International Journal of Applied Mathematics
Volume 38 No. 5 2025,
ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version)

Two-Parameter Modified Mishra Distribution

[1]Binod Kumar Sah, [2*]Suresh Kumar Sahani, [3]Arun Kumar Yadav, [4]Lal Babu Sah Telee, [5]Binod Kumar Paswan, [6]Umesh Kumar Yadav

[1]Department of Statistics, R.R.M. Campus, Janakpurdham, Tribhuvan University, Nepal; [2*]Faculty of Science, Technology, and Engineering, Rajarshi Janak University, Janakpurdham, Nepal; [3]Central Department of Statistics, Tribhuvan University, Kirtipur, Kathmandu, Nepal; [4]Department of Management Science, Nepal Commerce Campus, Tribhuvan University, Nepal; [5]Department of Statistics, R.R.M. Campus, Janakpurdham, Tribhuvan University, Nepal; [6]Department of Statistics, M.B.M. Campus, Rajbiraj, Tribhuvan University, Nepal

E-mail address: [1]sah.binod01@gmail.com; [2*]sureshsahani@rju.edu.np ; [3]arunyadav125@gmail.com; [4]lalbabu3131@gmail.com; [5]paswanbinod3@gmail.com; yadavumesh398@gmail.com

Corresponding Author: Suresh Kumar Sahani

Abstract: This distribution is a continuous distribution based on two parameters which is a generalized case of modified Mishra distribution (MMD) of Sah. The characteristics necessary for studying, analyzing and drawing inference from this distribution have been precisely defined and derived. This distribution appears more useful than MMD for statistical modelling of variables related to survival time data.

Keywords: Modified Mishra Distribution, Probability Distribution, Momens, Estimation, Goodness of fit, Modelling.

1.0 Introduction: There is a distinct joy and feeling in the insights gained from studying and researching by following the law of nature. Sah has discovered many new continuous probability distributions that are based on only one parameter, (see, [1] to [7]). The above-mentioned distributions also include Mishra distribution (MD) and modified Mishra distribution (MMD). To generate probability density function of MD and MMD, Sah used the following two different functions respectively.

$$y = (1+u+u^2)e^{-\theta u} \tag{1.1}$$

$$y = (\pi+u+u^2)e^{-\theta u} \tag{1.2}$$

The first equation contains a mathematical constant e, also known as Euler number, is approximately equivalent to 2.718281828. It is an irrational number related to the concept of continuously compounded interest. That is

$$\underset{n\to\infty}{Limit}\left(1+\frac{1}{n}\right)^n \approx 2.718281828 \tag{1.3}$$

The second equation has two irrational numbers, e and π. It is the number which cannot be expressed as a ratio of two integers. The probability distribution based on (1.2) gives more reliable result than based on the first function and it happens only due to an extra addition of another irrational number (π). The probability distributions based on the first and second function, (1.1) and (1.2), were obtained by Sah, known as Mishra distribution and Modified Mishra distribution respectively and their probability density function (pdf) are given by (1.4) and (1.5) respectively.

$$f_1(u,\theta) = \frac{\theta^3}{(\theta^2+\theta+2)}(1+u+u^2)e^{-\theta u} \tag{1.4}$$

Provided that $\theta > 0$ and $u > 0$

$$f_2(u,\theta) = \frac{\theta^3}{(\pi\theta^2+\theta+2)}(\pi+u+u^2)e^{-\theta u} \tag{1.5}$$

Provided that $\theta > 0$ and $u > 0$

Received: August 06, 2025

International Journal of Applied Mathematics
Volume 38 No. 5 2025,
ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version)

Let us consider another function as given in the expression (1.6).

$$y = (\pi + \beta u + u^2)e^{-\theta u} \tag{1.6}$$

Provided that $\theta > 0$ and $u > 0$.

This is a quadratic-exponential function which contains two irrational numbers as well as two parameters θ and β. It is our responsibility to use all information of the data collected and in this process we may need additional parameters in the distribution. We can see that the expression (1.6) has two parameters and the probability distribution based on this function is our proposed distribution named as "Two-Parameter Modified Mishra Distribution" and abbreviated as "TPMMD".

All the necessary characteristics such as Probability density function, Probability distribution function, the moments, estimation of parameters and chi-square goodness of fit have been explained. It has been observed that it gives better goodness of fit for survival time data than MMD.

2.0 Results: The results obtained of this distribution have been presented from (2.1) to (2.5) as follows.

2.1 Probability Density Function, Probability Distribution function and Moment Generating Function of TPMMD: These characteristics have been given by the expression (2.1.1), (2.1.2) and (2.1.3) respectively.

$$f(u) = \frac{\theta^3}{(\pi\theta^2 + \theta\beta + 2)}(\pi + \beta u + u^2)e^{-\theta u} \tag{2.1.1}$$

It is noted that $u > 0$, $\theta > 0$ and $(\pi\theta^2 + \theta\beta + 2) > 0$. When $\beta = 1$ and $\beta = 0$, the expression (2.1.1) is changed into the Probability density function of MMD and New Quadratic-Exponential distribution (NQED) respectively.

