mechanistic model of high dose irradiation damage", *Mathematics and Computers in Simulation*. Volume 151, 156-168
12. A Banitalebi, MIA Aziz, Arifah Bahar, ZA Aziz, (2015), "Enhanced compact artificial bee colony", *Information Sciences* 298, 491-511.
  13. MSA Mazlan, Norhayati Rosli, NS Azmi & Arifah Bahar (2015), "Modelling the cervical cancer growth process by stochastic delay differential equations", *Sains Malaysiana* 44 (4), 1153-1157.
  14. CM Ting, SH Salleh, ZM Zainuddin, A Bahar, (2015), "Modeling and estimation of single-trial event-related potentials using partially observed diffusion processes", *Digital Signal Processing* 36, 128-143.
  15. Ting, C. M., Sh-Hussain Salleh, Zaitul Marlizawati Zainuddin, & Arifah Bahar, (2014), "Artifact Removal from Single – Trial ERPs using Non – Gaussian Stochastic Volatility Models and Particle Filter", *IEEE Signal Processing Letters*, Vol. 21 (8), 923 – 927.
  16. Norhayati Rosli, Arifah Bahar, S. H. Yeak & X. Mao, (2013), "A Systematic Derivation of Stochastic Taylor Methods for Stochastic Delay Differential Equations", *Bulletin Of The Malaysian Mathematical Sciences Society*, (2) 36(3) (2013), 555–576.
  17. Haliza Abd.Rahman, Arifah Bahar & Norhayati Rosli (2012), "Stochastic Differential Equations: A Two Step Method of Parameter Estimation", *Sains Malaysiana* 41 (12), 1635-1642.
  18. Chee-Ming Ting, Sh-Hussain Salleh, Z. M. Zainuddin and ArifahBahar, (2011), "Spectral Estimation of Nonstationary EEG Using Particle Filtering With Application to Event-Related Desynchronization (ERD)", *IEEE Transactions On Biomedical Engineering*, Vol. 58 (2), 321-331.
  19. Norhayati Rosli, Arifah Bahar, Yeak Su Hoe, Haliza Abd.Rahman, Madihah Salleh & Mohd.Khairul Bazli Mohd.Aziz , (2010), "The Performance of Euler- Maruyama, 2-Stage SRK and 4 Stage SRK in Approximating the Strong Solution of Stochastic Model", *Jurnal Sains Malaysiana* 39(5): 851–857.
  20. Bahar, A & Mao, X, (2004), Stochastic Delay Lotka Volterra Model, *Journal of Mathematical Analysis and Applications*, Elsevier, pg. 364-380, vol 292

### **SCOPUS Journal :**

1. Hui Ming, W., Bahar, A., Bahar, K. R., & Mohd. Addi, M. (2020). Early Detection of Depression using Screening Tools and Electroencephalogram (EEG) Measurements. *International Journal of Integrated Engineering*, 12(6), 216-228.
2. Mohd Nor, S.R., Yusof, F., Bahar, A. (2019). Stochastic mortality model in a state-space framework. *Malaysian Journal of Mathematical Sciences*, 13(2), 251-264
3. Yulianti, L., Nazra, A., Zulakmal, Bahar, A., Muhafzan (2019). On discounted LQR control problem for disturbed singular system. *Archives of Control Sciences*, 29(1), 147-156
4. Nor, S. R. M., Yusof, F., & Bahar, A. (2018). Comparison of Stochastic Mortality Model for Wider Age Range. *Matematika*, 34(2), 227-233.
5. Shayma Mustafa, Arifah Bahar, Zainal Abdul Aziz & SaimSuratman, (2014), "Review of

- the role of analytical modelling methods in riverbank filtration system”, *Jurnal Teknologi (Sci. Eng.)* 71 (1), 59-69
6. Haliza Abd. Rahman, Arifah Bahar & Norhayati Rosli (2013), “Parameter Estimation of Lotka-Volterra Model : A Two-Step Model”, *Jurnal Teknologi*, Vol. 63, No 2.
  7. FN Daud, MN Johari, Arifah Bahar, AK Idris, A Yahya, (2013), “Characterization of Bacillus Licheniformis Strain Ta62bi as Potential Selective Plugging Agent for Enhanced Oil Recovery”, *Jurnal Teknologi* 62 (2)

