ภาคผนวก ข.

รายละเอียดขั้นตอนวิธีการคำนวณค่าต่าง ๆ ที่เกิดขึ้นในกระบวนการผลิตแบบ Shutdown Process สามารถแสดงให้เห็นได้ดัง Flow chart ที่แสดงถึงความสัมพันธ์กันของคำสั่งต่าง ๆ ที่มีอยู่ทั้งหมดของโปรแกรมภาษา C # โดยใช้เครื่องมือช่วยเขียนจาก Microsoft Visual Basic Studio 2008 ซึ่งรายละเอียดของตัวโปรแกรมสามารถพิจารณาได้จาก Coding

Coding

```
using      System;
using      System.Collections.Generic;
using      System.ComponentModel;
using      System.Data;
using      System.Drawing;
using      System.Text;
using      System.Windows.Forms;
using      System.Diagnostics;
using      System.Reflection;
using      System.IO;
namespace  Shutdown
{
public partial class Form1 : Form
{
#region              declare attribute.
private double       lamda;
private double       g;
private double       D;
private double       V;
private double       b;
private double       c;
private double       W;
private double       C1;
private double       C2;
private double       n0;
private double       n1;
private double       p0;
private double       S;
private double       T;
private double       A;
private double       delta = 3;
public               Form1()
{
InitializeComponent();
}
#endregion
#region utilities function
private double Factorial(double number)
{
if (number <= 1.00)
return 1.00;
else
return number * Factorial(number - 1.00);
}
private void ToExcel_Click(object sender, EventArgs e)
```

```
{
using (SaveFileDialog saveFileDialog = GetExcelSaveFileDialog())
{
if (saveFileDialog.ShowDialog(this) == DialogResult.OK)
{
string fileName = saveFileDialog.FileName;
ExporterDataGridVersExcel(this.dataGridView1, fileName);
Process.Start(fileName);
}
}
}
private SaveFileDialog GetExcelSaveFileDialog()
{
SaveFileDialog saveFileDialog   = new SaveFileDialog();
saveFileDialog.CheckPathExists  = true;
saveFileDialog.AddExtension     = true;
saveFileDialog.ValidateNames    = true;
saveFileDialog.InitialDirectory =
Environment.GetFolderPath(Environment.SpecialFolder.Desktop);
saveFileDialog.DefaultExt       = ".xls";
saveFileDialog.Filter           = "Microsoft Excel Workbook (*.csv)|*.csv";
return saveFileDialog;
}
public void ExporterDataGridVersExcel(DataGridView dgView, String fileName)
{
try
{
//Create the CSV file to which grid data will be exported.
StreamWriter sw = new StreamWriter(fileName, false);
//First we will write the headers.
int iColCount = dgView.ColumnCount;
int i = 0;
foreach (DataGridViewColumn ch in dgView.Columns)
{
sw.Write(ch.Name.Replace("DataGridViewTextBoxColumn", "").Trim());
if (i < iColCount - 1)
{
sw.Write(",");
}
i++;
}
sw.Write(sw.NewLine);
//Now write all the rows.
foreach (DataGridViewRow uneLigne in dgView.Rows)
{
i = 0;
foreach (DataGridViewColumn uneColonne in dgView.Columns)
{
sw.Write("'" + uneLigne.Cells[uneColonne.Name].Value.ToString().Trim());
if (i < iColCount - 1)
{
sw.Write(",");
}
i++;
}
sw.Write(sw.NewLine);
}
sw.Close();
}
catch (Exception ex)
{
MessageBox.Show(ex.ToString());
}
}
```