Figure-1 It shows probability density function of TPMMD when $\theta = 0.2, 0.4, 0.6, 0.8$ *and* $\beta = -1$

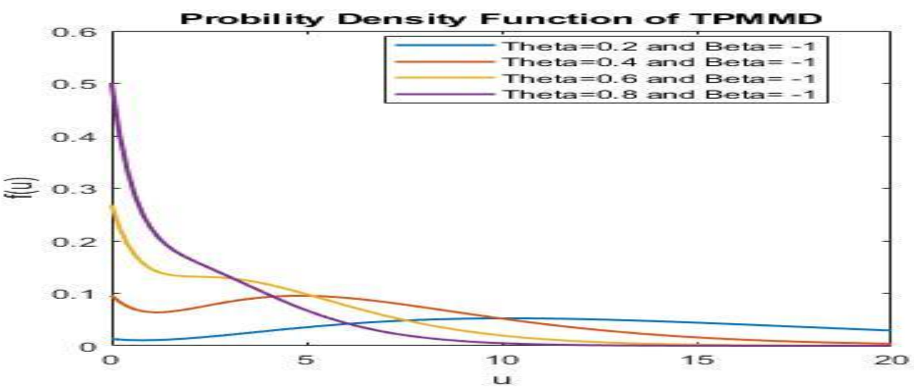
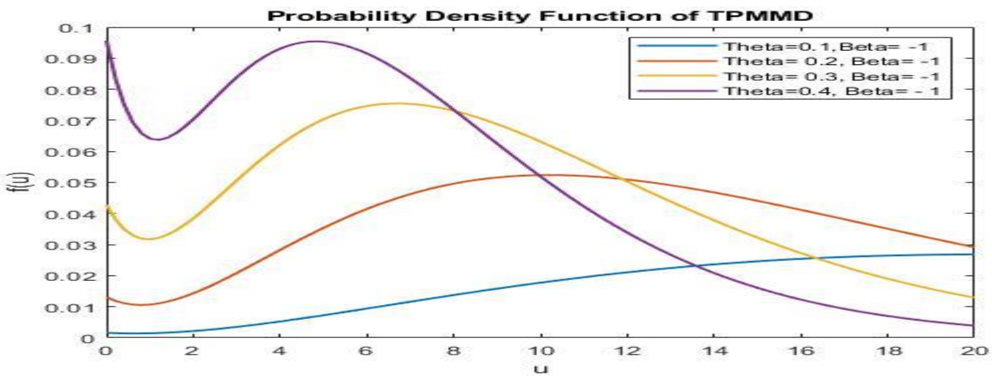
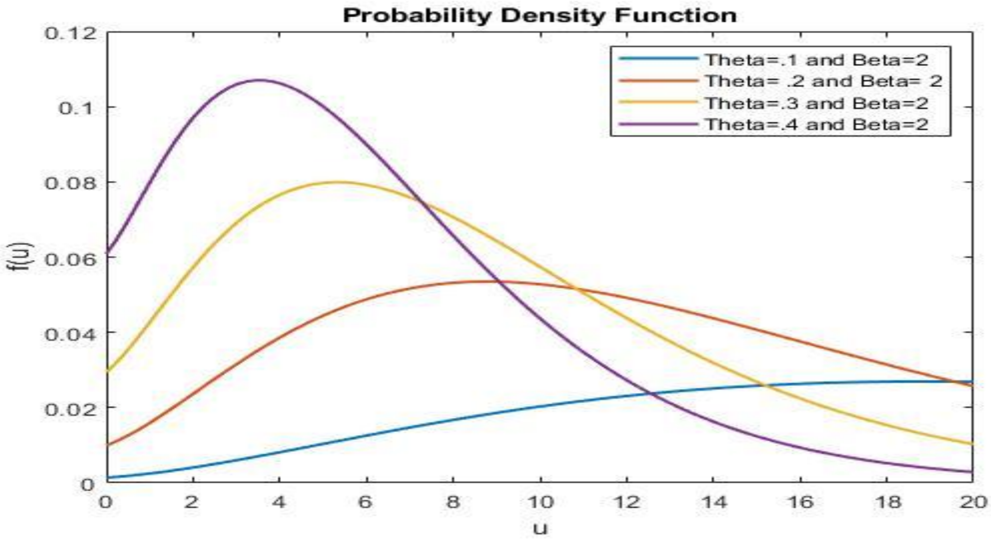


Figure-2 It shows probability density function of TPMMD when $\theta = 0.1, 0.2, 0.3, 0.4$ *and* $\beta = -1$



International Journal of Applied Mathematics
Volume 38 No. 5 2025,
ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version)