#### **NON INDEXED Journal :**

1. KC Chen, TS Ying, Arifah Bahar, (2014), Probability Distribution of Returns in Heston Model And Hurst Exponent Estimation for Index Prices of FTSE Bursa Malaysia KLCI, *Matematika* 30, 44-58
2. Norhayati Rosli, Arifah Bahar, Yeak Su Hoe & Haliza Abdul Rahman (2013) “Stochastic Taylor Methods for Stochastic Delay Differential Equations”, *Matematika*, Volume 29, Number 1c, 241-251.
3. Norhayati Rosli, Arifah Bahar, Yeak Su Hoe, Haliza Abd.Rahman, Mohd Khairul Bazli Mohd Aziz & Madihah Mohd Salleh (2011) “Stochastic Model of Gelatinised Sago Starch to Solvent Production by *C. acetobutylicum* P262”, *Journal of Statistical Modeling and Analytics*, Vol.2 (2), 9-20.
4. Haliza Abd.Rahman, Arifah Bahar, Mohd.Khairul Bazli Mohd.Aziz, Norhayati Rosli, Madihah Salleh & Gerhard-Wilhelm Weber (2010), “Parameter Estimation of Stochastic Differential Equation : Bayesian Regression” *Jurnal KALAM* Vol. 3 (1), 17-28.
5. Norhayati Rosli, Arifah Bahar, Yeak Su Hoe, Haliza Abd.Rahman & Madihah Md.Salleh, (2011) “Stochastic Modelling of Solvent Production by acetobutylicum P262” , *Jurnal KALAM* Vol. 4(1), 13 - 25.
6. Haliza Abd.Rahman, Arifah Bahar, Mohd.Khairul Bazli Mohd.Aziz, Norhayati Rosli, Madihah Salleh & Gerhard-Wilhelm Weber, (2009) “Parameter Estimation of Stochastic Logistic Model : Levenberg Marquardt Method”, *Matematika*, Vol 25, No.2, pg91-106.
7. Arifah Bahar, & Xuerong Mao, (2008) “Persistence of Stochastic Power law Logistic Model”, *International Journal of Applied Probability and Statistics*, Dixie W publishing, pg 37-43, vol 3 No 1.
8. Bahar, A & Mao, X, (2004), “Stochastic Delay Population Dynamics”, *International Journal of Pure and Applied Mathematics*, Academic Publications, pg. 377-400, vol 4.

#### **PROCEEDINGS/CONFERENCE PAPER**

1. David, V.D., Bahar, A., Aziz, Z.A, (2020) Flow over underwater inclination plane using forced Korteweg-de Vries via homotopy analysis method, AIP Conference Proceedings, 2266, 050016
2. Arifah Bahar, Shayma Mustafa, Kho Chia Chen, Haliza Abd Rahman, Nur Arina Bazilah Aziz, Zaitul Marlizawati Zainuddin, Zainal Abdul Aziz, (2020), Modelling long memory stochastic volatility of crude palm oil price, Proceedings ISI World Statistics Congress 2019 Special Topic Session,