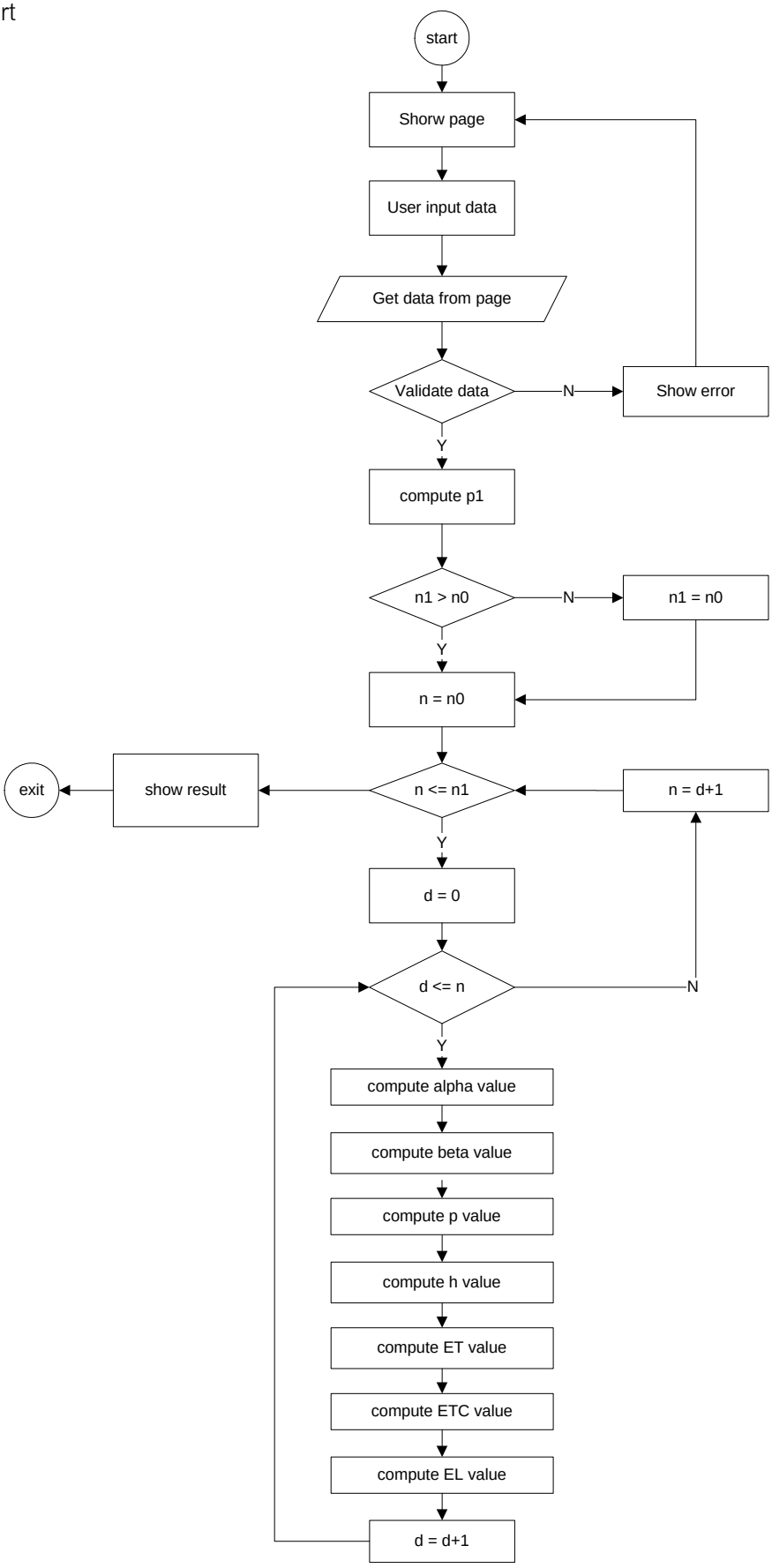
```
#endregion
private void RetrieveInformation()
{
string msg = "";
if (this.LBOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า lamda\n";
if (this.GBOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า g\n";
if (this.DBOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า d\n";
if (this.VBOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า V\n";
if (this.BBOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า b\n";
if (this.CBOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า c\n";
if (this.WBOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า W\n";
if (this.C1BOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า C1\n";
if (this.C2BOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า C2\n";
if (this.N0BOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า n0\n";
if (this.P0BOX.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า p0\n";
if (this.SBox.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า S\n";
if (this.TBox.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า T\n";
if (this.ABox.Text.ToString().Trim().Length < 1)
msg += "ยังไม่ระบุค่า A\n";
if (msg.Length > 1)
throw new Exception(msg);
try
{
this.lamda = Convert.ToDouble(LBOX.Text.ToString().Trim());
this.g     = Convert.ToDouble(GBOX.Text.ToString().Trim());
this.D     = Convert.ToDouble(DBOX.Text.ToString().Trim());
this.V     = Convert.ToDouble(VBOX.Text.ToString().Trim());
this.b     = Convert.ToDouble(BBOX.Text.ToString().Trim());
this.c     = Convert.ToDouble(CBOX.Text.ToString().Trim());
this.W     = Convert.ToDouble(WBOX.Text.ToString().Trim());
this.C1    = Convert.ToDouble(C1BOX.Text.ToString().Trim());
this.C2    = Convert.ToDouble(C2BOX.Text.ToString().Trim());
this.n0    = Convert.ToDouble(N0BOX.Text.ToString().Trim());
this.p0    = Convert.ToDouble(P0BOX.Text.ToString().Trim());
this.S     = Convert.ToDouble(SBox.Text.ToString().Trim());
this.T     = Convert.ToDouble(TBox.Text.ToString().Trim());
this.A     = Convert.ToDouble(ABox.Text.ToString().Trim());
if (N1BOX.Text.ToString().Trim().Length > 0)
this.n1 = Convert.ToDouble(N1BOX.Text.ToString().Trim());
```

```
else
this.n1 = -1;
}
catch (Exception) { throw new Exception("ข้อมูลไม่ถูกต้อง กรุณาตรวจสอบอีกครั้ง!\n"); }
}
private void ComputeNow_Click(object sender, EventArgs e)
{
double a             = 0.00;
double beta          = 0.00;
double p             = 0.00;
double h             = 0.00;
double EL            = 0.00;
double aOld          = 0.00;
double betaOld       = 0.00;
double pOld          = 0.00;
double hOld          = 0.00;
double ELOld         = 0.00;
resultsBindingSource.Clear();
//step0 get variable value from form. and validate it.
this.RetrieveInformation();
//เป็นค่าที่ต้องคำนวณเพื่อใช้ในสมการที่ 4
double p1 = p0 + (delta * Math.Sqrt(p0 * (1.00 - p0)));
//loop for increase n number.
if (n1 > n0) //คำนวนและแสดงค่าแบบช่วง
{
for (double n = n0; n <= n1; n++)
{
for (double d = 0.00; d <= n; d++)
{
if (d == n)
{
resultsBindingSource.Add(new Results(n, hOld, d, ELOld, aOld, betaOld));
continue;
}
a          = GetAlpha(n, d);
beta       = GetBeta(n, d);
p          = GetPN(n, d, p1);
h          = GetHN(n, p, a);
EL         = GetEL(n, h, d, a, p);
if (a > 0 && beta > 0 && p > 0 && h > 0 && EL > 0)
{
resultsBindingSource.Add(new Results(n, h, d, EL, a, beta));