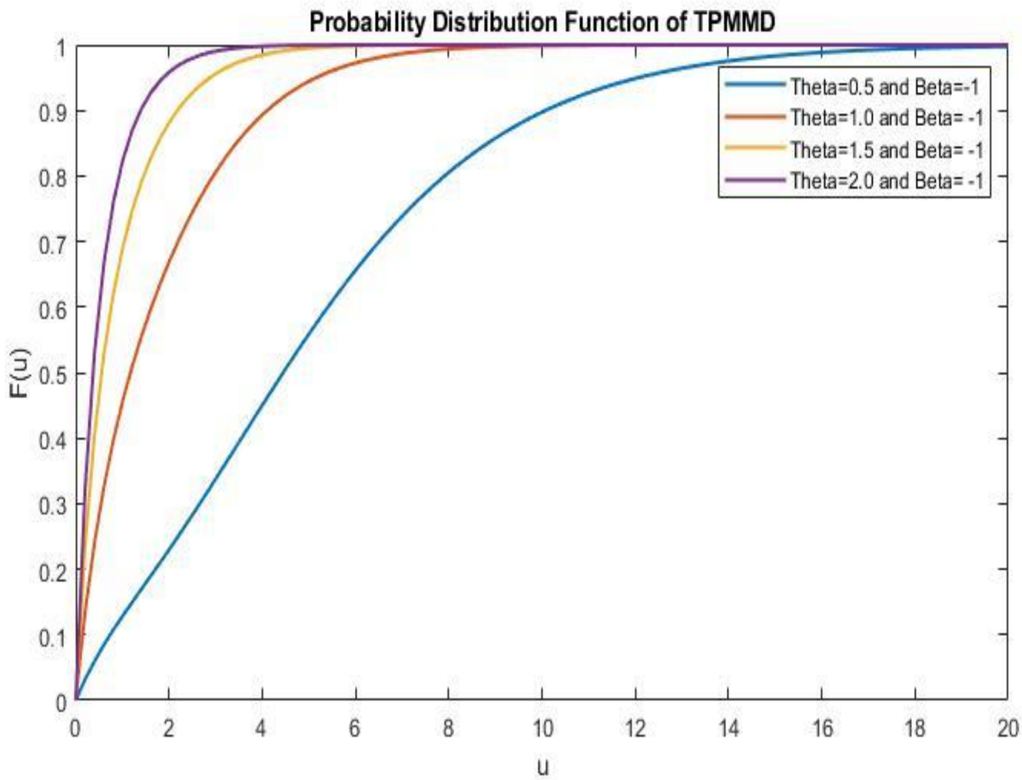
Figure-3 It shows probability density function of TPMMD when $\theta = 0.1, 0.2, 0.3, 0.4$ *and* $\beta = 2$



$$F(U) = \frac{\theta^3}{(\pi\theta^2 + \theta\beta + 2)} \int_0^u (\pi + \beta u + u^2) e^{-u\theta} du$$

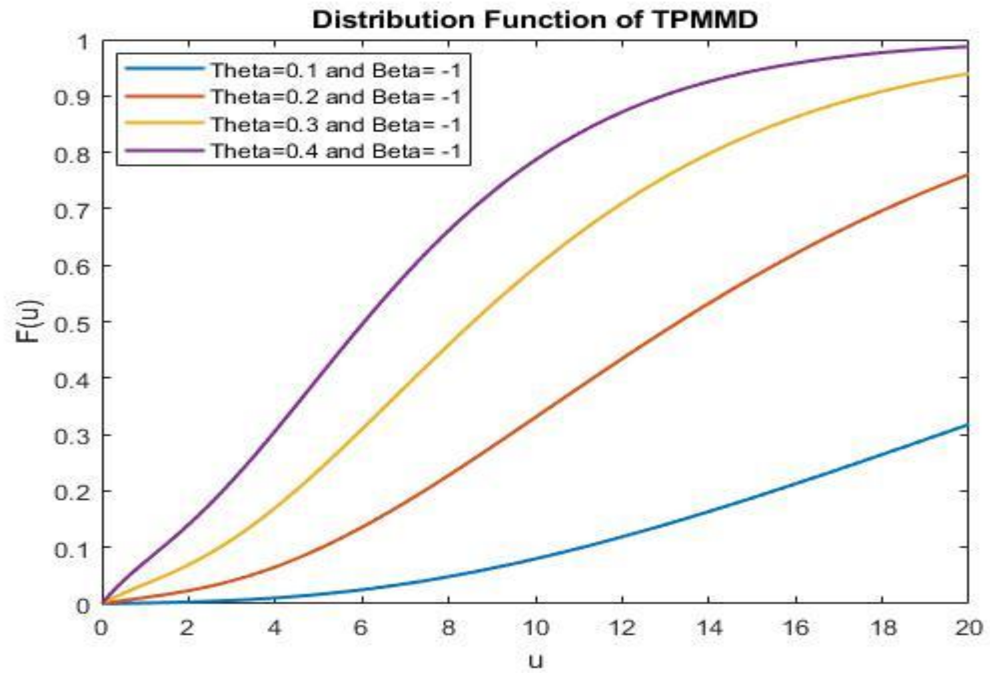
Or, $$F(U) = 1 - e^{\theta u} - \frac{u\theta(\beta\theta + \theta u + 2)}{(\pi\theta^2 + \theta\beta + 2)} e^{-\theta u} \tag{2.1.2}$$