- Volume 1, pg183-199, Department of Statistics Malaysia.
3. Zaitul Marlizawati Zainuddin, Arifah Bahar, Norshela Mohd Noh, (2020), Two-stage stochastic programming approach for oil refinery production planning, Proceedings ISI World Statistics Congress 2019 Special Topic Session, Volume 1, pg208-215, Department of Statistics Malaysia.
  4. Zainal Abdul Aziz & Arifah Bahar, (2016), The current scenario of industrial Mathematics in Malaysia, AIP Conference Proceedings 1775, 020001 (2016); <http://doi.org/10.1063/1.4965120>
  5. Granita, A Bahar, (2015), Stochastic differential equation model to Prendiville processes, AIP Conference Proceedings 1682 (1), 050007
  6. R Norhayati, B Arifah, Y SH, J Rahimah, (2015), "2-stage Stochastic Runge–Kutta for Stochastic Delay Differential Equations", AIP Publishing 1660 (050006), 1-9
  7. Norhayati Rosli, Tawfiqullah Ayoubi, Arifah Bahar, Haliza Abd. Rahman, & Madihah Md. Salleh, (2014), "Stochastic Growth Logistic Model with Aftereffect for Batch Fermentation Process", AIP Conference Proceedings, Vol.1602, Issue 1, 1168-1177.
  8. N Rosli, T Ayoubi, Arifah Bahar, HA Rahman, MM Salleh, (2014), "Stochastic growth logistic model with aftereffect for batch fermentation process", Proceedings of The 3rd International Conference On Mathematical Sciences .
  9. Mohd Khairul Bazli Mohd Aziz,, Arifah Bahar, Madihah Md Salleh, Haliza Abd Rahman, & Norhayati Rosli, (2009), Stochastic Power Law Logistic Model for the Growth of *C.acetobutylicum* in Sago Starch Fermentation, In Mohd Tahir Ismail & Adli Mustafa (eds) *5th Asian Mathematical Conference Proceedings* (Vol III), June 2009, pp348-354, ISBN 978-967-5417-55-9.
  10. Norhayati Rosli, Arifah Bahar, Yeak Su Hoe, Haliza Abd.Rahman, Madihah Salleh & Mohd.Khairul Bazli Mohd.Aziz, "The Performance of Euler Maruyama and 2-stage SRK in Approximating the Strong Solution of Stochastic Model", Proceedings of ICORAFSS 2009, 2-4 June 2009, The ZON Regency Hotel, Johor Bahru, Malaysia. pg 138-141, ISBN 978-983-9805-75-8.
  11. Haliza Abd.Rahman, Arifah Bahar, Mohd.Khairul Bazli Mohd.Aziz, Norhayati Rosli, Madihah Salleh & Gerhard-Wilhelm Weber, (2009) "Nonlinear Least Squares Estimation of Stochastic Logistic Model", Proceedings of ICORAFSS 2009, 2-4 June 2009, The ZON Regency Hotel, Johor Bahru, Malaysia. pg44-48, ISBN 978-983-9805-75-8
  12. Mohd.Khairul Bazli Mohd.Aziz, Arifah Bahar, Madihah Salleh, Norhayati Rosli & Haliza Abd.Rahman, "Stochastic Growth of *C.Acetobutylicum*", Proceedings of ICORAFSS 2009, 2-4 June 2009, The ZON Regency Hotel, Johor Bahru, Malaysia. pg146-149, ISBN 978-983-9805-75-8
  13. Arifah Bahar & Xuerong Mao, (2004), Boundedness of Solution to Stochastic Power Law Logistic Equation, Conference on "*Computational and Mathematical Population Dynamics*", 21-25 June 2004, University of Trento, Italy
  14. Arifah Bahar, Ahmad Mahir Razali & Kamaruzaman Sopian, (1999), Predicting The Potential of Energy from Agricultural Wastes in Malaysia, *Proceedings World Renewable Energy Congress*, Palace of The Golden Horses, Kuala Lumpur, 8-11 June 1999

## **ORIGINAL BOOK**

1. Zarina Mohd Khalid, Norazlina Ismail, Norhaiza Ahmad, Noraslinda Mohd Ismail, Arifah Bahar, Ismail Mohamad, Muhammad Hisyam Lee, Muhammad Fauzee Hamdan (2019), *Statistics for Engineers*, UTM Press, ISBN
2. Fadhilah Yusof, Zalina Mohd Daud, Maizah Hura Ahmad, Robiah Adnan, Zarina Mohd Khalid, Arifah Bahar & Norhaiza Ahmad (2009) *Basic Statistics*, Prentice Hall, Selangor, ISBN 978-967-349-033-2

## **BOOK CHAPTER**

1. ZA Aziz, A Bahar (2016), UTM-CIAM: Transformation and Beyond Malaysian Mathematics for Industry Applications, Practical Conceptualization + Mathematics = fruitful Innovation.
2. G.-W. Weber, P. Taylan, Z.-K. Görgülü, H. Abd. Rahman and A. Bahar (2011), "Parameter Estimation in Stochastic Differential Equations" Chapter 50, pp 685-714 of *Dynamics, Games and Science II*.
3. Arifah Bahar, B. A. Khairul & M.S. Madihah, (2008) Boundedness of the Solution of Stochastic Power Law Logistic Model, in *Research in Applied Mathematics* Ed. Zainal Abdul Aziz, Penerbit UTM, ISBN 978-983-52-0606-1.