aOld       = a;
betaOld    = beta;
pOld       = p;
hOld       = h;
ELOld      = EL;
}
else
{
resultsBindingSource.Add(new Results(n, hOld, d, ELOld, aOld, betaOld));
}
}
}
}
else  //คำนวนและแสดงค่าเฉพาะที่ค่า n0 เท่านั้น
{
for (double d = 0.00; d <= n0; d++)
{
if (d == n0)
{
```

```
resultsBindingSource.Add(new Results(n0, hOld, d, ELOld, aOld, betaOld));
continue;
}
a          = GetAlpha(n0, d);
beta       = GetBeta(n0, d);
p          = GetPN(n0, d, p1);
h          = GetHN(n0, p, a);
EL         = GetEL(n0, h, d, a, p);
if (a > 0 && beta > 0 && p > 0 && h > 0 && EL > 0)
{
resultsBindingSource.Add(new Results(n0, h, d, EL, a, beta));
aOld       = a;
betaOld    = beta;
pOld       = p;
hOld       = h;
ELOld      = EL;
}
else
{
resultsBindingSource.Add(new Results(n0, hOld, d, ELOld, aOld, betaOld));
}
}
}
}
private double FactorialMultiply(double n, double x, double multiply)
{
if (n < 2.00)
return multiply;
if (n == x)
throw new Exception("Can not compute value at n==d");
double fac1 = multiply;
double start = x + 1.00;
double stopdevice = n - x;
for (double i = start; i <= n; i++)
fac1 = fac1 * i;
for (double j = 1.00; j <= stopdevice; j++)
fac1 = fac1/j;
return fac1;
}
private double Power(double numBase, double power)
{
double r = 1.00;
power = power+1;
for (double i = 1.00; i < power; i++)
r = r * numBase;
return r;
}
private double GetAlpha(double n, double d)
{
double al = 0.00;
for (double x = 0.00; x <= d; x++)
al += (FactorialMultiply(n, x, (Power(p0, x) * Power(1.00 - p0, n - x))));
return 1.00 - al;
}
private double GetBeta(double n, double d)
{
double beta = 0.00;
for (double x = 0.00; x <= d; x++)
beta += (FactorialMultiply(n, x, (Power(1.00-p0, x) * Power(p0, n - x))));
return beta;
}
private double GetPN(double n, double d, double p1)
{
double p = 0.00;
```

```
for (double x = 0.00; x <= d; x++)
p += (FactorialMultiply(n, x, (Power(p1, x) * Power(1.00 - p1, n - x))));
return 1.00 - p;
}
private double GetHN(double n, double p, double a)
{
return Math.Sqrt((a * (C1 + C2) + (b + ((c * n)*(g * n + 1.00)))) / (lamda *
V * ((1.00 / p) - (0.5))));
}
private double GetEL(double n, double h, double d, double a, double p)
{
return (GetETC(n,h,d,a,p) / GetET(h,h,d,a,p));
}
private double GetETC(double n, double h, double d, double a, double p)
{
double talk          = (h/2.00)-((lamda*h*h)/12.00);
double duncan        = GetTDuncan(h, p, n);
double part1         = (b + (c * n)) * (duncan / h);
double part2         = (C1 * p) + (C2 * duncan * a) + W;
double part3         = V * ((h/p) - talk + (g * n) + D);
double part4         = T * ( ((A * a)/(lamda * h)) + D + S );
return ( part1 + part2 +  part3 + part4 );
}
private double GetTDuncan(double h, double p, double n)
{
return ((1.00 / lamda) + h * ((1.00 / p) - 0.5 + (lamda * h / 12.00)) + (g *
n));
}
private double GetET(double n, double h, double d, double a, double p)
{
return ((1.00 / lamda) + h * ((1.00 / p) - 0.5 + (lamda * h / 12.00)) + (g *
n) + (A * (a / (lamda * h))) + D + S);
}
}
}
```

Flow Chart


start
Shorw page
User input data
Get data from page
Validate data
N
Show error
Y
compute p1
n1 > n0
N
n1 = n0
Y
n = n0
exit
show result
n <= n1
n = d+1
Y
d = 0
d <= n
N
Y
compute alpha value
compute beta value
compute p value
compute h value
compute ET value
compute ETC value
compute EL value
d = d+1