Figure-4 It shows probability distribution function of TPMMD when $\theta = 0.5, 1.0, 1.5, 2.0$ *and* $\beta = -1$



International Journal of Applied Mathematics
Volume 38 No. 5 2025,
ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version)

Figure-5 It shows probability distribution function of TPMMD when $\theta = 0.1, 0.2, 0.3, 0.4$ *and* $\beta = -1$



Moment Generating Function:

$$M_u^{(t)} = E(e^{ut}) = \int_0^\infty e^{tu} f(u)du = \frac{\theta^3}{(2+\theta\beta+\pi\theta^2)} \int_0^\infty (\pi + \beta u + u^2) e^{-\theta u} e^{tu} du$$

Or, $$M_u^{(t)} = \frac{\theta^3}{(2+\theta\beta+\pi\theta^2)} \left[\pi \int_0^\infty e^{-(\theta-t)u} du + \beta \int_0^\infty u e^{-(\theta-t)u} du + \beta \int_0^\infty u^2 e^{-(\theta-t)u} du \right]$$

Or, $$M_u^{(t)} = \frac{\theta^3}{(2+\theta\beta+\pi\theta^2)} \left[\frac{\left\{ \pi(\theta-t)^2 + \beta(\theta-t) + 2 \right\}}{(\theta-t)^3} \right] \tag{2.1.3}$$

2.2 ***Moments of TPMMD:*** The expression (2.2.1) is the general form of the moments about the origin of TPMMD. The expression from (2.2.2) to (2.2.5) are the first four moments about the origin of TPMMD respectively.

$$\mu_r' = \frac{\theta^3}{(\pi\theta^2+\theta\beta+2)} \int_0^\infty (\pi + \beta u + u^2) u^r e^{-\theta u} du$$

Or, $$\mu_r' = \frac{\theta^3}{(\pi\theta^2+\theta\beta+2)} \left[\pi \int_0^\infty u^r e^{-\theta u} du + \beta \int_0^\infty u^{r+1} e^{-\theta u} du + \int_0^\infty u^{r+2} e^{-\theta u} du \right]$$

Or, $$\mu_r' = \frac{r!}{\theta^r} \frac{\left\{ \pi\theta^2 + (r+1)\beta\theta + (r+2)(r+1) \right\}}{(\pi\theta^2+\theta\beta+2)} \tag{2.2.1}$$

$$\mu_1' = \frac{1!}{\theta^1} \frac{\left\{ \pi\theta^2 + (1+1)\beta\theta + (1+2)(1+1) \right\}}{(\pi\theta^2+\theta\beta+2)}$$

Or, $$\mu_1' = \frac{1}{\theta} \frac{(\pi\theta^2 + 2\beta\theta + 6)}{(\pi\theta^2+\theta\beta+2)} \tag{2.2.2}$$

International Journal of Applied Mathematics
Volume 38 No. 5 2025,
ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version)

$$\mu_2' = \frac{2!}{\theta^2}\frac{\{\pi\theta^2 + (2+1)\beta\theta + (2+2)(2+1)\}}{(\pi\theta^2 + \theta\beta + 2)}$$

Or, $$\mu_2' = \frac{2}{\theta^2}\frac{(\pi\theta^2 + 3\beta\theta + 12)}{(\pi\theta^2 + \theta\beta + 2)} \quad (2.2.3)$$

$$\mu_3' = \frac{3!}{\theta^3}\frac{\{\pi\theta^2 + (3+1)\beta\theta + (3+2)(3+1)\}}{(\pi\theta^2 + \theta\beta + 2)}$$

Or, $$\mu_3' = \frac{6}{\theta^3}\frac{(\pi\theta^2 + 4\beta\theta + 20)}{(\pi\theta^2 + \theta\beta + 2)} \quad (2.2.4)$$

$$\mu_4' = \frac{r!}{\theta^r}\frac{\{\pi\theta^2 + (4+1)\beta\theta + (4+2)(4+1)\}}{(\pi\theta^2 + \theta\beta + 2)}$$

Or, $$\mu_4' = \frac{24}{\theta^4}\frac{(\pi\theta^2 + 5\beta\theta + 30)}{(\pi\theta^2 + \theta\beta + 2)} \quad (2.2.5)$$

The expression from (2.2.6) to (2.2.8) are the second, third and fourth moments about the mean of TPMMD respectively.

$$\mu_2 = \left[\frac{2}{\theta^2}\frac{(\pi\theta^2 + 3\beta\theta + 12)}{(\pi\theta^2 + \theta\beta + 2)}\right] - \left[\frac{1}{\theta}\frac{(\pi\theta^2 + 2\beta\theta + 6)}{(\pi\theta^2 + \theta\beta + 2)}\right]^2$$

Or, $$\mu_2 = \left[\frac{2(\pi\theta^2 + 3\beta\theta + 12)(\pi\theta^2 + \theta\beta + 2) - (\pi\theta^2 + 2\beta\theta + 6)^2}{\theta^2(\pi\theta^2 + \theta\beta + 2)^2}\right]$$

Or, $$\mu_2 = \frac{(\pi^2\theta^4 + 4\pi\beta\theta^3 + 16\pi\theta^2 + 2\theta^2\beta^2 + 12\beta\theta + 12)}{(\pi\theta^3 + \theta^2\beta + 2\theta)^2} \quad (2.2.6)$$

$$\mu_3 = \left[\frac{6}{\theta^3}\frac{(\pi\theta^2 + 4\beta\theta + 20)}{(\pi\theta^2 + \theta\beta + 2)}\right] - 3\left[\frac{2}{\theta^2}\frac{(\pi\theta^2 + 3\beta\theta + 12)}{(\pi\theta^2 + \theta\beta + 2)}\right]\left[\frac{1}{\theta}\frac{(\pi\theta^2 + 2\beta\theta + 6)}{(\pi\theta^2 + \theta\beta + 2)}\right] + 2\left[\frac{1}{\theta}\frac{(\pi\theta^2 + 2\beta\theta + 6)}{(\pi\theta^2 + \theta\beta + 2)}\right]^3$$

Or, $$\mu_3 = \left[\frac{\begin{array}{l}6(\pi\theta^2 + 4\beta\theta + 20)(\pi\theta^2 + \theta\beta + 2)^2 - 6(\pi\theta^2 + 3\beta\theta + 12)(\pi\theta^2 + 2\beta\theta + 6)(\pi\theta^2 + \theta\beta + 2)\\ +2(\pi\theta^2 + 2\beta\theta + 6)^3\end{array}}{\theta^3(\pi\theta^2 + \theta\beta + 2)^3}\right]$$

Or, $$\mu_3 = \left[\frac{\begin{array}{l}(2\pi^3\theta^6 + 12\pi^2\theta^5\beta + 12\pi\beta^2\theta^4 + 60\pi^2\theta^4 + 4\theta^3\beta^3 + 84\pi\beta\theta^3 + 36\theta^2\beta^2 + 72\pi\theta^2\\ +72\theta\beta + 48)\end{array}}{(\pi\theta^3 + \theta^2\beta + 2\theta)^3}\right] \quad (2.2.7)$$

$$\mu_4 = \left[\frac{24}{\theta^4}\frac{(\pi\theta^2 + 5\beta\theta + 30)}{(\pi\theta^2 + \theta\beta + 2)}\right] - 4\left[\frac{6}{\theta^3}\frac{(\pi\theta^2 + 4\beta\theta + 20)}{(\pi\theta^2 + \theta\beta + 2)}\right]\left[\frac{1}{\theta}\frac{(\pi\theta^2 + 2\beta\theta + 6)}{(\pi\theta^2 + \theta\beta + 2)}\right]$$
$$+6\left[\frac{2}{\theta^2}\frac{(\pi\theta^2 + 3\beta\theta + 12)}{(\pi\theta^2 + \theta\beta + 2)}\right]\left[\frac{1}{\theta}\frac{(\pi\theta^2 + 2\beta\theta + 6)}{(\pi\theta^2 + \theta\beta + 2)}\right]^2 - 3\left[\frac{1}{\theta}\frac{(\pi\theta^2 + 2\beta\theta + 6)}{(\pi\theta^2 + \theta\beta + 2)}\right]^4$$

Received: August 06, 2025

$$\text{Or, } \mu_4 = \left[\frac{\begin{array}{l} 24(\pi\theta^2 + 5\beta\theta + 30)(\pi\theta^2 + \theta\beta + 2)^3 - 24(\pi\theta^2 + 4\beta\theta + 20)(\pi\theta^2 + 2\beta\theta + 6) \\ (\pi\theta^2 + \theta\beta + 2)^2 + 12(\pi\theta^2 + 3\beta\theta + 12)(\pi\theta^2 + 2\beta\theta + 6)^2(\pi\theta^2 + \theta\beta + 2) - 3(\pi\theta^2 + 2\beta\theta + 6)^4 \end{array}}{\theta^4(\pi\theta^2 + \theta\beta + 2)^4} \right]$$

$$\text{Or, } \mu_4 = \left[\frac{\begin{array}{l} 9\pi^4\theta^8 + 72\pi^3\theta^7\beta + 384\pi^3\theta^6 + 132\pi^2\theta^6\beta^2 + 96\pi\theta^5\beta^3 + 1032\pi^2\theta^5\beta + 1224\pi^2\theta^4 \\ +24\theta^4\beta^4 + 960\pi\theta^4\beta^2 + 288\theta^3\beta^3 + 2304\pi\theta^3\beta + 1728\pi\theta^2 \\ +1008\beta^2\theta^2 + 1440\beta\theta + 720 \end{array}}{\theta^4(\pi\theta^2 + \theta\beta + 2)^4} \right] \quad (2.2.8)$$

2.3 ***Co-efficient of Skewness and Kurtosis:*** The expression (2.3.1) and (2.3.2) are the co-efficient of skewness and kurtosis of TPMMD respectively.

$$\gamma_1 = \frac{\begin{array}{l} (2\pi^3\theta^6 + 12\pi^2\theta^5\beta + 12\pi\beta^2\theta^4 + 60\pi^2\theta^4 + 4\theta^3\beta^3 + 84\pi\beta\theta^3 + 36\theta^2\beta^2 + 72\pi\theta^2 \\ +72\theta\beta + 48) \end{array}}{(\pi^2\theta^4 + 4\pi\beta\theta^3 + 16\pi\theta^2 + 2\theta^2\beta^2 + 12\beta\theta + 12)^{3/2}} \quad (2.3.1)$$

As $\theta \to 0, \gamma_1 \to 2/(\sqrt{3})$ and as $\theta \to \infty, \gamma_1 \to \infty$. Hence, $\left\{2/(\sqrt{3})\right\} < \gamma_1 < \infty$. It is positively skewed.

$$\beta_2 = \frac{\begin{array}{l} (9\pi^4\theta^8 + 72\pi^3\theta^7\beta + 384\pi^3\theta^6 + 132\pi^2\theta^6\beta^2 + 96\pi\theta^5\beta^3 + 1032\pi^2\theta^5\beta + 1224\pi^2\theta^4 \\ +24\theta^4\beta^4 + 960\pi\theta^4\beta^2 + 288\theta^3\beta^3 + 2304\pi\theta^3\beta + 1728\pi\theta^2 \\ +1008\beta^2\theta^2 + 1440\beta\theta + 720) \end{array}}{(\pi^2\theta^4 + 4\pi\beta\theta^3 + 16\pi\theta^2 + 2\theta^2\beta^2 + 12\beta\theta + 12)^2} \quad (2.3.2)$$

As $\theta \to 0, \beta_2 \to 5$ and as $\theta \to \infty, \beta_2 \to \infty$. Hence, $5 < \beta_2 < \infty$. It is Leptokurtic.

2.4 ***Nature of Dispersion:*** The proposed distribution will be over-dispersed if

$$\left[\frac{(\pi^2\theta^4 + 4\pi\beta\theta^3 + 16\pi\theta^2 + 2\theta^2\beta^2 + 12\beta\theta + 12)}{(\pi\theta^3 + \theta^2\beta + 2\theta)^2} \right] > \left[\frac{1}{\theta} \frac{(\pi\theta^2 + 2\beta\theta + 6)}{(\pi\theta^2 + \theta\beta + 2)} \right]$$

$$\text{Or, } \left[(\pi^2\theta^4 + 4\pi\beta\theta^3 + 16\pi\theta^2 + 2\theta^2\beta^2 + 12\beta\theta + 12) \right] > \left[\theta(\pi\theta^2 + \theta\beta + 2)(\pi\theta^2 + 2\beta\theta + 6) \right]$$

$$\text{Or, } \left\{ \left[(\pi^2\theta^4 + 4\pi\beta\theta^3 + 16\pi\theta^2 + 2\theta^2\beta^2 + 12\beta\theta + 12) \right] - \left[\theta(\pi\theta^2 + \theta\beta + 2)(\pi\theta^2 + 2\beta\theta + 6) \right] \right\} > 0$$

$$\text{Or, } \begin{array}{l} (\pi^2\theta^4 + 4\pi\beta\theta^3 + 16\pi\theta^2 + 2\theta^2\beta^2 + 12\beta\theta + 12 - \pi^2\theta^5 - 8\pi\theta^3 - 3\pi\theta^4\beta - 2\theta^3\beta^2 \\ -10\theta^2\beta - 12\theta) > 0 \end{array} \quad (2.4.1)$$

Index of Dispersion:

$$Index\ of\ Dispersion = \frac{\sigma^2}{\mu} = \frac{(\pi^2\theta^4 + 4\pi\beta\theta^3 + 16\pi\theta^2 + 2\theta^2\beta^2 + 12\beta\theta + 12)}{\theta(\pi\theta^2 + 2\beta\theta + 6)(\pi\theta^2 + \theta\beta + 2)} \quad (2.4.2)$$

This distribution will be Equi-dispersed if index of dispersion is equal to one, Under-dispersed if index of dispersion is less than one and Over-dispersed if index of dispersion is greater than one.

2.5 ***Hazard Rate Function, Reliability Function and Mean Residual Life Function of TPMMD***: These functions for TPMMD are denoted by $h(u), R(u = t)$ and $m(u = t)$ respectively and given by the expression (2.5.1), (2.5.4) and (2.5.5) respectively.

International Journal of Applied Mathematics
Volume 38 No. 5 2025,
ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version)

$$h(u)=\frac{f(u)}{[1-F(u)]}=\frac{\theta^3(\pi+\beta u+u^2)}{\left\{(\pi\theta^2+\theta\beta+2)+\theta u(\theta u+\theta\beta+2)\right\}} \tag{2.5.1}$$

$$h(u=t)=\frac{\theta^3(\pi+\beta t+t^2)}{\left\{(\pi\theta^2+\theta\beta+2)+\theta t(\theta t+\theta\beta+2)\right\}} \tag{2.5.2}$$

$$h(u=t=0)=\frac{\pi\theta^3}{\left\{(\pi\theta^2+\theta\beta+2)\right\}} \tag{2.5.3}$$

The expression (2.5.3) shows it is increasing function of u as well as θ.

$$R(u=t)=1-F(u)=\frac{\left\{(\pi\theta^2+\theta\beta+2)+\theta t(\theta t+\theta\beta+2)\right\}}{(\pi\theta^2+\theta\beta+2)}e^{-\theta t} \tag{2.5.4}$$

At $t\to 0, R(t)\to 1$ and at $t\to\infty, R(t)\to 0$. i.e. $R(t)\propto 1/t$.

Figure-6 It shows Reliability function of TPMMD when $\theta=0.5,1.0,1.5,2.0\,and\;\beta=-1$

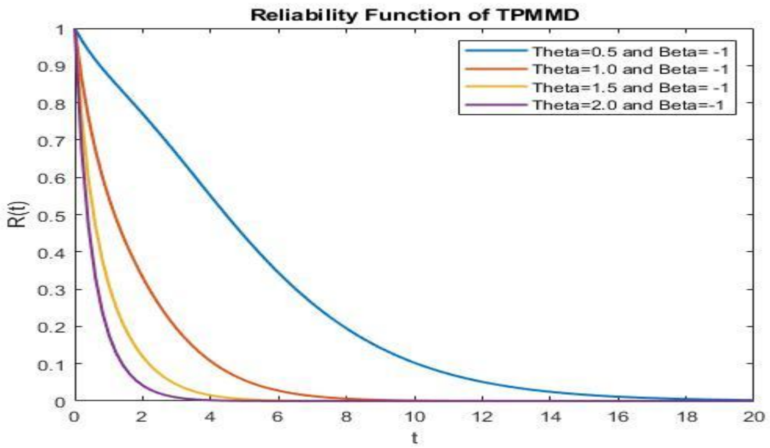
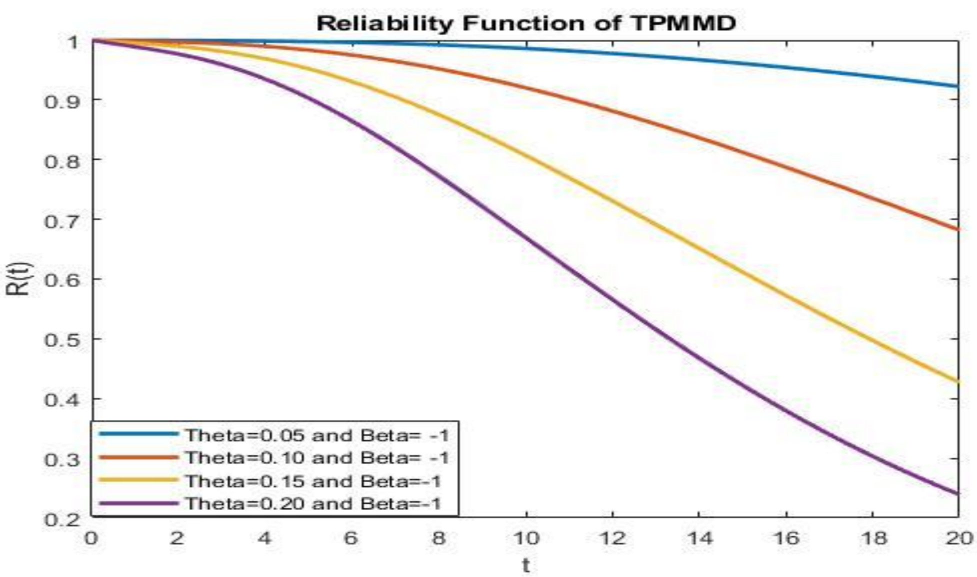


Figure-7 It shows Reliability function of TPMMD when $\theta=0.05,0.1,0.15,0.20\,and\;\beta=-1$



ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version)

$$m(u) = \frac{\left\{(\pi\theta^2 + \theta\beta + 2) + (\theta^2 u^2 + 2u\theta + 2) + (\theta\beta + 2)(\theta u + 1)\right\}}{\theta\left\{(\pi\theta^2 + \theta\beta + 2) + \theta u(\theta u + \theta\beta + 2)\right\}} \tag{2.5.5}$$

$$m(u=0) = \frac{\left\{(\pi\theta^2 + 2\theta\beta + 6)\right\}}{\theta\left\{(\pi\theta^2 + \theta\beta + 2)\right\}} \tag{2.5.6}$$

The expression (2.5.6) is the mean of TPMMD.

2.6 ***Estimation of Parameters of TPMMD:*** This distribution has two parameters, α and β, which can be estimated by different estimation techniques but we are going to use method of moments (MoM) only with the help of first and second moments about the origin of TPMMD which have already been defined by the expression (2.2.2) and (2.2.3). From the expression (2.2.2.), $\hat{\beta}$ is an estimator of β which can be obtained by using (2.6.1)

$$\beta(2\theta - \mu_1'\theta^2) = (\mu_1'\pi\theta^3 - \pi\theta^2 + 2\mu_1'\theta - 6)$$

Or, $\hat{\beta} = \dfrac{(\mu_1'\pi\theta^3 - \pi\theta^2 + 2\mu_1'\theta - 6)}{(2\theta - \mu_1'\theta^2)}$

Replacing μ_1' (Population mean) by $\bar{u}$ (Sample mean).

$$\hat{\beta} = \frac{(\bar{u}\pi\theta^3 - \pi\theta^2 + 2\bar{u}\theta - 6)}{(2\theta - \bar{u}\theta^2)} \tag{2.6.1}$$

Substituting the value of β in the expression (2.2.3) and replacing μ_2' by s^2, we get an estimate of α which is given by the expression (2.6.2) as

$$\pi s^2\theta^4 - 4\pi\bar{u}\theta^3 - 2s^2\theta^2 + 2\pi\theta^2 + 12\bar{u}\theta - 12 = 0 \tag{2.6.2}$$

3.0 Applications of TPMMD: It may be applicable to fit the data related to survival life time of animate or inanimate variables. Here, we apply chi-square goodness of fit test to mortality grouped data of blackbirds' species reported by Paranjpe and Rajarsi [8].

Table-1

Survival Time (in days)	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	>8
Observed Frequency	192	60	50	20	12	7	6	3	2

Table 2- This table contains observed frequency and expected frequency based on MMD and TPMMD based on

Table-1.

Survival Time (in days)	**Observed Frequency**	**Theoretical Frequency**			
		LD	**MD**	**MMD**	**TMMD**
0-1	192	173.5	142.8	165.0	173.9
1-2	60	98.6	104.5	83.3	74.2
2-3	50	46.5	58.7	51.9	45.2
3-4	20	20.1	27.5	27.4	27.6
4-5	12	8.1	11.5	13.4	15.5
5-6	7	3.2	4.5	6.2	8.1
6-7	6	1.4	1.6	2.8	4.0

7-8	3	0.4	0.5	1.2	1.9
>8	2	0.3	0.4	0.8	1.6
Total	352	352.0	352.0	352.0	352.0
$\hat{\theta}$	-	.984	1.311017	1.10616888	1.05261
$\hat{\beta}$	-	-	-	-	-1.179541
$d.f.$	-	4	4	5	4
$\chi_{d.f.}^{2}$	-	49.85	46.37	17.60	8.36
$P-value$	-	0.0001	0.0001	0.0035	0.0792

5.0 Findings:

* From table-2, It is concluded that this proposed distribution may be a better alternation to LD, MD and MMD for statistical modelling of similar kind of survival life data.

* It is positively skewed distribution.

* It is Leptokurtic by size.

Conflict of Interest:

This paper is written without any vested interests of authors.

Acknowledgement:

Our gratitude to everyone who contributed to improving the quality of this paper.

References:

[1] Lindley, D.V. (1958): Fiducial Distributions and Bayes' Theorem. *Journal of the Royal Statistical Society*, Series B, 20, 102- 107.

[2] Sah, B.K. (2015): Mishra Distribution. *International Journal of Mathematics and Statistics Invention*, 3(8), 14-17.

[3] Sah, B.K. (2022): Modified Mishra Distribution. *The Mathematics Education*, 56(2), 1-17. https://doi.org/10.5281/zenodo.7024719

[4] Sah, B.K. (2022): Quadratic-exponential distribution. *The Mathematics Education*, 56(1), 01-17. http://doi.org/10.5281/zenedo.6381529.

[5] Mishra, A and Sah, B.K. (2016): A Generalized Exponential-Lindely Distribution. *Recent Advances in Mathematic, Statistics and Computer Science*, 229-238. https://doi.org/10.1142/9789814704830_0021

[6] Sah, B.K. and Sahani, S.K. (2022): New Quadratic-exponential distribution. *Journal of Pharmaceutical Negative Results*, 13(4), 2338-2351. doi: 10.47750/pnr.2022.13. S04.289

[7] Sah, B.K. and Sahani, S.K. (2022): Polynomial-exponential distribution. *Mathematical Statistician and Engineering Applications*, 71(4), 2474-2486.

[8] Paranjpe, S. and Rajarshi, M.B. (1986): Modeling of Non-monotonic Survivorship with Bath Tube Distribution, *Ecology*, 67(6), 1693-1695. doi:10.2307/1939102.